LONDON

21-23 November 1977

Session 4

Management Information Systems for Strategic Planning and Resources Allocation

Chairman: Allan Bell

SYMPOSIUM OF TECHNOLOGY IN MODERN POLICE FORCES

Management Information Systems

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LIST OF CONTENTS

THE PROBLEMS OF POLICE ORGANISATIONS

1. In the examination of information needs and the desire for some form of management information system, police management must define its objectives and clearly understand how the organisation actually functions, as opposed to how it is intended or generally thought to function.

In any bureaucracy each level of command and responsibility is designed to operate in an ascending order of decision-making, relative to the importance of those decisions to the objectives of the organisation. Hence a system of rules and guidelines often in printed form, which is published as an aide memoire and working rule book by the organisation for its members.

More so than other bureaucratic organisations the Police Service is concerned with the environment and the people in it, which is constantly changing in the character of criminal and social behaviour. In such an atmosphere a strict set of operating rules may tend to inhibit rather than increase the efficiency of the personnel. Therefore to minimise bad decision making, adhering strictly to the letter of the law or explicitly following an instruction, initiative and discretion are allowed where the written instruction and the overall objective of the police organisation are at variance. It is of fundamental importance therefore when looking to establish a comprehensive system of management information that the initial analysis is concerned with how the organisation actually functions rather than how it was planned, expected to function or generally believed to function.

TACTICAL AND STRATEGIC POLICE OPERATIONS

2. Although there are distinct differences between tactical and strategic police operations the information of the tactical system is essential for longer term planning and prediction. Indeed a considerable element of strategic planning will be concerned with the ability of the Police Force to respond tactically to future situations. Therefore any comprehensive system of Police Management Information will need all available data on the tactical demands and effectiveness of its resources. To this initial and essential information, will be added other information from a number of sources until a comprehensive data base of information is available for analysis prediction and subsequent resource deployment.

2.1 Tactical Operations The Command and Control computerised systems have been designed to meet this important police operational requirement but there are two important areas of information from them that need to be analysed in the longer term. Firstly the amount of public generated demand for police resources at varying times of the day, day of the week and month of the year. In Great Britain we have probably the most highly developed system of communication between police and public through the 999 emergency call system, whereby from any telephone in any part of the country a member of the public can make an emergency call to a police operations centre without any cost, in the quickest possible time. This priority service over the public telephone network produces in some urban areas at peak times, such a volume of emergency calls requiring immediate police response, that almost all available police tactical resources are needed to respond. Any system of management information must therefore be able to predict such levels of public generated response

in order that sufficient tactical units are available to meet public demand and can respond within acceptable time scales.

The other main element of police tactical operations is preventive patrolling where officers on foot and in vehicles all equipped with either personal or vehicle radio systems patrols defined geographical areas to prevent and detect crimes to provide a visible deterrent and maintain personal contact with the public. A management information system should be able, through the information data base on reported crime, accidents and other information be able to give a positive indication to the management of geographical areas where the police patrolling presence will be most effective. In this way the patrolling officer's attention is drawn to those areas on his beat where crime is most likely to occur at certain times and where he can be most successful in achieving his objectives.

The preventive patrolling side of police uniformed activity occupies the majority of time for tactical policing throughout Great Britain and only when public generated demands exceed certain levels that the patrolling system ceases to operate and then only for comparatively short periods.

2.2 Strategic Operations I have stressed the close relationship between the information derived from tactical operations being used as a basis for strategic policing. We now need to add information concerning reported crime, by exact location, time of day, day of week etc and other information concerning the movements and whereabouts of suspected or know active criminals. A similar approach is necessary concerning information on accidents and anti-social behaviour occurrences. Another element of valuable information is that obtained from the public by way of complaint, telephone, letter and other non-emergency methods. In fact all the relevant information which comes to police attention from a variety of sources, is needed to form the comprehensive data base on which an effective management information system depends.

THE MANAGEMENT INFORMATION SYSTEM

3. The advantages of using a computer for such a system are its accuracy and speed. A computer can cull information from ongoing activities without additional administrative work, indeed it is arguable that without a computer many of the applications would require an unacceptable level of manpower to operate, and even then could not give the information required within an acceptable time scale. The object of the system should be to obtain the most effective use of police resources by detailed analyses of function and demand.

