THE USE OF GEOGRAPHICAL INFORMATION IN LOCAL AUTHORITY PLANNING DEPARTMENTS

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by

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SUMMARY

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Information is perceived to be a vital resource by most organisations. In the case of local authority planning departments the majority of the information utilised has a geographical component. Technological advances in the last ten years have made it practical for most planning authorities in Britain to store and process a substantial proportion of their data needs using computers. However, despite the removal of many of the technical barriers which inhibited the development of computer based systems the experiences of planning authorities have been mixed.

With these considerations in mind the research examines three areas which are regarded as likely to influence the effective utilisation of geographical information by planning authorities. These are firstly, factors affecting the development of automated systems, secondly, the role of information in the process of formulating planning policies and thirdly, factors directly influencing the utilisation of information including automated data. The investigation explores through empirical studies the validity of a range of theoretical perspectives which have sought to describe and explain the use of information in organisations. The conceptual framework underlying the research draws on the findings of a series of major studies based in local government in the United States undertaken by the Public Policy Research Organisation of the University of California at Irvine. The framework suggests technology and more particularly the utilisation of information is embedded within the social

and political processes of organisations. Three groups of organisational factors are identified as significantly influencing the experiences of local authorities. These are: (i) the organisational context; (ii) people; and (iii) change and instability.

The empirical investigations are based on the findings of two in depth case studies undertaken in Hertfordshire County Council and Glasgow District Council. A two stage case study approach was adopted. The methods utilised include exploratory and semi-structured interviews, an analysis of existing documentation, attendance at meetings and observation of the activities of the department.

The research findings support the arguments underlying the conceptual framework that organisational factors have a significant impact on the development of computer based systems and the utilisation of geographical information in planning authorities. The link between information and policy making was found to be complex with information often performing tactical, background and even political roles rather than the substantive function often assumed by systems designers. These findings also have important implications for planning practice. Given the significance of human, institutional and organisational considerations to the effective utilisation of geographical information a user centred strategy is proposed. This approach provides a framework which enables the social and political as well as technical nature of computer based systems to be incorporated into the development process. With these considerations in mind there is a need for further work which explores the impact of organisational factors if the current technological opportunities are to be realised in practice.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Information is perceived as a vital resource by most organisations. It is suggested that this is particularly true of planning authorities, with the nature of the discipline dictating that the vast majority of the information handled has a geographical component (Bromley and Coulson 1989; Cooke, 1980; Department of the Environment 1987). Technological advances in the last ten years have made it practical for most local authority planning departments in Britain to store and process a substantial proportion of their data requirements using computers. A survey undertaken in 1984 demonstrated that 85.3 per cent of British planning authorities had access to at least one computer (Bardon, Elliott and Stothers 1984b). As a result the use of geographical information is increasingly dependent upon the effective utilisation of automated information systems. However, despite the removal of many of the technical barriers which inhibited the development of computer based systems the experiences of planning authorities have been mixed (Bardon 1985; Farthing 1986b). Research has shown that even in instances where departments adopted the same configuration of equipment the problems encountered and the extent of the benefits derived varied greatly (Campbell 1989; 1987). With these considerations in mind, this research addresses the important issues associated with the effective utilisation of geographical information in local authority planning departments and more particularly the impact of organisational factors. The study examines three areas

which are regarded as likely to influence the use of information. These are firstly, the factors affecting the development of automated systems, secondly, the role of information in the process of formulating planning policies and thirdly, the factors directly influencing the utilisation of information including automated data. The investigation explores through empirical studies the validity of a range of theoretical perspectives which have sought to describe and explain the use of information in organisations.

This chapter outlines the background and context for the research. The importance of the study is assessed in the light of past experience and the present level of computerisation in planning departments as well as an overview of the existing literature. Theoretical debate examining the relationship between information systems and their organisational setting has led to the development of a range of perspectives. The main approaches will be highlighted in the review of the existing research as this has important implications for the breadth of variables studied. The nature of the perspective adopted depends on the extent to which the operation of computer based systems and the utilisation of information is presumed to be enmeshed within the social and political processes of a given organisation. An additional distinction concerns the perceived robustness of such processes to change and as a result the ease with which it is assumed the human and institutional elements of an organisation may be amended to enhance the operation of an information system. The review of existing work will outline the perspectives adopted and indicate the implications for the conduct of the study.

The importance of the research in the context of planning practice and existing studies is the main focus of the chapter. Additional background is provided by a brief review of the research methodology, an indication of the limits to the field of investigation and an outline of the structure and organisation of the thesis.

1.2 INFORMATION TECHNOLOGY AND PLANNING PRACTICE

The preparation of plans and the processing of planning applications, known as development control, are the main statutory responsibilities of local planning authorities. Planning agencies in the county and regional tier of local government presently take responsibility for formulating a strategic framework for planning through the production of structure plans. The activities of departments in shire and metropolitan districts focus on development control and the preparation of the more site specific local and unitary development plans. Since computers were first utilised by planning departments in the 1960s general perceptions of the capacity of information technology to facilitate the planning process have varied. This discussion will examine past experiences describing and seeking to account for the changing pattern of computer usage as well as identifying current trends. Evidence concerning a period of disillusionment with technology will be examined for contemporary relevance as well as giving brief consideration to trends in the United States.

The research categorises the functions performed by information systems into three. These are:

- operational use for routine day to day decision making and administration;

- strategic use linked to the complex and often lengthy process of policy making or the production of decisions of this type;
- managerial control.

Computers were first introduced into British local government in the early 1960s. Their primary function was as an aid to those involved with the time consuming and repetitious tasks associated with organising the payroll and other routine financial matters. During this period of technological progress developments in planning methodology linked to the ideas of general systems theory were encouraging planners to undertake large scale modelling and forecasting exercises. The scale of the land use/transportation studies envisaged and the incorporation of complex mathematical models were only possible due to the availability of computer technology. Planners were one of the earliest users of computers in local government utilising the facility introduced to serve the operational needs of finance departments to fulfil more strategic functions.

The local government context was largely receptive to the ideas current in the British planning profession in the 1960s due to the general acceptance of the principles of corporate management. There was as a result considerable interest and agreement about the authority wide value of establishing corporate data banks. This prompted research into the most appropriate structure for urban data bases and how they could be managed most effectively (see for example Cater 1970; Cripps 1969; Willis 1971). The enthusiasm for large scale data management is reflected in a series of studies instigated by the Ministry of Housing and Local Government which culminated in the General Information Systems for Planning report (Department of the Environment 1972).

During the 1970s optimism about the capabilities of these vast information systems when coupled to the new planning process enacted in 1968 began to wane. Barrett and Leather (1984) in their review of the use of information technology in planning practice consider there to be four main reasons for the disillusionment. Firstly, that information systems were not judged in the 1970s on the grounds of their initial justification based on the long term advantages of integrated data sets but rather on the basis of short term gains in efficiency. The urban data banks had not been designed to fulfil these modified criteria and as the practical difficulties of integrating and maintaining the information systems superseded the initial enthusiasm, staff became disillusioned. Evaluations tended to conclude that the expense of developing and updating general purpose data bases was substantially greater than the perceived benefits. Barrett and Leather suggested, secondly, that the initial excitement about the potential of technology resulted in expectations that were either beyond the capabilities of the existing hardware and software or required authorities to invest more resources than they were prepared to make available. The slowness and complexity of mainframe computers also frustrated planners.

Local government reorganisation between 1974 and 1975 was regarded as the third factor contributing to the decreasing interest in computing in the 1970s. The replacement of unitary authorities by two tiers of local government led to the sub-division of planning responsibilities. As a result development control became physically and often politically separate from the strategic monitoring and forward planning functions, therefore splitting the key source of land use data, from the existing centres of computing expertise and resources. Arrangements were developed in a great many instances whereby the counties provided the districts with

a data processing service. The latter by this stage was more concerned about operational efficiency than sophisticated analysis. Barrett and Leather argue lastly that the centralised nature of urban data banks was responsible for much of the subsequent disillusionment. Specialist staff were appointed who in practice performed the function of gatekeepers mediating user requirements according to central priorities and controlling access to technology. They also suggest centralisation provided little scope for small scale learning or experimentation.

Barrett and Leather's analysis indicates that technical limitations were only partially responsible for the disappointment and declining interest in computing during the 1970s. Equally if not in some ways more important was

> ...the divorce of planning theory developments from the reality of the organisational and political world in which planning takes place - particularly attempts to integrate the statistical rationality of complex spatial modelling with local political decision making processes. (Barrett and Leather 1984, p.6).

This discussion of past computing experience in planning highlights the influence of social and political processes within local authorities as well as the impact of external agencies such as central government on the development and use of information systems.

Despite these negative experiences, the last decade has seen a massive increase in the planning profession's interest in computers. The key stimulant has been developments in microcomputer technology which in association with standard business packages has offered flexible and relatively easy to use systems at a considerably lower cost and requiring less technical support than had been the case with traditional mainframe systems. Overall the speed and capacity of computer facilities increased and with the shift from batch processing to interactive modes mainframe

technology was also becoming more accessible. Awareness about the potential of these developments for planning started to gain momentum around the time of the Government's Information Technology Year in 1982. A special issue of the Planner, the journal of the Royal Town Planning Institute (RTPI), was published in that year while the planning schools started to include information management in their programmes. By 1985 a book on information management in local government had been published with significant contributions from the planning profession (England et al. 1985). Bardon and Stothers' national surveys conducted in 1982 and 1984 provide a quantitative indication of the growing presence of technology in planning departments (Bardon and Stothers 1984; 1982). The number of computers available for use by planners, although not necessarily owned and controlled by them, doubled between 1982 and 1984. The growth was mainly accounted for by a tripling in the quantity of minis and a four fold increase in micro technology. The number of mainframes remained relatively static over the period. As a result by 1983 only 74 out of the 503 authorities which responded to the survey did not have access to at least one computer with adoption slowest in small district authorities. It is highly probable that the level of computer usage will have increased. Surveys by the County Planning Officers' Society (CPOS) have shown that these long established computer users have consolidated their resources particularly with respect to micros. In 1984 there was on average just over one micro per county authority that figure had risen to slightly under six by 1987 (Biddick 1988).

The surveys suggest the functions performed by the burgeoning array of technology to be different from the systems of the 1960s and early 1970s. Computerisation in the constrained economic circumstances of the last ten years has tended to gain its justification from meeting short term

operational needs through its much promoted potential to improve effectiveness while reducing overall costs. This is reflected in the introduction of systems designed to process planning applications. The other main functions for which computers are utilised include word processing, data base management and handling national data sets, particularly the Census of Population. It is clear there is currently less emphasis on the development of integrated data bases for modelling and forecasting which tend to involve extensive data collection than was the case in the 1970s. Information systems are much more self contained, storing data on a single topic with analysis conducted using standard data base and spreadsheet packages. The most substantial developments have concerned operational and administrative activities such as word processing and the routine elements of development control which most directly affect clerical and non-professional staff.

The link between automation and administrative activities tends to provide a much firmer justification for technology than the strategic reasoning underpinning developments in the 1970s. Interest in a wider range of applications is, however, growing (Masser 1987). Evidence from the surveys suggests computer aided design (CAD) networking, automated mapping and the potential of sophisticated geographical information systems (GIS) have provoked considerable interest. The planning profession's use of spatial data has resulted in a particular enthusiasm for the opportunities offered by GIS. A technology which has been described as "... the biggest step forward in the handling of geographical information since the invention of the map." (Department of the Environment 1987, para. 1.7). The central attribute of GIS is the ability to integrate, manipulate and display vast spatial data sets at speeds which were not possible prior to enhancements in hardware capacity.

The significance of the opportunities offered by GIS both for public sector activities such as planning and also the business and commercial community was marked by the appointment in 1985 of a Committee of Enquiry chaired by Lord Chorley to examine methods for handling geographic information. The Committee reported in May 1987 and with the focus of attention on GIS officers throughout local authorities argued that the integration of spatial data sets would result in strategic as well as operational benefits. It was suggested that better, timely and more complete data would enhance the quality of decisions in addition to improving service delivery and efficiency. Edinburgh City Council stated in their submission to the Chorley Committee,

> ...that the quality of decision-making could be improved if the spatial element of the various information bases were to be subjected to more thorough and systematic analysis. (Edinburgh City Council in Department of the Environment 1987, p 176).

Given the strategic value authorities are attaching to GIS Barrett and Leather's (1984) discussion indicates the need for a detailed examination of the use of spatial data in an attempt to avoid the disillusionment and wasted resources which occurred in the 1970s. The Chorley Report in studying the impact of conditions external to organisations considered that technological developments were a "...necessary, though not sufficient, condition for the take-up of geographic information systems to increase rapidly." (Department of the Environment 1987, para. 1.22). Organisational constraints such as the form in which data is made available, user awareness and commitment to training and research were cited as important barriers. Barrett and Leather's analysis of the difficulties encountered in the 1970s also suggested that if problems are to be avoided there is a need to look beyond the superficial claims associated with particular applications to the underlying political and social processes operating within organisations.

The growth in computer based applications of an operational nature followed by interest in the potential of GIS is mirrored by trends in the United States. A series of major studies of computerisation in local government in the United States between 1976 and 1979 conducted by the Public Policy Research Organisation of the University of California at Irvine demonstrate that the larger county and city authorities showed the greatest propensity to introduce technology and that they largely developed systems of an operational nature (Danziger et al. 1982). The Irvine Group as these researchers will be referred to henceforth, also had access to the results of a survey of sixteen large urban authorities in Europe, Japan and Canada undertaken between 1974 and 1978 by the Organisation for Economic Cooperation and Development (OECD). The findings suggest that computer adoption in Europe, Japan and Canada was proceeding at a similar pace to that in the United Kingdom. The Irvine Group undertook a second round of studies in 1985 but little detailed analysis based on these findings has as yet been published (International City Management Association 1989).

Indications of trends with respect to planning are provided by French and Wiggins' mail survey of 501 county and city authorities in California conducted in 1988 and a follow-up study of GIS users in 1989 (French and Wiggins 1989; French, Wiggins and Heffernon 1989). The increasing presence of micro computers, exclusively in small authorities and in combination with mainframe and minis in the larger departments was clearly shown by the findings. Software utilisation was dominated by word processing, spreadsheet and data base management packages with future interest centred on automated mapping and GIS. Authorities perceived their greatest difficulties concerning computer use to be staff training and gaining funding for hardware and software, reflecting the findings of the

CPOS's surveys in the United Kingdom. The follow-up study of existing GIS users which represented about 8 per cent of those originally surveyed identified similar problems in addition to a lack of skilled staff and difficulties in achieving cooperation between departments within a single authority. Somers' (1987) discussion of the introduction of GIS into local government in the United States also suggests the considerable impact of organisational factors on the effective utilisation of information systems.

Computing trends in planning authorities in Britain and the United States appear to be following a similar trajectory. The conclusions of French and Wiggins' first survey are interesting in the context of the research. They found that factors internal to the planning authority rather than the characteristics of the external context were of greatest significance with reference to the perceived effectiveness of computer based information systems. As a result French and Wiggins suggest that to fully understand the impact of computing on planning agencies it is necessary to undertake a number of detailed case studies.

1.3 APPROACHES TO ANALYSIS

Consideration of past trends and the probable future direction of information system development in local authority planning agencies has made reference to a number of the existing studies. With these considerations in mind this section outlines the main approaches of the full range of published literature. Five types of analysis are identified providing the background against which the research is set.

(i) Studies providing an overview of the experiences of planning authorities. These include surveys prompted by the increasing presence of automated systems in planning agencies during the 1980s. The aim of these studies was to collate evidence concerning the basic pattern of computer acquisition and the range of applications developed (Bardon and Stothers 1984; 1982). A more recent set of surveys have sought in addition to identify the major problems planning authorities are encountering (Biddick 1988; French and Wiggins 1989). A basic overview is also provided by accounts of the experiences of practitioners in publications such as the Planner and the Newsletter of the British Urban and Regional Information Systems Association (BURISA). These accounts suggest that the outcomes of information system development are very varied (see for example: Caddick 1988; Challen 1982; Henderson and Markham 1982; Kirk 1982; Stothers and Thorpe 1986). Similar discussions have been published concerning non-British environments (Bayer 1982; Bollens and Godshalk 1987; Dangermond 1982).

(ii) Investigations of individual planning departments which use the general surveys cited above to assist case study selection (see for example Bardon, Elliott and Stothers 1985a; 1984a; Farthing 1986a). The growing awareness of great variations in the level of user satisfaction derived from the introduction of computers prompted more detailed investigations to be undertaken. It was argued that by identifying the lessons learnt by departments at an advanced stage of system implementation problems could be avoided by comparably sized authorities preparing to acquire computers. Bardon, Elliott and Stothers describe a range of applications present in eight authorities while Farthing concentrates on systems designed to facilitate the development control process. There is very little theoretical discussion underpinning this

work. The empirical findings suggest organisational issues influence the effective utilisation of information systems, however, such factors are not clearly defined or located within a broader explanatory framework. This approach narrows the focus of study to the benefits and problems associated with different configurations of equipment and the most obvious expression of the difficulties encountered rather than exploring the underlying processes. It is envisaged in turn that these problems can be overcome by improving procedures and more rational management. The result is a partial analysis which fails to explore fully the organisational environment in which automated systems are embedded and as a consequence lacks the explanatory power to account for the varied impact of computerisation on the utilisation of information.

(iii) General evaluations of the changing pattern of computer use in planning authorities (Barrett and Leather 1984; Barrett and Masters 1985; Yeh 1988). These analyses link experiences of automation to underlying social and political processes in the internal and external contexts of organisations. Reviews of this type suggest researchers need to examine the interrelationships between information systems and a broad range of variables. The theoretical discussion is not supported by the development of a conceptual framework and in the absence of systematic empirical investigations the conclusions can only be tentative.

(iv) Studies examining the impact of social and political processes on the utilisation of computer based systems. The poorly developed theoretical framework for the analysis of computer and information usage in the studies of British planning authorities prompted the literature reviewed to be widened to include the private sector and contexts outside Britain. It should be emphasised that much of this literature mirrors the approach

underlying the studies cited earlier, however, particularly the work of the Irvine Group in local government in the United States (see for example Danziger et al 1982; Danziger and Kraemer 1986; King and Kraemer 1985; Kling 1987) and also a number of studies conducted in the private sector (see for example Hirschheim 1985; Mumford and Pettigrew 1975; Pettigrew 1988) evaluate a range of theoretical perspectives against evidence collected from empirical investigations. These studies reject the view that computer based systems are purely technical in nature, arguing that such systems are embedded within the social and political processes of organisations. As a result it is regarded as essential for studies of computer use to examine the organisational aspects of any computing environment. Three groups of factors are highlighted as having a significant influence on the development and subsequent use of computer based systems. These are: (i) the internal and external organisational context; (ii) people; (iii) change and instability. The studies also question the view generally accepted by information system designers that data is the determining factor in the decision making process. It is argued that there is a need to reassess this perspective which underlies the development and organisation of most information systems. Assumptions about the design of computer based systems are important as the misinterpretation of the functions for which information is required must influence utilisation and user satisfaction. The theoretical framework underlying these analyses is much more fully developed than is evident in existing studies of British planning authorities and as a result will be given detailed consideration in this research.

(v) A substantial body of literature which focuses on the technical aspects of innovation and its implications for planning. Discussions of this type can be divided into three strands. These are firstly, studies

which concentrate on the technical dimensions of a particular application, secondly, those that indicate the potential planning benefits associated with a particular innovation and lastly, descriptions of the hardware, software and data components of systems already operating in local authorities (see for example Buxton and Ball 1989; England et al. 1985; Gault and Peutherer 1989; Leary 1986; Lyon 1989; Marble and Amundson 1988; Newton and Taylor 1986; Newton, Taylor and Sharpe 1988; Nijkamp and Rietveld 1984; Shand 1986; Yeh 1989). These discussions are concerned with the technical issues associated with the development of information systems and the resultant benefits. Interest is focused on achieving technical goals such as faster methods for digitising map based data which is mainly of direct concern to computer specialists. The work provides useful indicators of the potential of automation for planning but has limited direct relevance for this research.

1.4 THE OBJECTIVES OF THE RESEARCH

The overview of the pattern of computerisaton in local authority planning departments and the review of the main themes of the studies undertaken in the field provide essential background for the research. It is clear from these discussions that while the presence of ever more sophisticated technology is growing in planning departments, understanding of the factors affecting the utilisation of geographical information and computer based systems is extremely limited. There is a considerable body of literature focusing on the technological issues associated with information system development, however, a complementary series of systematic studies concerned with system utilisation and the impact of organisational factors have not been undertaken.

Computers are now found in the vast majority of British planning departments with generally the larger authorities acquiring highly sophisticated technology such as geographical information systems. Barrett and Leather's (1984) analysis of the reasons underlying the declining enthusiasm for technology in the 1970's suggests the importance of considering not only the technical specifications of information systems but also the social and political processes in which they are embedded. A number of case studies have highlighted the diversity of results and the failure of many systems to meet initial expectations. However, as a result of the partial nature of the analysis these studies have proved unable to explain why such situations have arisen or provide practitioners with anything more than superficial advice.

The review of existing studies and the growing interest in computers suggests the need for research which explores a range of theoretical perspectives and attempts to develop a conceptual framework with the explanatory power to account for the experiences of individual planning authorities. Detailed case study investigations are also required as a means of assessing the value of such a framework. It is the combination of an examination of a range of theoretical perspectives with detailed empirical studies which distinguishes this research from existing work in the field.

The aim of the research is to explore the contribution of organisational factors to the utilisation of geographical information in British planning authorities. The growing presence of automated information systems in these contexts makes it crucial to link this discussion to the development and impact of computerisation. The research concentrates on the use of information in strategic decision making such as the formula-

tion of planning policies. As a result it is important to evaluate how accurately different theoretical perspectives approximate to the role performed by information in the decision making process of planning authorities. Inappropriate assumptions about the functions data is required to perform are liable to lead to wasted resources due to the failure to satisfy user needs. The findings of this work have implications both for researchers analysing the utilisation of geographical information and also for practitioners attempting to maximise the benefits and minimise the problems associated with computerisation.

1.5 RESEARCH METHODOLOGY

The empirical research is based on the findings of two case studies undertaken between May 1988 and February 1989 in the planning authorities of Hertfordshire County Council and Glasgow District Council. A case study approach was selected as the best means of achieving the depth of study required to investigate the complex and interrelated processes underlying the utilisation of geographical information. Previous experience in the field, preliminary discussions with practitioners and existing surveys of the distribution of computer technology in planning agencies provided the background for case study selection. The authorities were chosen on the basis of their different statutory responsibilities, their active involvement with the development of systems designed to process geographical information and their support and willingness to facilitate the research.