The environment and the people in it are constantly changing, police priorities tend to change with greater or lesser emphasis being given to differing categories of crime and anti-social behaviour. The attitudes of police and public tend to change regarding the commission of certain offences, and this is reflected in a priority rating given to different categories of offences. New legislation is constantly being introduced, and all these factors need to be accommodated by a management information system which must br flexible, produce information in a form which is understood by all levels of management within the organisation, and be credible and

advantageous to the operational efficiency of police personnel. Policing a modern society is a complex task, it cannot be accomplished without adequate information. A Police Force needs properly designed systems to present that information in such a way that it can be understood and used in the decision making process of the police organisation.

TECHNOLOGY AND THE POLICE ORGANISATION

4. A Police Force when contemplating the introduction of computerised systems must be prepared to dedicate sufficient manpower at senior level to the project. There are a number of distinct phases during the project, and often a senior management decision will be required at each stage. The police input will vary as the stages progress towards completion of the project, but will be particularly relevant at the early stages of the feasibility study and preparing the operational requirement, which will describe the police objectives the system will be required to fulfil.

The following stages of system design, testing, implementation and evaluation will require expert help and guidance which the Police Force is unlikely to possess. To achieve this essential merging of police knowledge and scientific expertise the services of a consultative agency is desirable from the inception of the project. In the United Kingdom Police Forces are fortunate in having a Government Agency available for this purpose. The Home Office Scientific Development Branch is organised and equipped to work with Police Forces from the outset, for without their knowledge and expertise and complex phases of system design testing and implementation would be beyond the competence of many Forces. The Home Office scientist also provides a valuable link with manufacturers, and his knowledge of available hardware and software ensures the Force obtains the equipment best suited to their needs in the most cost effective way.

Inevitably with the introduction of any new system of management information, the existing organisational structure, needs to be examined and often this will give an opportunity to chief officers to improve and change aspects of the organisation, which without the introduction of the new system would not have been viable.

It is important that the ramifications of the system be considered and anticipated, and that comprehensive training is given at all levels in skills required to operate and use the system. Training programmes should run parallel to the phased development of the project, to ensure that when the system is operating, all levels of the organisation are competent and familiar with its working.

The system is designed primarily for management use and consequently management training in the use of the system will produce the greatest benefits for the organisation. Basically management information will be provided in two distinct forms viz the routine or on-going supply of certain information and the ability of an on demand facility for specific management problems and decisions.

The routine supply of management information will normally consist of print-outs of incidents, crimes, accidents and patrol strengths for the past 24 hours of operational duty. This will be the essential basic information that police management will need for the day to day appraisal and knowledge. The on-demand

facility will encompass almost every permutation and correlation of the total information contained in the data base. For example, if police management wants to examine a particular geographical area, however large or small, the on-demand facility can be used over whatever time period needs to be examined. The skill in using the on-demand facility will depend on the individual manager's knowledge of the system, what information it contains, and how he can use its analytical and forecasting abilities.

In the complex world of modern policing the right information at the right time and in readily understandable form, is essential for good and effective decision making. The overriding aim of all Police Forces is to use its resources to maximum effectiveness. The monitoring of operational effectiveness against the backcloth of a changing environment needs a comprehensive system of management information designed to meet that need. Without such systems the standard of police management decision making will be less than acceptable which is a situation no Police Force should allow to happen.

65493

SYMPOSIUM ON TECHNOLOGY IN MODERN POLICE FORCES

Home Office Sponsored Management Information Systems

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LIST OF CONTENTS

INTRODUCTION

1. The purpose of a management information system is to provide managers, in this case police officers, with appropriate data in an acceptable format, to assist them in carrying out their management functions of decision-making and planning with greater efficiency. Managers act on the basis of information relating to the performance of the organisation for which they are responsible and their actions can be satisfactory only if this information is accurate, relevant, timely and properly presented. It is obviously necessary, before embarking upon the design of management information systems, to consider the process of management and to consider what managers do. Basically their job is one of decision-making and these decisions relate to short, medium or long term events. In the latter cases they involve planning and making estimates of the situation as it will be at some future time.

The information required by police managers for short term decision-making may include such facts as the nature of the workload and its location and the availability of resources and their location. The provision and analysis of such short term information forms the first part of the development programme being undertaken by the Home Office.

Planning decisions require future events and situations to be forecast by the extrapolation of historic data in order to take account of anticipated changes in workload and the availability of resources to deal with it.

Forecasting is often, of necessity, done intuitively but the advent of police operational computer systems has made possible the collection of accurate and reliable historical data and allowed the use of well understood mathematical forecasting methods to provide more reliable estimates. Forecasting models are well understood but often their use and interpretation requires skills and time that managers do not have. It is not satisfactory to simply process data through standard statistical packages and pass it to operational policement. Interpretation and proper presentation is absolutely essential.