A phased case study approach was selected consisting of two main stages. The aim of the first stage in each authority was to establish a profile of the activities of the department, basic indicators of information use and

the factors influencing the development of the computer package. The results of the exploratory interviews conducted with professional and managerial staff also provided the basis for an informed selection of respondents for the follow-up studies. The second phase focused on identifying the role of geographical information in the policy making process and determining the factors affecting the level of information utilisation. Preparation of the interview schedule for the second stage took advantage of the studies undertaken by the Irvine Group, which enabled experience from Britain and the United States to be compared and reduced the time associated with piloting and testing the questionnaire. A number of methods were adopted in addition to conducting interviews as a means of obtaining a range of perspectives. These included analysis of the existing documentation, attendance at meetings and observation of the activities of the department.

A more detailed account and justification of the methods selected for the empirical research is developed in Chapter 3. The overview of the methodology has concentrated on the conduct of the case study investigations. However, consideration of a range of theoretical perspectives, a review of the existing studies and the development of a conceptual framework were also significant elements in the overall research strategy (see Chapter 2).

1.6 LIMITS TO THE FIELD OF INVESTIGATION

The experiences of staff in two planning authorities form the basis for exploring a range of theoretical perspectives on the use of geographical information. The case studies were carefully selected as environments which would yield maximum insight into the processes affecting the

utilisation of information. The increasing link between technology and spatial data made it appropriate to choose highly automated departments, although the underlying approaches of the two authorities were very different. As a result it is not suggested that Glasgow or Hertfordshire are typical planning departments but rather as data rich environments with a significant presence of sophisticated technology contexts which should provide evidence about the range of factors influencing the development of information systems and their utilisation.

The limitations of the existing studies inevitably leads the research to be a starting point, raising questions which require further investigation. The objective is to develop a framework which enhances understanding and highlights significant issues for practitioners. It is not argued that the findings of the research are necessarily representative of all planning agencies or the complete range of computer applications. However, a review of the literature indicates that factors similar to those identified by the research have been found to influence the development of computer based systems and the utilisation of information in planning contexts outside Britain as well as public organisations in the United States and the private sector (see for example Benson 1988; Culnan 1983; Danziger et al. 1982; Danziger and Kraemer 1986; Hirschheim 1985; Masser 1990; Masser and Campbell 1989; Rockart and Flannery 1984).

1.7 STRUCTURE OF THE THESIS

The thesis has been divided into five further chapters having initially considered the broad area of study and the research context. Chapter 2 explores the various theoretical perspectives on the utilisation of technology and information in organisations. The assumptions underlying

the perspectives are examined in relation to planning practice and the approaches adopted by the existing empirical research. The limitations of the theoretical debate in the published studies of computerisation in British planning authorities results in an alternative conceptual framework being proposed. In the light of this discussion Chapter 3 specifies the research hypotheses and outlines the methodology adopted for the empirical investigations.

Chapters 4 and 5 focus on describing and analysing the findings of the case studies undertaken in Hertfordshire County and Glasgow District Councils respectively. The first part of each chapter consists of a profile of the authority, highlighting the factors influencing the development of computer based systems and the broad pattern of information usage. The second part examines the role performed by data in policy making and the processes affecting the utilisation of information. Chapter 5 includes in addition a preliminary evaluation of the findings through a comparison of the results of the two case studies.

The final chapter evaluates the theoretical and practical implications of the research. The findings are examined in the light of the initial hypotheses and existing studies. It is concluded that there is a need to reconsider the appropriateness of conventional perspectives on the development of information systems and the role and use of geographical information. Consideration is given to the implications of these findings for planning practice, resulting in the suggestion that the effective development and utilisation of information systems could be enhanced by the adoption of a user centred strategy.

CHAPTER 2

CONCEPTUAL FRAMEWORK

2.1 INTRODUCTION

Two groups of theoretical perspective underlie studies of computer use in organisations. The majority are based on a formal-rational or systems rationalist approach while a minority of studies have rejected this framework taking the view that technology is embedded within the social and political processes of organisations and consequently a socio-technical or segmented institutionalist perspective is more appropriate (Kling 1980). This chapter outlines the assumptions on which these groups of perspectives are based and considers the extent to which they accord with planning practice. As a result of this analysis the approaches adopted in the existing literature are examined and a conceptual framework for the research is developed.

2.2 ASSUMPTIONS UNDERLYING STUDIES INVESTIGATING THE USE OF INFORMATION SYSTEMS

2.21 Introduction

Studies concerned with the use of information and technology are based on a number of important assumptions. These relate to three main areas:

- the nature of computer technology;
- the characteristics of organisations;
- the decision making process, particularly the role performed by information and the contribution of automation.

Kling (1980) reviewed the assumptions adopted in the literature and concluded that there were two broad groupings of approaches, systems rationalism and segmented institutionalism. The value of these two sets of perspectives will be evaluated in relation to planning practice following consideration of the underlying assumptions.

2.22 Computer technology

Studies adopting a formal-rational approach consider computer technology to consist solely of items of hardware and software. The image presented is of a tool which is relatively easy to use and manage. The Irvine Group question whether it is appropriate to conceptualise computer technology as a physical device in much the same way as a hammer or a simple pocket calculator (Danziger et al. 1982; King and Kraemer 1985; Kling 1980). Instead the term 'computer package' is favoured. This is defined as a "complex system of people and equipment guided by technique..." (Danziger et al. 1982, p.4). The computer package therefore consists of three components of which equipment is just one element. The group of individuals most directly concerned with the provision of information and a combination of techniques such as personal skills, organisational practices and corporate expectations are regarded as vital components of any technical system and are included in the definition of computer technology alongside hardware and software.

The computer package is not perceived to be isolated from the rest of the organisation or broader external forces rather it is viewed as embedded within the complex social system of an individual concern. The nature of the contextual factors affecting the computer package will be considered in greater detail later in the chapter. The important issue at this stage

is to distinguish work which concentrates virtually exclusively on computer equipment from that which assumes computer technology to consist of a broader range of variables and as a consequence adopt the package metaphor.

2.23 Organisations

There has been a tendency for the formal-rational tradition to depict all organisations possessing an information system as having similar basic characteristics. This is due to the adoption of a normative perspective with the resulting assumptions leading to a conceptualisation of an organisation in a situation of ideal conditions. As a consequence it is presumed that the personnel of an organisation act in as rational a manner as their personal capacities will allow and are largely free from external constraints. Further to this the goals of such concerns are assumed to be known and shared by all staff leading to consensus and a unity of purpose. Efficiency and profitability are regarded as the central objectives of private sector organisations, a goal which is translated into achieving value for money while serving the interests of the populace in the public arena. The staffing structure of organisations is generally conceived to be hierarchical while the activities of staff are guided by rules and procedures. In such circumstances information management is regarded as a relatively straightforward task mainly dependent on the acquisition of the 'right' combination of computer equipment with technological constraints the main limiting factor.

The formal-rational conceptualisation is regarded by many as at best an oversimplification and at worst misleading due to the lack of attention given to the contribution of social and political processes (Danziger et

al. 1982; Hirschheim 1985; Pfeffer 1981). Morgan (1986) has distinguished eight images ranging from descriptions of an organisation as a machine or an organism through to a culture or a coercive political entity. Morgan emphasises that as conditions change individual images of organisations are liable to be modified.

The formal-rational perspective discussed above is associated with the concept of an organisation as a machine. The analogy to an organism also assumes the goals of an organisation to be shared by all staff, however, the motivation in this instance is one of survival in the face of a hostile external environment rather than rationality. Greater complexity is also assumed in terms of the many sub-sections into which an organisation is divided.

Hirschheim (1985) in studying office automation rejected the more rational conceptions stressing the need to consider organisations as social systems consisting of individuals with their own values, motivations and priorities. Staff as a result are not necessarily presumed to be working towards the same objectives. This mirrors Morgan's concept of a culture which suggests an organisation is a negotiated order where coalitions are continuously being formed and reformed with separate groupings aiming to structure resources to favour their particular interests. It is also acknowledged that contextual variations and the interaction of different personalities give each organisation a distinctive character. These factors in addition to instability and uncertainty suggest the management of information technology to be a substantially more complicated task than envisaged by the formal-rational approaches.

Pfeffer (1981) suggests organisations are characterised by the interplay of power and politics in which the objectives of individuals or coalitions are frequently in conflict. An organisation is characterised as a coercive political entity in which activities are divided between different sections which are in a permanent state of competition. However, these sub-divisions are not perceived to be equally powerful and as a result it is argued that those in the most favourable positions use this advantage to strengthen their situation.

> Offices are not rational and manifestly rule following, they are social arenas where power, ritual and myth predominate. (Hirschheim 1985, p. 279).

2.24 The decision making process and the role of information

Decision making is generally regarded as the central activity of any organisation. Information is perceived to contribute to this process and with the increasing use of computers to store, manipulate and retrieve data, the role of automation also has to be considered. The precise nature of the link between decision making, information and technology varies according to the perspective adopted. Four perspectives on decision making will be examined. These follow on from the earlier discussion concerning the characteristics of organisations and reflect the sub-division of more rational approaches into formal-rational and bureaucratic interpretations and the more socio-technical into interactionist and political conceptualisations. The assumptions underlying these perspectives will be outlined prior to a discussion of the role performed by information in general and computer based data in particular. Many of the broad distinctions apply to all forms of

decision making but due to the emphasis of the research the discussion will concentrate on the issues associated with the formulation of decisions of a strategic nature.

Assumptions concerning the decision making process

The formal-rational perspective assumes decision makers seek the optimal solution to a given problem. Organisations are presumed to have a single goal which due to the development of the approach in the private sector is generally envisaged as profit maximisation. It is also assumed that in any decision making situation a comprehensive evaluation will be undertaken of all possible courses of action with the probable consequences of each option readily discernible. Individuals involved in the decision making process are regarded as analytically objective and free from resource constraints such as incomplete or inaccurate information.

Simon's concept of satisficing behaviour represents a variation of the formal-rational approach (Simon 1952). It is argued that decision makers search for a satisfactory course of action rather than striving for an optimal solution. Simon has also suggested that the level of rationality an individual can achieve is bounded by their personal capacities and the resources available, although within these limits objectivity is regarded as the prime motivation.

The bureaucratic perspective emphasises that while rational decision making is theoretically desirable, organisations have found it necessary in practice to substitute procedures for the goal of individual objectivity. These rules, which are developed and adapted in time, are envisaged as structuring and as a result facilitating the complex process

of decision making. The procedures are designed to provide lines of communication for the swift flow of information particularly to senior staff. It is perceived that rules which have been effective in the past will be continued. As a result the best predictor of the budget for the coming year is the previous year's estimates. Given these distinctions the assumptions underlying the bureaucratic approach have much in common with the formal-rational perspective, for instance, organisations are assumed to have an overall unity of purpose.

Interactionist perspectives in contrast to the above emphasise that decision makers are individuals possessing their own values and motivations. As a consequence the existence of a single goal shared and accepted by all staff within an organisation is questioned. Doubt as to the applicability of the assumptions underlying the more rational approaches is further confirmed by the observation that decision making takes place in a context of uncertainty engendered by instability within an organisation and an ever changing external environment.

> Decision making is an exercise in coping with uncertainty but the participants in the process may themselves add to the uncertainty. (Mumford and Pettigrew 1975, p.55).

The interactionist approach is typified by Lindblom's concept of disjointed incrementalism (Lindblom 1959). He suggests that decision makers only consider a small number of alternative courses of action which differ marginally from the existing policy and for each only the important consequences are evaluated. It is regarded as impossible in many instances to be certain as to the likely outcome of a particular decision, while to suggest the existence of one 'right' solution is perceived to be inappropriate. Decision making is also said to be

dominated by short time horizons with the attention of individuals fluctuating between issues, resulting in a tendency to react to immediate problems rather than having the time or resources to devote to long term planning. Emphasis is placed on decision makers 'muddling through' and as a consequence they achieve what is possible rather than optimal.

The concept of mixed scanning devised by Etzioni (1973) suggests that there is no universal mode of decision making. He developed a compromise between the more rational and interactionist positions arguing that routine day to day decision making is typified by an incremental approach, while for fundamental issues a greater degree of formal rationality is characteristic. The substantial level of uncertainty inherent in the decision making process prompted Cohen, March and Olsen (1972) to construct the garbage can model. The model suggests that points at which it is necessary to take a decision, actors, problems and solutions are located in an environment of uncertainty, where interaction between these elements is the result of chance. As a consequence decision making is viewed as unpredictable and even to some extent accidental.

Conceptions such as the garbage can model are regarded as overstating the random nature of decision making by those favouring the political perspective (Pfeffer 1981). They instead focus on the conflict which exists between the differing interests present within an organisation. Interactionist approaches recognise that a process of negotiation and bargaining takes place in any decisions arena but rather than the outcome being uncertain the political perspective suggests the winners will be

those already in possession of power. It is argued that the outcome of the decision making process is predictable from the existing distribution of authority (Pfeffer 1981).

Assumptions concerning the role of information including automated data in the decision making process

The various perspectives outlined above conceptualise information to have a role in the decision making process but there is little agreement as to the extent or nature of this involvement. Formal-rational approaches suggest decision making to be a linear process, whereby the realisation of a problem results in the search for information which in turn determines the most appropriate course of action. Data is regarded as performing a substantive function with debate resolved by reference to the available evidence. Bureaucratic perspectives assume information to have a similar decisive role but within the constraints imposed by the existing procedures of the organisation.

The two perspectives discussed above suggest that the development of computer based information systems will increase the underlying rationality of the decision making process (Simon 1973; Whisler 1970). Computerisation is regarded as enhancing the quality of data and as a direct consequence lead to 'better' decisions. Computers are assumed to provide a 'technical fix' (Kling 1978) compensating decision makers for personal weaknesses such as an inability to select or remember information, resulting in the attainment of greater rationality. Emphasis is placed on the capacity of computers to manipulate large volumes of data at great speed using sophisticated techniques. Automation is also said to improve accessibility to data sets therefore reducing the chance of a

decision maker being unaware of the full range of available information and the opportunity for the material to be distorted or filtered by the staff responsible for data provision. The additional ability to integrate data sets concerning remote parts of an organisation is perceived to facilitate coordination. Computers are therefore assumed to improve the quality of decision making with the only doubt raised by those Dutton (1984) refers to as 'disappointed rationalists'. They question the capacity of many decision makers to utilise properly the available information or sophisticated modelling techniques. The underlying assumption that decision making is a linear process in which information should be the determining factor is not, however, questioned.

The interactionist approach recognises the normative attractiveness of rational perspectives but is sceptical as to their applicability in practical decision making situations. It is argued that information seldom indicates a single optimal course of action rather it may be used to support several frequently contradictory opinions. Boland (1987) even suggests that of itself information has no meaning and only acquires meaning through human interaction. The availability and even the nature of the data which will inform a given decision making situation is also regarded as being uncertain. A complex interactive process is envisaged whereby once the initial probably ill-defined problem has been identified, participants agree upon a set of assumptions as a basis for the collection of data. The final outcome is negotiated between interested parties with information employed to justify the final compromise. The process of decision making in these circumstances is seen as more important than the end result. As a consequence individuals muddle through until a decision is eventually agreed rather than striving for an optimal solution.

Greenberger et al. (1976) examined the use of computer based models in the decision making process of federal and local government in the United States. They found policy makers were rarely influenced by the evidence of such techniques utilising information for purposes other than determining the most appropriate direction of policy. This experience is confirmed by the empirical studies of Feldman and March (1981) which indicate a weak link between the information processed by organisations and the decisions that result. They observed that at times a great deal of information is requested which decision makers then fail to use, while on other occasions data is not sought until the decision has at least substantially been taken. The rational explanation that such circumstances are simply the result of human limitations or inadequate data sources is not regarded as satisfactory. Feldman and March suggest information has a symbolic rather than substantive role. The process of data collection and analysis is regarded as signalling to other organisations that decision making has been undertaken in a rigorous and systematic fashion. It is suggested that arguments which are supported by information symbolise rationality and individual competence which is a necessary element if a case is to be proven in the prevailing culture of western society (Franz and Robey 1984). The initial decision is often more a result of intuition and even emotion than objectivity and rationality (Argyris 1971).

The interactionist perspective recognises that computer based data tends to be regarded as of a higher quality than information emanating from more traditional methods, although this is not necessarily the case. Lindblom and Cohen (1979) questioned whether data accuracy is the primary concern of decision makers. They examined the reasons why policy makers have

tended to ignore the findings of systematic social science research. Their results indicate that the degree of rigour with which a study is conducted is not considered to be a crucial issue particularly in instances where analyses support the preferred course of action. Quick and dirty studies providing evidence rapidly were regarded by practitioners to be of greater value than more lengthy projects which often only confirm accepted knowledge. It was also found that decision makers were very wary of commissioning studies in circumstances where the outcome is likely to be unpredictable. As a result policy makers are not assumed to be disinterested recipients of analyses, as findings which contract a favoured decision can undermine a group's or an individual's accepted competence and even personal prospects of career advancement.

The political perspective also dismisses the conceptualisations of the more rational approaches. It is envisaged that decisions are formulated prior to the search for supporting evidence, with information utilised to convince dissenting interests. Interactionist perspectives acknowledge that such a process takes place but unlike the more political views are less certain that decisions always benefit the same group or individual. The former perceive the winners and losers to differ depending on the circumstances. The political perspective does not envisage the role performed by automated data to differ from other sorts of information as it is equally subject to selectivity, distortion and manipulation by the dominant grouping. However, the symbolic importance of the association of computers with rationality is regarded as favouring those in the most powerful position as they possess the resources to acquire the necessary equipment and personnel. It is suggested therefore that this strengthens their capacity to generate evidence supporting their interests. The

central grouping are consequently able to perpetuate their dominance within the decision making process.

Empirical studies examining the nature of public sector decision making in the federal government of the United States conclude that no single perspective forms an adequate description of this highly complex process (Allison 1971; Greenberger et al. 1976). Earl and Hopwood (1980) demonstrate the existence of four decision making styles at any point in time. These are computation, judgement, compromise, and inspiration. Hopwood has developed this concept arguing that the role performed by an information system will vary according to the decision making style adopted. As a result the function required of even a single information system may vary from an answer to a learning machine through to a device providing ammunition or the capacity to rationalise decisions (Hopwood 1983).

These analyses indicate that the nature of the decision making process will influence the demands placed on information systems and is therefore a critical issue for studies examining the design, implementation and use of computer based systems. It is not appropriate at this point to conclude which approach or approaches most accurately describe the situation in British local authority planning departments. The important issue is an awareness of a range of perspectives.

2.25 Two theoretical approaches to the analysis of information system usage in organisations

The preceding discussion outlines the range of considerations which underlie the concepts of technology, organisations and the decision making

process. Kling (1980) in a detailed review of the assumptions on which existing research was based concluded that studies adopted one of two groupings of perspectives. These approaches were termed systems rationalism and segmented institutionalism and were regarded as encapsulating the continuum of theoretical positions from the more rational and bureaucratic to the interactionist and political.

Table 2.1 integrates the assumptions discussed earlier under the separate headings of technology, organisations and decision making in terms of the appropriate perspective. The main characteristics underlying the formal-rational, bureaucratic, interactionist and political perspectives are summarised and an indication of their relationship to Kling's two-fold classification is provided. It is clear from the table that analyses adopting a systems rationalist approach focus on computer equipment and assume there to be consensus on the dominant organisational goal of efficiency. Decision making is perceived to be dominated by the objective of achieving rationality. It is acknowledged that human limitations may inhibit the orderly formulation of decisions, making the imposition of procedures necessary as a means of structuring the process. Information is regarded as having a substantive role in the decision making process with automation presenting a valuable opportunity to enhance data precision, accessibility and the range of available techniques.

Segmented institutionalism in contrast considers technology to be most accurately represented by the notion of a computer package which is itself located in an environment of intergroup competition and even conflict. The dominant goals are those of groups and individuals each perceived to be attempting to enhance their status and credibility rather than striving

Table 2.1: An overview of the theoretical perspectives underlying analyses of information system usage in organisations

	SYSTEMS RATIONALISM		SEGMENTED INSTITUTIONALISM	
	DISCRETE-ENTITY MODEL		WEB MODEL	
Characteristic	Formal-rational	Bureaucratic	Interactionist	Political
Computer technology	Equipment	Equipment	Package	Package
Organisational image	Machine	Machine/ organism	Culture	Coercive
Organisational goals	Economic efficiency	Procedural efficiency	No clear goals	Partisan goals
Agreement on organisational goals	Single shared goal	Single shared goal	Ambiguous - many competing goals	Many conflicting goals
Organisational control	Centralised	Centralised - dependent on rules	Decentralised - anarchic	Shifting amongst politically powerful coalitions
Organisational independence	Independent	Independent	Constrained by external environment	Constrained by distribution of power
Decision making style	Rational, orderly, comprehensive, optimisation	Satisficing, procedural rationality	Compromise, negotiation, 'muddling through'	Disorderly, conflict
Decision making process	Problem-information-decision	Problem-information-decision, but constrained by historical procedures	Ill-defined problem - search for information based on agreed assumptions - compromise	Decision-propaganda-conformity
Information and computational requirements	Extensive	Constrained by rules	Haphazard use of information	Information used and withheld
Role of information	Substantive	Substantive	Symbolic	Symbolic, political
Role of automated data	Increases rationality	Increases rationality	No difference to other sorts of data	No difference to other sorts of data

for economic or organisational efficiency. Decision making is conceptualised as a complex interactive process in which negotiation and bargaining dominate with the outcome either unpredictable or constantly favouring the most powerful interests. Automated data is perceived to perform a similar function to information from other sources, that is having a symbolic and even political role.

The concepts of systems rationalism and segmented institutionalism provide a useful means of summarising the earlier discussion, although it is inevitable that the detailed arguments have been simplified. Kling (1980) argues that much of the literature examining the use of computer based information systems has favoured a systems rationalist perspective, leading to the dominance of normative and prescriptive studies. The theoretical approach adopted has a significant impact on the breadth of variables analyses consider and therefore the methodology for empirical investigations. Two approaches underlying research concerned with information management have been identified. These are the discrete-entity and web models (Kling 1987; Kling and Scacchi 1982).

Table 2.2 highlights the large measure of similarity between the assumptions underpinning the discrete-entity approach and systems rationalism and in a contrasting manner the web model and segmented institutionalism. The former concentrates on computer equipment and the associated administrative structures in a value free environment of consensus where there are few constraints on system development. The web model in contrast conceptualises technology as a package emphasising the need to examine the interaction between the computer package and the social and political processes both within and outside the focal

Table 2.2: Assumptions underlying the discrete-entity and web models (Developed from: Kling 1987; Kling and Scacchi 1982)

Characteristic	Discrete-entity model	Web model
Nature of the computing resource	a 'tool'	a 'package' - charged with social meaning
Role of infrastructure	neutral, need to develop organisational procedures for computing	political, complex, human factors inseparable from technical
Control over infrastructure	ample resources, freely available, good quality	limited resources, restricted control over resources
Relationship between the focal computing resource and any element of the infrastructure	independent of: - interactions with other computers; - social and organisational arrangements	contingent upon: - interactions with other computers; - social and organisational arrangements
Value attached to formal evidence of organisational goals, procedures and role of the computing system	a good guide	a fair/poor guide
Importance of history	unimportant	important
Relevant actors	actors who have direct contact with the computer application	all those present within the organisation

organisation. The historical context in terms of past rounds of negotiation and bargaining are also perceived to influence significantly the nature of the current computer package. This approach is reflected in Pettigrew's (1988) content-context-process model. It suggests that the components of the computer package and associated decisions are embedded within an inner and outer context in which the relationship between technology and the organisational environment is guided by underlying processes. The application of the web model to empirical studies and its appropriateness for research based in British planning authorities will be examined in detail in Chapter 3.