This is the second stage of the work programme and it is possible that this stage may provide for an interactive mode of operation where the manager will be able to alter the relative importance of different items of data and be presented with the likely consequences of different courses of action.

The third and final stage of the work is the development of resource deployment models that allow police managers to decide on the best response to a situation when constraints such as limited resources have been taken into account. Ideally such models will be interactive and will be used by the police through on-line computer terminals.

TRAFFIC MANAGEMENT SYSTEMS

2. Together with UK industry the Home Office has done a substantial amount of work related to the first part of this programme covering aspects of traffic and uniform (patrol) policing. In the case of the traffic management information project, data is collected at some 20 sites distributed over an area about 1400 square

kilometers in the English county of Sussex. The sites are located at places selected by the local police in areas where there are traffic speed limits. They are designed to give information about traffic on major routes and traffic behaviour at places of high accident risk. Each site has inductive loop sensors set into the road surface and connected to a road-side cabinet equipped with mains electricity supply, a telephone line connected to the public switched network and a traffic-data collection unit. This unit has detection circuitry which generates pulses when vehicles enter and leave the loop sensors; a microprocessor which is programmed to calculate the speed and lengty of each vehicle and gaps between vehicles and a random access memory which stores the vehicle data.

A mini-computer, with an autodial unit, polls the data collection sites at half or one hour intervals (sites can be called more frequently if required) and the stored data is transmitted to the central computer over the public switched telephone network.

The central computer calculates various data including traffic flow, mean traffic spread and standard deviation and the percentage of vehicles exceeding the speed limit. This data is then stored in a random access file and twenty-eight days of data are held on line. Access to the files can be gained from police stations at Chichester and Worthing by means of visual display units. An interactive dialogue is used and the data can be displayed in a number of tabular or graphical forms. The dialogue specifies the sites for which information is required; directions of traffic flow, dates, times of day and the type of data required. The visual display units are equipped with thermal printers for making printed copy when required.

Regular checks are carried out to ensure that the system is functioning correctly and it is recalibrated if this is necessary. These checks include comparison with manual counts and radar speed checks at the roadside.

This system and the information that it provides can clearly be used in a number of ways. It can help to access the response by drivers to various police tactics such as warning signs or police presence and estimate the effect of these tactics on driver behaviour. It can be used, together with models of traffic behaviour which have also been developed, to predict accident risks. On the basis of this data, it is possible to schedule the limited police resources available so as to minimise the accident potential in the prevailing traffic situation, both by changes in actual deployment and by a change in emphasis of the specific activities of the resources.

UNIFORM BRANCH MANAGEMENT SYSTEMS

3. Two separate projects deal with the management information requirements of the Uniform Branch of the Police Service. These projects are located in Dorset and Strathclyde.

3.1 The Dorset System. The system being developed for the Dorset Police comprises a number of sub-systems, each designed to produce a particular type of management information. Details of crimes, accidents and arrests are collected directly from police stations by means of visual display or teleprinter terminals and this dispenses with cumbersome manual systems, enabling direct production of operational and statistical reports. One year's crime and stolen property information

is held on line to facilitate follow-up enquiries. Personnel and Duty States sub-systems are linked and provide a detailed personal record of each officer, together with his predicted duties and absences. Trial duty state formulations up to six weeks in advance are prepared by the computer and these are scrutinised and modified as necessary by supervisory officers. Projections of manpower availability for up to twelve months in advance are available on demand and the computer assists the scheduling of training by producing lists of personnel eligible for the various courses.

Resource activities, calls for service and accidents are classified by command and patrol areas as a guide to the deployment of resources and performance measures such as response times and detection rates are regularly reviewed by senior officers.

Most management reports are of the 'regular', 'exception' or 'on-demand' variety but an easy-to-use file enquiry package has also been incorporated to assist with particular requirements.

The computer system comprises two mini-computers, each with main and exchangeable disk storage and was designed to meet the police needs of high through-put and very high reliability. In normal operations one computer handles the police communications network, while the other runs the application tasks of incident logging, crime reporting etc. Critical parts of the computer and communications equipment are duplicated for high reliability and it is possible to continue operating even if some components fail.

Telephone lines link the dedicated police computer with the Dorset County Council mainframe computer which is used for some storage and processing functions.