Kling concludes that the systems rationalist framework and the associated discrete-entity model are of greatest value in stable settings where there is a large measure of consensus, while the reverse was true of the segmented institutionalist approach and the web model (Kling 1987; 1980). It is therefore important to examine which set of circumstances typify conditions found in local authority planning departments before in the next section reviewing the perspectives adopted in the published studies.

2.26 Planning practice

> ....the political nature and the irrational features of planning have to be respected in the design and implementation of information systems...spatial planning is in many respects routinely unique and novel. (Peters 1984, p.55).

It would appear inappropriate to describe either the organisational context or the nature of the tasks undertaken by the planning discipline as stable or characterised by consensus. The applicability of systems rationalism to conditions found in the private sector has been questioned (Hirschheim 1985; Pettigrew 1988) and there is even greater scepticism as

to the value of such approaches in the context of public sector organisations and planning in particular (Barrett and Leather 1984; Bozeman and Bretschneider 1986; Kling 1987). It is difficult to satisfy the assumptions of the more rational theoretical perspectives in the complex and overtly, as well as at times covertly, political world of local government. The activities of individual authorities also have to be considered in relation to conditions external to the organisation such as the socio-economic context, the pressures of the democratic process and policies of central government.

The assumptions on which the systems rationalist perspective is grounded are problematic in relation to local authority planning departments. The planning process as well as individual authorities are characterised by a multiplicity of interests leading to many contradictory goals. As a consequence a planner will be faced with competing and often conflicting sets of priorities when making a decision. The ruling political group in theory is regarded as setting the agenda but this grouping may itself be divided on certain issues, while there are also pressures from other sources. These include the interests of the general public, professional opinion, departmental orthodoxy, the accepted views of the chief officer as well as an immediate section head and last although not to be underestimated personal self interest linked to career development. The existence of a single shared organisational goal would therefore appear to be unlikely. The theoretical relationship between the politician as master and the planner as servant equally seems improbable. Departments tend to take an active role in the policy making process with the chief officer performing a crucial intermediary function between professional staff and elected members (Faludi 1973).

Schon (1983) in his work which looked at the five professions of engineering, architecture, management, psychotherapy and town planning suggested practitioners face situations of uncertainty, complexity, instability, uniqueness and conflicting values. It is argued that in these decision making environments frequently the main difficulty is identifying the problem rather than striving for a rational solution. Schon questions whether in these circumstances it is either possible or appropriate to attempt to achieve technical rationality. Faludi has commented, "There is no doubt that disjointed incrementalism is highly descriptive of real life planning" (Faludi 1973, p 153), although he goes on to suggest there is value in striving for a rational comprehensive approach.

It is not simply the organisational context which is characterised by instability and lack of consensus. Rittel and Webber (1973) have argued that the planning discipline is faced with 'wicked problems'. This term is chosen to convey the complex and interrelated nature of planning issues. Wicked problems are therefore considered to be difficult to define with in each instance several courses of action possible while the outcome of a single alternative is perceived to be problematic.

The work of Friend and Jessop highlights the uncertainty inherent in the process of formulating planning policies (Friend 1983; Friend and Jessop 1969). They identify three categories of uncertainty. The first of these concerns the external planning environment; the second, assumptions about the future intentions of the whole local authority; and the third, value judgements to be applied in the selection of a preferred solution. This description of the unpredictability present in the decision making process

led Friend and Jessop (1969) to propose the strategic choice approach as a means of structuring and therefore managing uncertainty. However, it is the analysis of the decision making arena rather than the prescription which is of value for this discussion.

Planning departments far from being typified by stability and consensus handle issues of considerable complexity in a dynamic organisational context of uncertain and at times conflicting objectives. A segmented institutionalist perspective in these circumstances would seem appropriate for studies investigating the use of information systems.

> In explaining the use of computerised data in complex social arenas such as public policy making in urban governments, systems rationalist accounts are of limited value. (Kling 1980, p.101).

2.3 STUDIES EXAMINING THE USE OF INFORMATION SYSTEMS IN PLANNING DEPARTMENTS

2.31 Introduction

The opening chapter outlined the range of studies which have investigated information system usage. The aim of this analysis is to examine the underlying assumptions and theoretical perspectives of the main empirical studies based in planning authorities, not to rework the earlier review. The approaches adopted by the investigations conducted in British local authority planning departments have been very similar (Bardon 1985; Bardon, Elliott and Stothers 1984a; Biddick 1988; Farthing 1986a; Grimshaw 1988). The evaluation will analyse the theoretical framework favoured by Bardon and Stothers in their description of computer usage in eight authorities and Farthing in his study of applications designed to

facilitate the development control process, as these typify the approaches adopted in the British planning context. This discussion will be followed by consideration of whether empirical research undertaken in contexts outside Britain is based on the same grouping of assumptions. The analysis will consider the extent to which the methodologies underlying the selected studies coincide with the pertinent issues identified in the preceding discussion.

2.32 Studies of British planning experience

The case studies undertaken by Bardon and Stothers were designed to elaborate the findings of their earlier national surveys (Bardon and Stothers 1984; 1982) and provide guidance for authorities developing computer based systems with similar technical configurations (Bardon 1988; Bardon, Elliott, Grimshaw and Stothers 1986). There is little discussion of the theoretical issues associated with the conduct of studies of this type in their published reports (see for example Bardon, Elliott and Stothers 1985a; 1985b; 1984a). The profiles of each planning authority suggest computer technology was conceptualised in terms of hardware and software. The context in which the equipment was located is described in formal terms. For instance reference is made to the statutory responsibilities of the authority, the internal organisational structure and administrative procedures of the department and the size and extent of the locality served. The objectives of individual planning officers are presumed to reflect those of the organisation as a whole. It is acknowledged that individual members of staff can perform a key role in the introduction of information systems but this is not linked to broader social or political processes. The influence of agencies external to planning departments is considered but only in terms of their formal

association with computer equipment. The role performed by outside consultants, computer manufacturers and the central computing section of an authority are examined where appropriate.

The assumptions outlined suggest Bardon and Stothers have favoured a systems rationalist perspective in profiling the computing experiences of individual planning authorities. The resulting descriptions concentrate on the different applications of computer equipment in settings represented by formal features. The limitations of this approach are highlighted by reference to the issues associated with departmental dependence on a central computing section. Bardon and Stothers note the inconvenience and delays which are often a symptom of this arrangement. A segmented institutionalist perspective would attempt in addition to identify the underlying processes which have led to this arrangement. The social network of personalities and their efforts to gain and maintain control would be examined alongside consideration of the relationship between planning and a computing section often situated in an influential department such as finance. Knowledge of the underlying processes significantly enhances the value of the recommendations derived from research. Continuing with the example of the problems caused by reliance on a central computing section, the logical solution would be to increase departmental independence by appointing technically skilled personnel and/or acquiring microcomputers (Bardon 1988). However, given departmental will to act which is not inevitable, such activities do not take place in a vacuum and as a result are likely to be vigorously resisted due to the challenge such changes represent to the established

pattern of control. The segmented institutionalist position provides a theoretical framework by which the difficulties associated with implementing certain apparently logical recommendations can be understood.

The adoption of a systems rationalist perspective results in a partial description of the development and utilisation of information systems in the eight planning authorities studied. The findings of the work suggest the outcomes of computerisation have been more problematic than authorities initially expected. However, there is little evaluation of the reasons which have led to the difficulties departments have encountered. This is due to the theoretical framework which restricts the level of understanding and explanatory power achieved. The summary report (Bardon 1985) concludes that organisational as well as technical factors should be considered in the development of computer based systems but as discussed above such comments are of limited value in the absence of knowledge concerning the underlying processes present in a given organisation. This also leads to organisational factors becoming an umbrella term for an ad hoc and as a result increasingly meaningless set of non-technical issues.

The objectives of Farthing's work were to assess the impact of different development control software packages and evaluate the success of the implementation strategies adopted by various local planning authorities (Farthing 1986a; 1986b). The conceptual framework on which the research is based suggests that the development of computer based systems is influenced by the tasks performed by an organisation, the existing administrative structure and individual staff members. Technology is conceptualised in terms of computer equipment and emphasis is placed on

the formal characteristics of organisations while the impact of agencies external to planning departments is not included in the model. Farthing states that the theoretical framework assumes a process of rational decision making but there is no attempt to justify or indicate the limitations of this perspective.

The conceptual framework outlined above provides the basis for an examination of the degree to which particular configurations of computing equipment increase the efficiency with which the development control process is conducted. The study assesses the extent to which the introduction of automation decreases the time taken to process planning applications, diminishes overall costs and reduces staff numbers. The methodological difficulties of differentiating whether time savings were directly attributable to automation rather than modified administration practices for instance was not debated. Issues associated with the utilisation of the information generated by the development control process for strategic decision making is not discussed in the published literature.

The findings of the research suggest that the outcome of computerisation has not in many instances fulfilled expectations, while the problems encountered during implementation have been substantially greater than foreseen. The evaluation of the reasons underlying these results are largely based on the initial research model. Three sets of factors are cited as imposing limits on the capacity of computer based systems to increase the efficiency of the development control process. The first of these is the nature of the tasks being automated. Farthing divides the activities involved in processing a planning application into structured

and unstructured tasks and concludes that the latter more difficult to automate. The second concerns the limitations of the available technology. It is suggested that much dissatisfaction is a consequence of the lengthy process of customising standard software packages and the frequent failure of the resulting product to fulfil an authority's initial requirements. The final set of factors are termed institutional barriers. Two agencies external to planning departments are cited as exerting a significant influence on system development. These are computer suppliers with their differing merchandise and varied after sales service and also pressure from central government through financial restrictions and calls for greater efficiency. Institutional barriers in the internal organisational context of planning authorities are also highlighted. It is argued that long established procedures such as committee cycles and arrangements for consultations restrict the improvements achieved in the critical area of the time taken to process a planning application. It is also noted that individual members of staff can make a significant contribution to the development of computer based systems.

Farthing concludes that each software package produces different benefits but that the extent to which these potential improvements are realised largely depends on the nature of the existing administrative practices. The explanation strongly resembles the arguments of the bureaucratic perspective suggesting that the main issue for a planning authority is the attainment of optimal administrative procedures. As a result Farthing's evaluation of the factors which affect the outcome of computerisation is based on a systems rationalist framework leading to a partial analysis.

As with the earlier studies of Bardon and Stothers the research fails to identify the social and political processes generating the findings which are noted.

2.33 Studies of information system usage in non-British planning environments

Empirical studies of the development and utilisation of information systems in planning contexts outside Britain are based on a very similar grouping of assumptions as the work outlined above (see for example, Bayer, 1982; Bollens and Godshalk 1987; Dangermond 1982). For instance organisational issues are cited as an important influence on the outcome of computerisation but the role and impact of such factors are not generally located within a broader framework. This review therefore is selective, focusing on investigations which question the value and attempt to develop an alternative to a systems rationalist approach.