3.2 The Strathclyde System A more general approach to management information systems is being taken by the Strathclyde Police. The computerised command and control system is the means by which the operational data is obtained and details of incidents, crimes and the activity status of resources are collected. All the necessary processing of this data is carried out by the same two mini-computers that perform the command and control functions and thirty-two types of report are produced, comprising maps, tables and lists of incidents and crimes; workloads and resource activities. Ten reports are produced daily and ten periodically. Twelve are provided at the request of police officers.

Substantial use is now made of management information by those forces that have the means to capture the basic data about their operational activites. It is to be expected that as more forces get operational computer systems MIS will become more widespread.

We indend to continue with our programme of work to develop reliable systems that are able to make full use of the accurate data about police operations that is now available.

65494

SYMPOSIUM ON TECHNOLOGY IN MODERN POLICE FORCE

The Acquisition and Development of a Management Information System

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SUMMARY

A Management Information System provides wide ranging information, on all branches of a Police Force, for medium and long-term planning purposes. Computer assisted Command and Control may be seen as an essential sub-system of a MIS.

Two major options for the acquisition of a MIS are:-

(1) To enhance an existing Command and Control system, or

(2) To front-end a mainframe computer (owned for example by Local Government) with a police-dedicated mini-computer.

Both of these approaches have advantages and disadvantages which are discussed in the paper. The final choice will depend on the precise requirements of each Police Force.

A MIS must be regarded as an evolving system - during its lifetime additional facilities will be added as greater understanding is gained regarding police effectiveness and management information requirements. A gradual approach to system implementation enables the costs to be contained within limited annual budgets.

Human Factors considerations are of major importance in the design and implementation of the system. The information provided should meet users' requirements and be easily accessible. The solutions to most of the human factors problems encountered lie in the involvement of the ultimate system users in design stages and the provision of appropriate training.

British Industry has gained considerable experience in meeting the varying requirements of UK Police Forces and is now in a position to implement an effective system to meet the requirements of any Police Force.

LIST OF CONTENTS

INTRODUCTION

1. The previous paper described a number of Management Information Systems (MIS) being developed by the Home Office in conjunction with British Industry. This paper considers how a Police Force might approach the acquisition and progressive development of such a system. It also highlights a number of important considerations to be made in this process.

Before turning to this theme, however, a number of general comments are made concerning Management Information Systems.

MANAGEMENT INFORMATION SYSTEMS

2. It is important to bear in mind a number of characteristics of Management Information Systems which distinguish them from the Command and Control Systems described in an earlier session:-

(1) Much wider ranging information is provided for long-term planning purposes, i.e. whereas the Management Information available on a Command and Control System includes a variety of short term tactical and limited strategic information, the MIS addresses the total requirements of strategic decision makers.

(2) The whole Force, CID, Traffic, Uniformed and Administrative branches at all levels is considered.

(3) The information gathered allows some probing of fundamental questions concerning internal Force matters, e.g. organisation and efficiency, and external duties.

The computer assisted Command and Control system may be seen as an essential sub-system within a MIS, since it provides a continuous log of calls for assistance, resource availabilities and deployments. However, more information is required before a full analysis of criminal activities and police effectiveness can be made.

The manual gathering of information for analysis is often prohibitively expensive, time consuming and viewed as additional drudgery by those asked to produce it by completing even more forms. However, in the case of an Information System, the costs can be contained within limited budgets. Also the gathering of information does not imply more bureaucracy but is of immediate value to operational policemen since it satisfies the needs for better communications and greater accessibility of information.

ACQUISITION OF A MANAGEMENT INFORMATION SYSTEM

3. Two major options for the acquisition of a MIS are exemplified by the systems described in Mr. Holt's paper.

3.1 Option 1 Use of a Command and Control Computer (as in Strathclyde) A force may have decided to acquire a police-dedicated command and control facility as an early phase within an overall plan for automation. The Strathclyde configuration is shown in Figure 1. Such a system would have the desirable properties of good security of data and high system availability. It would also have an initial data bank containing information on all calls for assistance and resource deployments.

Usually ample spare computing capacity would be available for the incorporation of additional management information applications. Since these applications would include the analysis of long-term patterns and trends, magnetic tape facilities and possibly additional core space would be required.

A potential disadvantage is that the type of real-time computer usually provided for Command and Control may not have the sophisticated data processing software which is available on mainframe computers. Consequently, the development of Management Information application programmes should be carefully planned to ensure that the capacity of the system is not exceeded.

3.2 Option 2 Use of a Mainframe Allied to a Police Dedicated Computer (as in Dorset) Some forces may have certain administrative programs already running on a large Government or Local Authority mainframe computer. These might include details of road traffic accidents, crime reports, pay and personnel records which would provide a valuable foundation for the development of a more comprehensive Management Information System. However, mainframe computers have certain severe disadvantages when used for police work:-

(1) They provide limited availability.