The need for a theoretical framework closer to the segmented institutionalist perspective is indicated by two studies based in the European context (Peters 1984; Scheurwater and Masser 1983). Peters' discussion, derived from experience in West Germany, questions the appropriateness of assuming planning departments to be characterised by a situation of consensus and stability. The planning discipline is perceived to be political rather than technical in nature due particularly to the large number of competing interests which are involved in the process. As a result it is argued that information is unlikely to have a substantive role in the decision making process and therefore the ability of automa-

tion to enhance rationality is questioned. A process of negotiation is regarded as more accurately reflecting the manner in which decisions are formulated. Peters states,

> Planning is a political process because it is directed by the desires, perceptions and values of people and because the implementation of plans is a political process. The use of computers and of rational models does not necessarily increase the rationality of the planning process. (Peters 1984, p.59).

The analysis suggests the planning process and the decision making environment in which it is located to be unstable and typified by bargaining between competing interests. This leads Peters to propose that the use of information and the development of computer based systems is embedded within the wider social and political processes of an individual organisation. The assumptions underlying Peters' work more closely resemble the segmented institutionalist perspective than the British studies described above, however, there is still a tendency to describe technology in terms of computer equipment.

Scheurwater and Masser's (1983) experience of implementing a prototype geographical information system as a means of monitoring national spatial policies in the Netherlands confirms the value of a more broadly based approach. They found that the organisational setting of the Dutch National Physical Planning Agency and the existing pattern of information usage influenced the way in which end users utilised the system. As a result the outcome of technological innovation was shown to be dependent on the institutional context in which it was located rather than being a discrete-entity. It is suggested as a consequence of this experience that there is a need for enhanced understanding of the processes affecting the utilisation of information within planning departments.

These two studies in common with Barrett and Leather's (1984) overview of the issues which have influenced the utilisation of information systems in British planning authorities discussed in Chapter 1 suggest the need to base empirical investigations on a segmented institutionalist perspective. It is therefore surprising given the earlier analysis of planning practice that very few studies outside the United States have developed a socio-technical approach or applied the web model to the planning context. It should be pointed out that the studies in the United States adopt the whole local authority as the unit of study rather than planning in particular (see for example Danziger et al. 1985; Danziger and Kraemer 1986). A notable exception to this general trend is an investigation of the design and implementation of an information system for the Sudanese Planning Ministry (Calhoun et al. 1987). Calhoun et al. conceptualise technology as a package which is located in a web of competing relationships. The organisational setting is described as inhospitable. The internal environment is characterised by the presence of individuals with conflicting motivations and objectives. The outcome of the decision making process is not perceived to be random but rather to favour the most powerful grouping, with technology utilised to reinforce the authority of these individuals. Pressures from external agencies such as aid and donor agencies are also shown to have a significant influence on the design and implementation of information systems.

Calhoun et al.'s study suggests the value of conceptualising computer technology as a package and relating the implementation and utilisation of this package to the web of social and political processes present within a given organisation. The research utilises the conceptual framework outlined by the Irvine Group and applies it to a central government

planning context in a developing country which has little experience of computerisation.

2.34 Summary

The assumptions underlying the existing empirical investigations of the use of information systems in British local authority planning departments indicate a systems rationalist perspective to have been adopted. The earlier discussion concerning the nature of planning practice suggests such an approach to be inappropriate as planning authorities fail to satisfy the basic presumptions of stability and organisational consensus. The resulting studies provide a partial analysis highlighting the varied experiences of planning authorities and the impact of organisational factors but failing to identify the processes leading to the observed outcomes. A number of general discussions focusing on British and overseas contexts have indicated the need for a conceptual framework which more closely reflects the characteristics of planning authorities. Calhoun et al.'s (1987) work in Sudan is one of surprisingly few studies in the planning field to have applied a socio-technical approach. The next section will examine the work of the Irvine Group and based on a segmented institutionalist perspective develop a conceptual framework for the analysis of the use of geographic information in British planning authorities.

2.4 CONCEPTUAL FRAMEWORK

2.41 Introduction

The assumptions underlying the segmented institutionalist perspective have been shown to most accurately reflect the conditions found in planning

practice. However, this approach has not been adopted in the existing studies. As a result it is necessary to develop the conceptual framework for the research from work based in local government in the United States (see for example Danziger et al. 1982; Danziger and Kraemer 1986; King and Kraemer 1985) and the theoretical analysis of a minority of studies undertaken in the private sector (see for example Hirschheim 1985; Hirschheim et al. 1987; Mumford and Pettigrew 1975; Pettigrew 1988). It is assumed that computer technology is most appropriately conceptualised as a package which includes people, corporate expectations, existing practices and equipment as described at the start of the chapter. The characteristics of organisations and their impact on the process of decision making indicated by the segmented institutionalist approach, emphasises the importance of organisational factors to the development and utilisation of the computer package and more specifically the use of geographical information. The conceptual framework distinguishes three groups of organisational factors. These are: (i) the organisational context; (ii) people; (iii) change and instability. Each of these groups of factors will be examined in detail with consideration given to the key variables influencing the experiences of British planning authorities. Prior to this discussion the empirical methodology of the Irvine Group will be outlined and explored with reference to the context for the present research.

2.42 Background to the work of the Irvine Group

The work of the Irvine Group combines theoretical analyses with extensive field investigations. The empirical findings are derived from the two stage Urban Information Systems (URBIS) project conducted in local authorities in the United States between 1975 and 1979. A similar survey

was undertaken in 1985 but as yet there is little published literature based on these findings (International City Management Association 1989). The results of a sixteen city OECD project conducted between 1974 and 1978 were also made available to the Group and have been utilised in some of the analyses. The first phase of the URBIS project entailed a three part mail questionnaire of all the city authorities with populations in excess of 50,000 and counties with populations greater than 100,000 in the United States. Approximately 700 authorities were surveyed. Computing staff were asked to comment on the existing technology and probable future developments, while the views of chief executives with regard to the role of automation in the activities of local government were also sought. This data was used as a basis for the selection of 42 detailed case studies undertaken in the second phase. These case studies based in municipal authorities were designed to evaluate the impact of computer based information systems. The methods adopted included self administered questionnaires, semi-structured interviews and observation. Respondents were selected from all levels of the administrative hierarchy and included both those directly and indirectly involved with technology. Staff were asked to state the benefits and problems they perceived to have resulted from computerisation as well as details concerning their personal characteristics such as age and computing experience. Each case study took on average three person weeks to complete. The investigations examined systems designed to assist management control, operational decision making and less routine strategic activities.

The findings of the second phase of fieldwork were used to investigate a range of issues. Danziger et al. (1982) consider the constraints imposed by the organisational context on the development of the computer package

and the impact of automated information systems on the policy making process. King and Kraemer (1985) examine the diffusion of technology over time and the link between the computing policies adopted and the problems and benefits encountered. The third theme explored, concerns the varied computing experiences of end users. Danziger and Kraemer (1986) investigate the relationship between the perceived fortunes of individual members of staff and the characteristics of the computer package, the organisational context and individual skills and awareness.

The theoretical work of the Irvine Group is supported by extensive investigations. However, the empirical methodology differs in emphasis from the current research project based in British planning authorities in two main respects. The first of these relates to the time which has elapsed since the completion of the original URBIS fieldwork on which most of the published work is based. These empirical surveys were conducted at least ten years ago and therefore do not take account of technological developments such as the introduction of micro computers, work stations and distributed networks.

The second issue concerns the unit of study. The Irvine Group examined the impact of computerisation at the level of the entire local authority and also studied the experiences of users with respect to systems involved with the full range of computing activities. As a result in many instances findings have been aggregated across both tasks and departments. Local government in Britain appears ill-suited to an authority wide perspective, for not only are the tasks of officers involved with for instance Social Services, Finance, Engineering, Parks, Education or Planning different but so are the attitudes and culture of the individual departments. It is

also highly probable that each department faces very different internal and external pressures. The responsibility for servicing the same geographical area would seem to be insufficient grounds for suggesting common experiences. The Irvine Group received completed questionnaires from 2,537 end users. This appears a substantial data set but must be divided between 42 authorities, a variety of computer applications and the interests of individual departments. Danziger and Kraemer categorise end users into four groups according to the activities they perform. These are managers, professionals, street-level bureaucrats such as community policemen and desk-top bureaucrats referring to staff undertaking clerical work. However, within these groups there are considerable variations between computer systems and departmental contexts. It would have been more valuable to have focused the resources available on a narrower field of study and as a result achieved greater depth.

The importance of the Irvine Group's work lies in the development of a theoretical perspective which provides an alternative to the systems rationalist approach. The research draws on their theoretical analysis as a basis for the conceptual framework while acknowledging the limitations of the empirical studies in the context of British planning authorities. The framework developed stresses the contribution of (i) the organisational context; (ii) people and (iii) change and instability to the utilisation of information systems. Subsequent sections will examine these three sets of factors separately, although it is appreciated that they are not discrete and in any given situation interact together.

2.43 The organisational context

> ...information systems are not technical systems but social systems and must be developed within a social and organisational context. (Hirschheim 1985, p.3).

The more rational approaches assume the impacts of computer technology to be universal with all members of staff, like the organisation as a whole able to benefit. Several studies have questioned this assumption and have demonstrated that the development and use of information systems is inseparable from the context in which they are located (Attewell and Rule 1984; Danziger et al. 1982; Hirschheim 1985; Kraemer and King 1986; Pettigrew 1988; Robey 1987). Studies which focus on computer equipment presume that the nature of the technology determines the outcome of the implementation process. The studies cited above question this view, suggesting that the experiences of organisations are influenced significantly by the organisational context and bargaining between individuals. This section will examine the contribution of the organisational context to the evolution and utilisation of information systems, particularly in relation to British planning authorities.

Danziger et al. (1982) investigated whether the variability in the speed and nature of automated system adoption could be accounted for systematically by the basic characteristics of the local authority. Operational indicators were devised as surrogates for the internal and external organisational environments and the level and sophistication of computer use in a particular authority. Features of the external environment included the availability of independent sources of funding, the authority's population size and individual per capita income while the summary indicators of the internal environment included the presence of a professional chief executive and the location of control over computing

decisions. The results of the multivariate analysis suggest that about 50 per cent of the variation in the extent of information system development is related to these basic contextual factors. These results were supported by detailed case studies which suggest that the remaining variation was accounted for by factors unique to each authority. It was noted that these characteristics were either associated with the context or the activities of individual members of staff in a particular authority. This work demonstrates the contribution of the organisational context to the development of computer based systems with the analysis suggesting the relationship to be more complicated than assumed by the mechanistic pespectives. For instance it cannot be presumed that an authority serving a large population will automatically be an extensive computer user or that a small authority will have little experience of automation.