(2) They tend to be orientated towards batch processing rather than on-line enquiry.

(3) They can prove to be costly when used for low throughput enquiry purposes.

To overcome these disadvantages, the solution adopted in Dorset is to have a dedicated, dual processor, mini-computer system linked to a large Local Government computer, Figure 2. In this way, the advantages of 24-hour a day on-line enquiry and high availability are provided at low cost. Also, the link to the mainframe computer allows its sophisticated software to be used for Management report generation and other purposes. The data base at the police dedicated computer is short-term (of the order of 7 days to one year) whilst longer term data can be stored economically on magnetic tape or large disk files at the mainframe.

Although the main reason for developing a system of this nature is to provide immediate access to comprehensive information for Management purposes, the autonomous, police-dedicated mini-computer allows Command and Control to be incorporated as a sub-system.

Both of the options described above have a number of advantages. The choice between them must obviously depend on Force requirements and the types of police

system thought to be of more immediate value. With careful planning, either system could develop into the other and British Industry has the capability to advise on the most effective route to take.

SUBSEQUENT SYSTEM DEVELOPMENT

4. It may be desired for a number of reasons (one of which is obviously the availability of funding) to implement a Management Information System progressively voer a number of years. This has the advantage of enabling later development to be planned in the light of experience gained in the use of the system.

A Management Information System can be designed so that additional facilities can be added over a period of time. Figure 3 provides examples of sub-systems which should be implemented progressively. Most of them have been included in the systems described in the previous papers. However, two of them, traffic management and criminal information, are worthy of further comment. They are discussed in the Appendices.

Even if a progressive approach to system development is not adopted, a Management Information System must be viewed as an evolving system. During the life of the system more knowledge will be gained concerning the interaction between the police and the public and of the effectiveness of the police in achieving their objectives. This will lead to the need for additional information, alternative analyses, experimentation and, perhaps most significantly, different deployments of resources.

Certainly, new application programs will be produced throughout the lifetime of an MIS project; more powerful computer systems may be acquired and new devices for man-machine communications may be developed. This evolution should be planned and British Industry, with experience of the different requirements of UK police forces, can assist a Force to develop its strategic plan, adapt existing systems and implement the new system to meet its specific requirements.

IMPORTANT CONSIDERATIONS IN SYSTEM DESIGN AND IMPLEMENTATION

5. Finally, this paper discusses human factors and training considerations both of which are of considerable importance to the successful implementation and operation of a Management Information System.

5.1 Human Factors In many areas of application, Management Information Systems have failed through lack of understanding of users' requirements and of the human and organisational aspects involved.

Management reports, particularly at the 'strategic' level, are traditionally troublesome. The system should provide information which is genuinely required by Managers in order to increase the effectiveness of the Force. However, it has been argued that Managers suffer from too much irrelevant information rather than too little information. Consequently, systems which add to the amount of irrelevant information can be expected to fail. A major characteristic of UK systems is that a manager may obtain information when he requires it by making an on-line enquiry using a VDU. He is not subject to masses of printed reports which may be of little value to his immediate requirements.

There is, of course, the problem that Managers themselves may not agree on what information is relevant and may have widely varying expectations of a computerised information system. An exhaustive design exercise, in which all potential users participate fully, is clearly an essential preliminary to final system design and implementation.

Human factors problems can be particularly acute in real-time systems; examples have been documented showing how failure to consider the characteristics and expectations of terminal operators led to the failure of sophisticated systems. In one case, the dialogue employed was too difficult to learn (relying on operators rembering long lists of codes). In another, the operators found the simple step-by-step conversational mode employed to be too time comsuming and frustrating. Operator procedures must therefore be designed most carefully.

Resistance to change is a phenomenon common to most organisations and, in the short term, it is likely that those whose jobs are most intimately affected by the computer (control room staff and senior and middle management) will offer the most resistance. Certainly, the involvement of these groups in the design of the system and the provision of appropriate training will help to produce the motivation and co-operation necessary for the successful implementation and operation of the system.

In the longer term, resistance may be expected from changes resulting indirectly from the introduction of the system, as managers act upon the information produced. Such changes might include redeployment of resources from low crime (typically rural) areas to high crime (typically urban) areas, adjustments to shift systems to make them more demand-orientated, and rationalisation in the use of specialists. Success here will be very dependent upon the committment and skill of the management and the co-operation of the work force.

Finally, it must be recognised that changes in Management styles and techniques are implied in the introduction of a Management Information System. The need to evaluate and plan for the future on the basis of more objective data is the essence of such a system. Inevitably certain Managers will devote more of their time to longer term planning and evaluation, and less to day to day operations. These changes must be planned in parallel with the development of the system and, through selection, training and in-job development, personnel must be motivated and provided with the skills required by their new roles.

5.2 Training As indicated above, training is of vital importance in the implementation and subsequent development of the system.

The whole force must be familiarised with the concepts and values of the system and be given realistic expectations of its performance and benefits:-

(1) Police Officers who will use the system operationally must be taught how to use it properly.

(2) Supervisory staff and computer system operators have to be shown the routines of computer systems and trained to deal with emergency situations and the unexpected.

(3) Police Management may require training in interpreting the reports generated and in making the most effective use of the system's facilities.

These training programmes require heavy involvement of the Force at all levels and its total co-operation in making personnel available for training at the appropriate time.

The system itself can be used as a training aid and on-line training facilities are provided in UK implementations. This training should, of course, be reinforced with classroom tuition and seminars. Various forms of communication media, e.g. video tapes, pre-recording, news sheets etc, should be thoroughly exploited.

CONCLUDING REMARKS

6. The timescale for the development of a comprehensive MIS must be measured in years rather than months. Thus the costs, when spread over the total duration of a project can be contained within limited annual budgets. The costs may be contained further by:-

(1) Enhancing the existing communications and Command and Control facilities, or

(2) Adapting the advantages of a mainframe computer with an autonomous front-end processor.

Experience within the UK indicates that, if a Command and Control or MIS system is to be totally successful, it must be designed to meet the specific needs of an individual Police Force, it is not sufficient to impose a standard solution irrespective of a Force's precise requirements. Consequently, the systems being implemented by British Industry, although having much in common, have been tailored to meet the requirements of individual Forces.

It is ultimately the responsibility of Police Management to ensure that the introduction and subsequent operation of any system are justifiable both economically and in terms of the morale of police personnel. System evaluation must be performed continually to ensure that the expected benefits are realised and to identify the need for changes to existing facilities and the introduction of new ones.

A Management Information System provides a Police Force with the total picture of Police activities and the requirements placed upon them. It thus allows a rational and objective appraisal of objectives and performance. This, combined with the changes in management styles and techniaues required for the effective operation of the system, represents the major benefit of an automated Management Information System.

British Industry has gained considerable experience in meeting the varying requirements of UK Police Forces and feels confident that it can implement an effective system to meet the precise needs of any Police Force.

APPENDIX 1

TRAFFIC MANAGEMENT SUB-SYSTEM

The traffic management system, described by Mr. Holt, was designed primarily as a research facility for studying the relations between police activities, traffic behaviour and accidents. However, it could become a sub-system of a Management Information System and be used for the following purposes:-

(1) To identify abnormal traffic behaviour on key routes (in a timescale which would enable a police response to be made).

(2) To predict future traffic patterns (on the basis of past observations) which would enable the deployment of Traffic Police resources to be planned in advance.

(3) To evaluate and monitor the effectiveness of police activities in influencing undesirable aspects of driver behaviour. This would provide Managers with a better understanding of the effect of police activities and thus stimulate the design of more effective traffic policing activities. It might also lead to adjustments in the mix of resources employed for traffic policing.

APPENDIX 2

CRIMINAL INFORMATION SUB-SYSTEM

A criminal information sub-system would be employed primarily to provide information in support of police operations rather than for Management Information purposes. It would enable a Force to obtain much more benefit from the information kept on criminals, their associates and their activities. The use of a computer would enable much greater manipulation, e.g. updating, cross referencing, indexing and searching, of the data than is possible with the manual methods normally employed. The sub-system would comprise a structured data base containing files holding cross-referenced information including:-

(1) Information which would identify a person as an unique individual in the context of criminal operations (names, alias, description etc).