It is necessary to consider in more detail what is meant by the organisational context. Figure 2.1 illustrates the model developed by the Irvine Group. This framework highlights the importance of two sets of contextual factors termed the intra-organisational environment and the extra-organisational environment. The extra-organisational environment is further sub-divided into the extra-community and the community environments. The extra-community environment refers to the political and administrative influence of central government and other local authorities. Potentially important issues in this respect include shared facilities or joint working arrangements between authorities as well as central government's control over funding and contribution to the format and availability of data sets. The activities of computer suppliers and professional attitudes towards technology are also incorporated under this

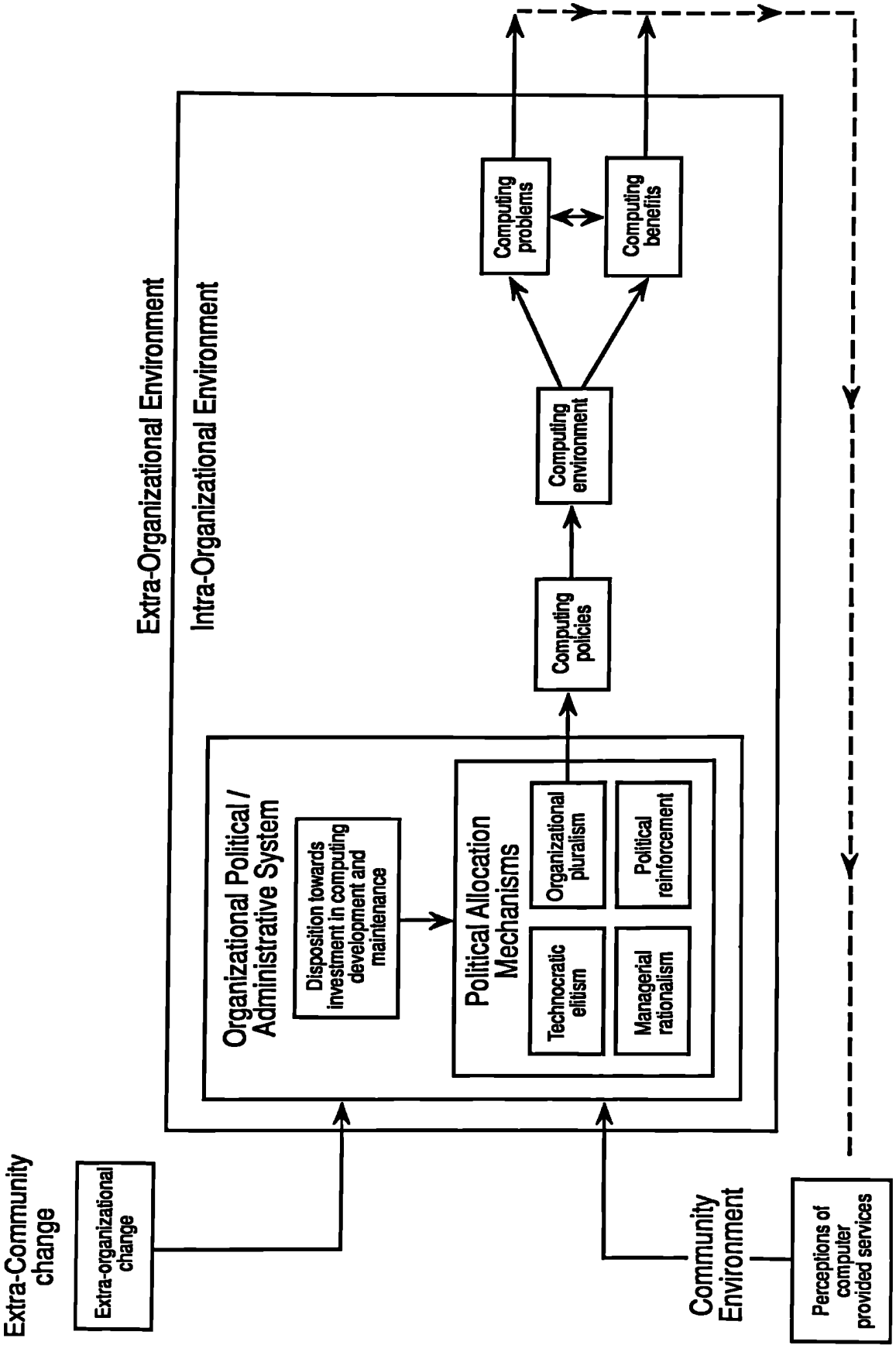

Figure 2.1: A model of the relationship between the computer package and the organizational context
Source: King and Kraemer (1985, p.22)

heading. The community environment refers to the socio-economic characteristics of the population served by a particular authority, specifically the extent of their technological awareness and degree of support for computer based innovations. The environment is also important as it affects the balance and priority of the services provided by an authority.

The term intra-organisational environment is adopted to describe the attributes of the organisation in which the information system is located. These include features such as the organisational structure, administrative arrangements and procedures for decision making in general and more specifically with regard to computing resources. The political allocation mechanism is included within this level of the model. This term refers to the bargaining process through which policy results and also embraces the perceived values of politicians and staff involved in the decision making process.

The model developed by the Irvine Group suggests that contextual factors have a significant influence on the impact of computer based information systems. Technology is conceptualised as being subject to the social and political processes present in the external environment and the internal organisational setting rather than being independent of them. Figure 2.2 shows a simplified version of this model designed to illustrate the organisational context of a single British local authority department such as planning. Issues concerning the political allocation mechanism and the activities of individuals have been excluded and will be considered in the next section.

Figure 2.2 suggests that the computer package is embedded within the social and political processes of a planning department with the department itself influenced by the local authority context. These elements comprise the internal organisational context. Although the computer package has been placed at the centre of the diagram this is not designed to suggest that the activities of the department revolve around automation. The model argues that the nature of British local government makes it important first to examine factors affecting the outcome of computerisation at the departmental level and secondly in relation to the authority as a whole. The utilisation of information and the accepted

Figure 2.2: The organisational context of computing in a local authority planning department

role for computers is likely to vary between departments within the same authority. However, it is unlikely that a planning department will be able to act independently as authority wide practice and procedures in addition to the department's position within the hierarchy of local authority services will be influential in determining the range of available options. Studies based on a systems rationalist perspective focus on formal internal structures and the activities of manufacturers and suppliers in the context of external factors. The two models presented in this discussion suggest that local authorities are influenced by the external organisational context. The general description adopted in Figure 2.2 is regarded as embodying all the features of the Irvine Group's extra-organisational environment but avoiding the complex terminology.

The impact of contextual factors external to organisations have been investigated by a number of studies. Kling and Iacono (1988) have suggested the important role performed by computerisation movements in encouraging both the general adoption of computer technology and also specific applications. These computerisation movements which are said to become established within society are perceived to consist of a coalition of senior professional and political opinion as well as the computer manufacturers. The link between automation and increased efficiency is regarded as having gained general acceptability due to the support of this influential grouping and as a result shaped the expectations of organisations with regard to computing. Kling and Iacono also acknowledge the existence of counter computerisation movements but perceive these to be less powerful in terms of influence or financial resources. These pressure groups lack the cohesion of those that favour automation as they

are usually forced to protest about individual applications and isolated issues such as confidentiality.

The introduction of computer based systems must therefore be considered in relation to conditions external to an organisation. The recommendations of the Chorley Report (Department of the Environment, 1987) on handling geographic information indicated the contribution central government could make to creating the circumstances necessary for the take up of geographical information systems. The ability to raise awareness through education, training and research were mentioned in addition to the government's capacity to influence the format in which data sets are provided and the production of digital material by the Ordnance Survey.

The utilisation of information as well as the development of computer based systems is influenced by the external organisational context. Feldman and March (1981) suggest that the general propensity to use information is related to the accepted customs and culture of a given society. It is argued that automated data will be used in circumstances where it is regarded as the best means of proving the validity of a decision, while in other instances compelling evidence may take a different form.

The importance of contextual factors particularly those unique to a particular organisation suggest that information systems are not located within standard environments. As a result analyses must start by examining the characteristics of organisations in real world situations not as prescriptive approaches based on ideal conditions. The research model provides a simple summary of the organisational layers which must be

considered. It is highly probable the pertinent details will vary between case studies and also within an individual organisation over time. The emphasis placed on the constraining as well as facilitating role of the organisational context should not be assumed to suggest rigid determinism. These contextual features are regarded as the background against which the actions of the second element of the conceptual framework should be considered.

2.44 People

> Because the interests of different groups and individuals do not coincide, competition for desired resources will lead to intense political behaviour, with each faction attempting to guide the change process and its consequences in the direction which suits its interests. (Mumford and Pettigrew 1975, p.223).

It has been assumed by systems rationalist perspectives that staff concerns coincide with the goals of the organisation in which they work and therefore these studies have given little consideration to the relationship between computerisation and the activities of individuals. The benefits derived from automation are presumed to be shared evenly between staff. As a result technology is regarded as neutral and apolitical. This element of the conceptual framework emphasises that individuals and the groups into which they form have differing values and motivations. The introduction of computer based systems tends to challenge traditional interests, threatening some and offering opportunities to others. Members of organisations seldom envisage the benefits to be gained from the introduction of technology will be shared evenly. The perceived disruption to the existing balance tends to be the focus of intense bargaining and negotiation, with this political process

set against the organisational context. These activities are likely to have an affect on the development of computer based systems and the utilisation of information.

The first part of this section examines the findings of the Irvine Group studies which investigated who benefits from the introduction of computers. The organisational context and the operation of political processes have a substantial impact on the outcome of computerisation but there is also a need to consider the activities and characteristics of individuals. The second part explores the contribution of key individuals and groups to the adoption, implementation and utilisation of computers and the information which is produced. A number of studies have shown that the mere presence of an automated information system is no guarantee that the data held will be utilised (see for example Danziger et al. 1982; Dutton and Kraemer 1985; Hirschheim 1985; Hirschheim et al. 1987; Keen 1981; Kraemer et al. 1987). This discussion suggests that user characteristics and the relationship between personalities contributes to the extent individuals utilise technology.

The organisational context provides the background against which at least in part political processes determine the allocation of benefits emanating from the introduction of information systems. The Irvine Group examined the relative influence various groups were found to exercise over computing decisions and related this to the interests served by technology. They distinguished four decision making styles specifically concerned with automation but that could be applied to the general process of policy making and the role performed by information (see Table 2.3).

Table 2.3: Assumptions underlying the four decision making styles identified by the Irvine Group

Assumption	Managerial rationalism	Technocratic elitism	Organisational pluralism	Reinforcement politics
Role of information in the decision making process	Information is objective and neutral and has a decisive role in the decision making process	Information is objective and has a decisive role in the decision making process, consequently individual policy makers are keen to utilise information but may lack the necessary skills and are therefore reliant on technical experts	Information is just one element amongst several considerations which policy makers have to take into account Information is generated through institutionalised channels, modified as a result of standard operating procedures and is employed selectively by decision makers	As organisational pluralism
Contribution of automated data to the decision making process	Technology enables policy makers to overcome human limitations by allowing larger quantities of data to be processed at speeds and levels of sophistication in excess of manual processes Automated data is free from the distortions and human errors caused by manual processing Automation improves accessibility to information Enhanced data accuracy and accessibility improve the quality of decisions	The enhanced accuracy and accessibility of automated data improves the quality of decisions	Automated data is not regarded as significantly different from other types of data	As organisational pluralism
Location of control over the decision making process and information	Management have responsibility for information processing and decision making with their objective to realise the shared goals of the organisation	Information is controlled by the technical experts and is used to serve their interests The technical experts reduce issues of concern to policy makers to technical problems	Information serves political agendas rather than increasing rationality No single group or individual has complete control over information or is always dominant within the decision making process	Information serves political agendas rather than increasing rationality Information reinforces the position of the dominant coalition or individual and therefore the results of the decision making process favour their interests

Figure 2.3 provides a diagrammatic representation of the key distinguishing features of the four decision making styles. These concern the interests served and the form of control exerted over computing resources. The manner in which these issues are conceptualised by each decision making style is illustrated below.