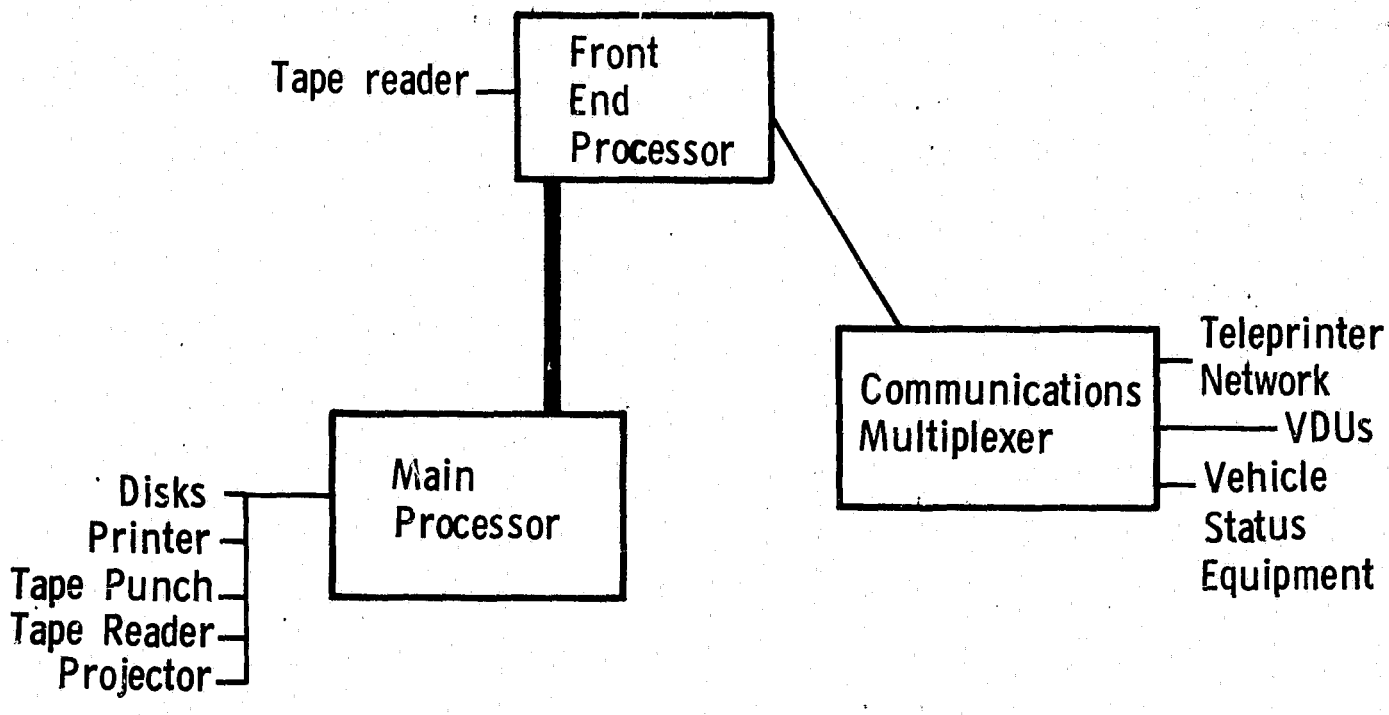
(2) Vehicle information (including known users).

(3) Place information (geographic reference and information relevant to the place).

(4) Information about crimes.

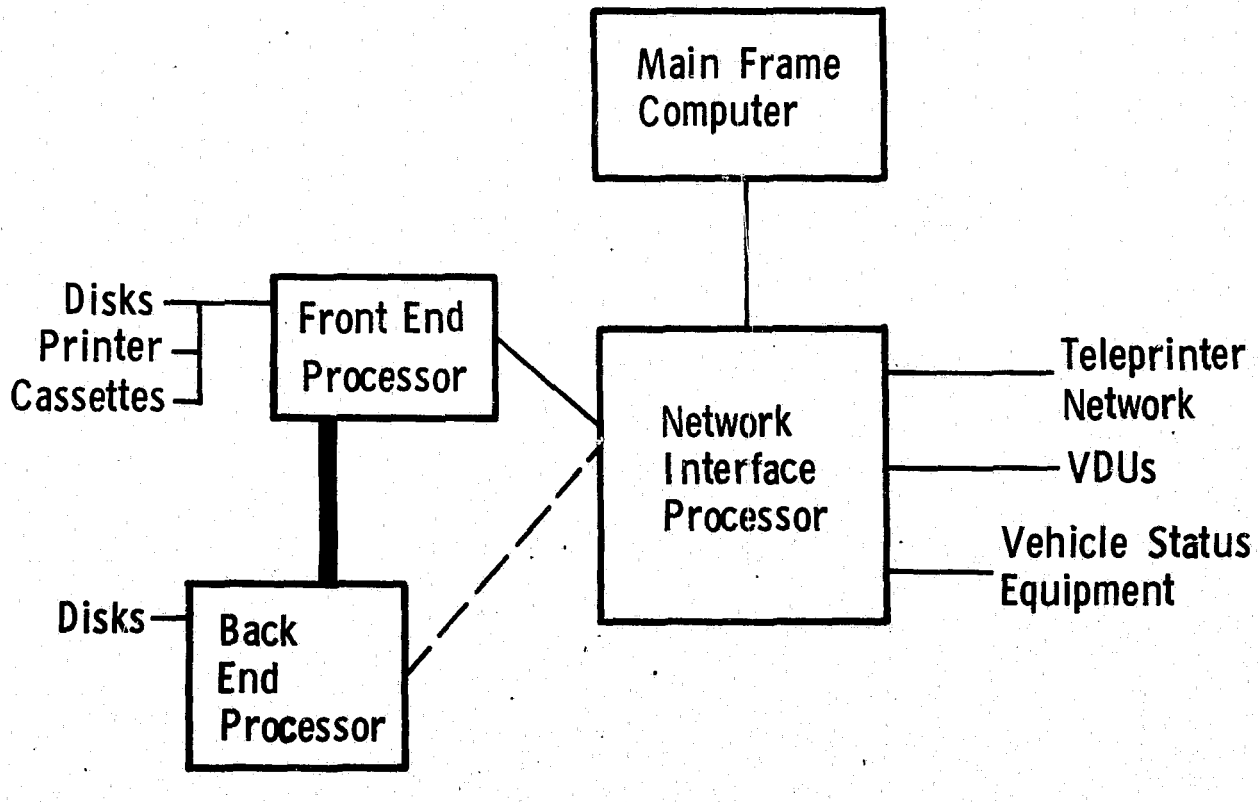
(5) Chronological information on all relevant occurrences.

Extensive on-line search facilities would be available. The use of equivalent terms could be provided so that a search for a 'blue-eyed person' could also include, say, those with blue-grey, grey and blue-green eyes.



Typical Configuration For Option 1. (Strathclyde)

Figure 1.



Typical Configuration For Option 2 (Dorset)

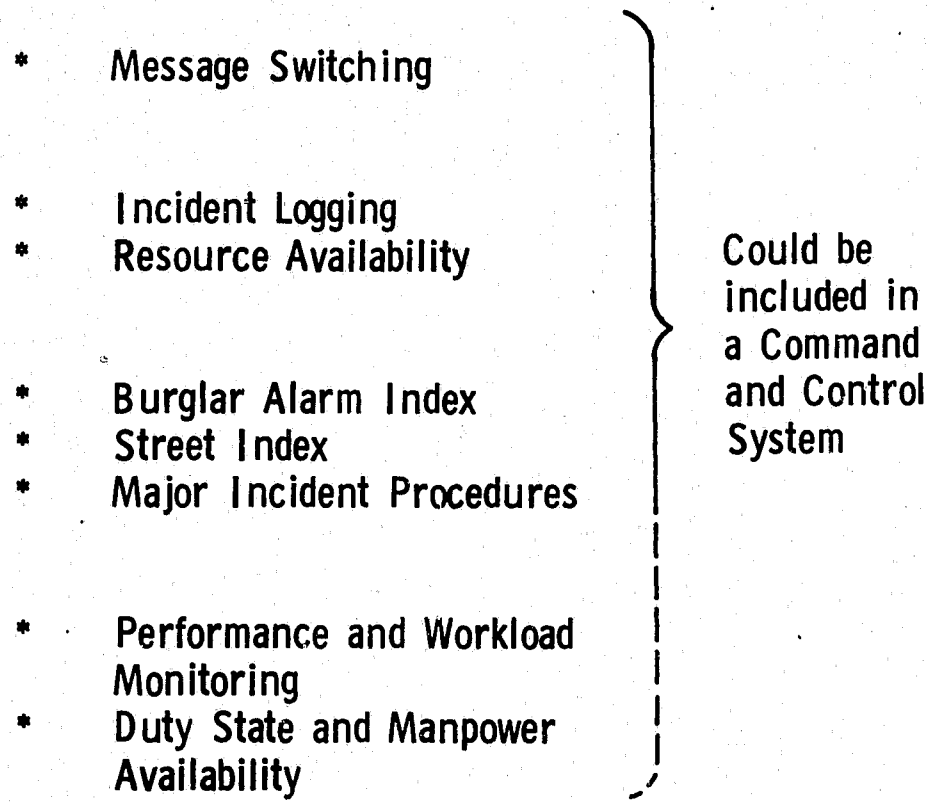


FIGURE 3 SUB-SYSTEMS OF A MANAGEMENT INFORMATION SYSTEM

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