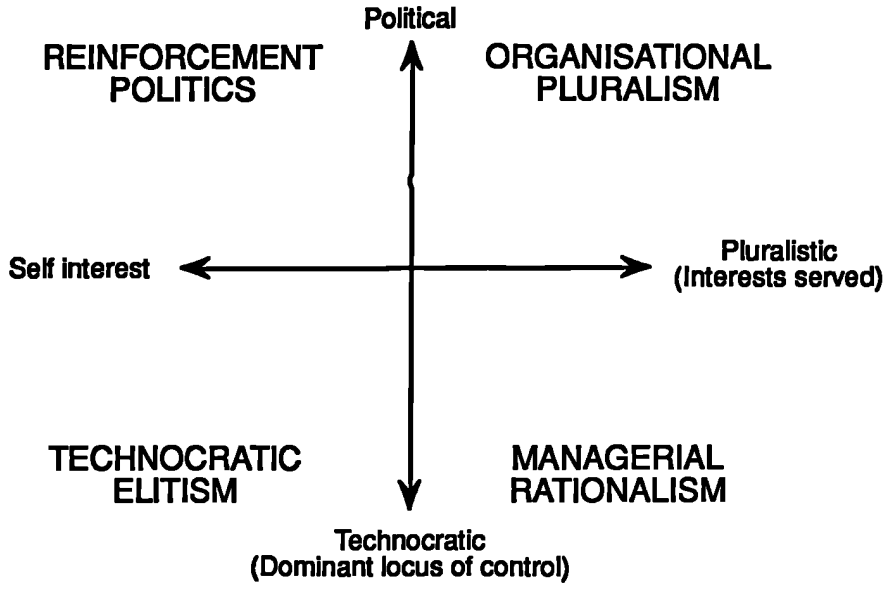

Figure 2.3 Decision making styles and their relationship to the use of computing resources
(Developed from Danziger et al. 1982; Dutton and Kraemer 1985)

It is probably an oversimplification to suggest that any single decision making style is universally applicable no matter the nature or importance of the matter under discussion. Many studies have questioned the appropriateness of managerial rationalism, for as with the earlier discussion of the systems rationalist perspective most organisations are unable to satisfy the underlying assumptions (see for example Danziger et al. 1982; Hirschheim 1985; Markus 1983; Pettigrew 1988). The dependence

of non-technical staff on the specialist knowledge of computer programmers has prompted suggestions that automation will lead to a shift of power towards the technical experts (Downs 1967; Markus and Bjørn-Andersen 1987). Computer analysts act as gatekeepers in many organisations as they possess the necessary skills to design and maintain automated systems as well as the ability to access data. Technical experts are also likely to be instrumental in the formulation of policies concerning technology while their contribution to the development of information systems has an impact on the administrative procedures of an organisation. It is also suggested that those with computing skills are regarded as symbolising a rational or scientific approach which is often perceived to be superior to other forms of evaluation (Markus and Bjørn-Andersen 1987). The findings of the work of Danziger et al. (1982) question whether the technical experts have assumed dominance. It is suggested that computer programmers tend to be far more interested in the elegant design of information systems than becoming involved in the wider policy making arena, except for issues concerned with the acquisition of new and/or sophisticated technology.

The presence of heterogeneous interests within organisations has led to the suggestion that individuals and groups will attempt to use information systems to advance parochial concerns (Bjørn-Andersen et al. 1986; Danziger et al. 1982; Kling and Iacono 1984; Kraemer and King 1988; Markus 1983). These studies consider that the process of bargaining between different interest groups tend to favour those in the most powerful position. Automated information systems are relatively expensive to acquire and maintain therefore existing imbalances in finance and staffing are likely to be translated into corresponding inequalities in data resources. As a consequence the dominant coalition is best placed to

introduce technology which through the generation of information can be used to support and reinforce its activities and position. It is also argued that individuals such as computer analysts are likely to act in accord with their perceptions of what the dominant group, generally senior staff, regard as desirable so as to avoid harming their career prospects. The assumption that computer based systems improve data accessibility supports the notion that automation has a democratising capacity. However, the above discussion questions this line of reasoning as it would appear that those controlling the technology will ensure it serves their interests. This argument suggests that the underlying political processes present within organisations result in the status quo being maintained.

These studies demonstrate the need to examine computerisation as part of a political system of competing interests. The preceding discussion concerning the organisational context suggested that decisions about the beneficiaries of automation have to be resolved between different departments in the same authority as well as within individual departments. It is not appropriate at this stage to draw any conclusions as to which decision making style or styles characterise the situation found in local authority planning departments rather to acknowledge the range of potential approaches.

The organisational context and the political system substantially contribute to the manner in which organisations introduce and use information systems. However, within these parameters the activities of individual officers shape the detailed operation of computer based systems. This includes the contribution of key actors such as the individual with

responsibility for implementing and developing the system as well as staff throughout the organisation who determine whether the system is actually used. The Irvine Group's model (Figure 2.1) is weakest with respect to staff activities, although work has been undertaken to examine the factors affecting end user computing (Danziger and Kraemer 1986).

The introduction of computer based systems and the continued acquisition of resources is frequently associated with the activities of a single individual. The process of obtaining agreement for the allocation of the financial resources involved in the development of computer based systems requires the presence of at least one member of staff with the necessary ability, willingness and probably experience to fight the inevitable political battles given the limited funding available to local authorities.

> CBIS [Computer based information systems] live and develop through the energies of their promoters rather than 'evolve' through a 'life of their own'. (Kling and Iacono 1984, p.1225).

These individuals are likely to be members of senior management as they are most closely involved with the committees which have responsibility for budgeting, although in certain circumstances a middle ranking officer may be able to take the initiative. Chief officers at the very least set the scene as they in conjunction with elected members are responsible for the interdepartmental negotiations concerning the distribution of resources and also select the officer with the pivotal task of implementing and maintaining computer based systems.

It appears that the results of the introduction of information systems are not necessarily dependent upon the nature of the technology adopted. Studies examining the capacity of computer based systems to encourage

centralised or decentralised decision making have shown the outcomes to be problematic (King 1983; Kraemer and King 1986). These findings question the appropriateness of the concept of technical determinism which assumes that the theoretical capabilities of technology will be achieved in practice. These studies suggest the results of computerisation reflect the underlying aims of senior staff, therefore the introduction of automated systems cannot on its own produce for example centralised decision making.

Boddy and Buchanan argue that the outcome of computerisation is a direct result of the decisions and pre-planning of senior management (Boddy and Buchanan 1986; Buchanan and Boddy 1983). They envisage that these members of staff have a great deal of freedom over their actions and unlike the Irvine Group place less emphasis on the capacity of the organisational context or political processes to constrain the range of activities possible. However, acknowledging the debate over the breadth of the decision making environment, there seems little doubt that key individuals can have a significant influence over the development and utilisation of information systems in organisations.

The rest of the staff within an organisation are not passive recipients of the activities of a key individual. Mumford and Pettigrew (1975) have emphasised the organisational uncertainty the introduction of technology can engender. Staff are naturally suspicious and cautious about change even instances where a direct challenge to status and influence is not implied. As a result individuals generally prefer existing routines unless personal gain can be perceived. Managerial skills largely determine whether staff develop counter-implementation strategies with such

disruption either taking an ad hoc form or being coordinated by trade unions (Keen 1981; Mumford and Pettigrew 1975). Negative responses may be perceived as honest resistance to a misguided system or sabotage based on selfish interest. It is not only middle and lower levels of the staff hierarchy who may be sceptical about change. Members of senior management can be antagonistic towards computerisation, being wary of the challenge to their power and control from a technology which offers an apparently more 'rational' although not fully understood mode of decision making. (Argyris 1971).

Staff not only contribute significantly to the introduction of technology but also to its eventual use. The presence of information systems within an organisation provides no guarantee that they will be used. It would appear that the characteristics of individuals and the interaction between personalities plays an important role in ensuring the utilisation of technology. Personnel within organisations possess very different skills, views of the type of activities for which information systems are useful as well as varying in their willingness and inclination to exploit technology (Hirschheim et al. 1987).

The propensity to utilise technology has been linked to personal characteristics such as age, sex, length of time spent in the same job, educational qualifications, membership of professional bodies and training or experience in computer related fields. There has been a tendency to associate computer usage with well educated professional young male staff. Danziger and Kraemer's (1986) study of end user computing found only a quarter of professional staff throughout all local authority departments either directly accessed or made regular requests for automated data in

contrast to the accepted image. The findings indicated that around half the staff could most accurately be described as passive users, making infrequent requests and receiving although not necessarily utilising this information. The administrative arrangements of an organisation and nature of the technology were not found to account for these results. Factors of far more significance were the degree of confidence users had in their own computing skills and their experiences of working with computer specialists.

The interpersonal relationship between users and technical experts was found to have a marked impact on the utilisation of information systems. Computing specialists or intermediaries liaising between technically skilled and unskilled staff can either reduce the anxieties of individuals or exacerbate deeply embedded scepticism. Utilisation of the available computing facilities will not be encouraged in circumstances where the personalities of those possessing technical knowledge antagonise users. A situation which has been noted in a number of studies (Argyris 1971; Danziger and Kraemer 1986; Greenberger et al. 1976; Mumford and Pettigrew 1975). This work indicates that trust, respect and reasonableness must dominate over rivalry, contempt and a lack of understanding if information systems are to be utilised. Senior management also have a significant contribution to make to the creation of favourable conditions.

> Thus, despite continuing images of the computer as a mechanistic and homogenizing technology, its impact is highly contingent upon the personal and interpersonal context within which computing is provided and used. (Danziger and Kraemer 1986, p.207).

Technology is not apolitical and by challenging existing patterns of power and control provokes individuals to protect their interests. The impact of computerisation is significantly influenced by underlying political processes with the organisational context acting as the background against which such activities take place. Individual characteristics and the relationship between personalities also affect computer usage. The outcome of computerisation is therefore influenced by a complex set of interacting factors but these conditions are not static as the third element of the conceptual framework seeks to demonstrate.

2.45 Change and instability

Systems rationalist perspectives assume technological advances lead to alterations in the equipment element of the computer package. Change under these circumstances is regarded as taking place in a controlled manner and to be prompted by the increased capacity of more sophisticated systems. It is also presumed that the initial period of learning will be completed relatively quickly with the system then accepted as part of the routines of the organisation.

King and Kraemer (1985) explored the pattern of information system development in organisations and sought to identify the factors influencing the process of change. The findings of this study question the ease with which the introduction of new or modified computer based systems can be managed. Instability in the internal and external organisational contexts is perceived to compound these difficulties rather than simply a minor inconvenience which can be easily resolved.

King and Kraemer's (1985) analysis contradicts the more rational interpretations, with their findings suggesting that internal pressures for change are more important than external supply factors in prompting the growth of computer based systems. The availability of technology is therefore not regarded as sufficient grounds for equipment to be purchased. King and Kraemer went on to examine the process of computer adoption in organisations. Systems rationalist approaches argue that in time a state of equilibrium is reached where experience and knowledge balance the problems or difficulties which are likely to occur. The study compared the level of computing sophistication found within an organisation with the policies adopted and the resulting benefits and problems. Their findings indicate that high levels of computing development and so called advanced policies are associated with diminishing benefits and increasing problems. The work of Danziger and Kraemer (1986) demonstrated the association between greater computing sophistication and a growth in the problems encountered, however, they found that the benefits achieved tended to increase. The results of these studies also suggest that the development of information systems is constrained by past computing commitments and therefore choices are limited by the existing configuration.

The work of King and Kraemer (1985) is of value as it demonstrates the complexity of the change process. They reject the view that greater technical experience leads to a reduction in the problems encountered by organisations. It is argued that the growing sophistication of computer based systems introduces organisational as well as technological issues which are difficult to resolve. This complexity makes it unlikely that a

single individual can acquire a complete knowledge of every aspect of the system while it is also important to remember that the human and organisational context is liable to be in a state of constant flux.

Instability is a critical factor in understanding the difficulties faced by organisations. Computer based systems are not designed once and for all as due to changing circumstances such as alterations to the format for statutory returns modifications require to be made. Development is therefore an ad hoc and incremental process with amendments to existing systems favoured over the potentially greater disruption of an entirely new system. Computer based systems prosper in stable conditions where there is a steady flow of resources to maintain routine procedures. However, no organisation is static, in particular the departure of key personnel can cause significant upheaval while control of the ever changing external environment is impossible. The impact of party political volatility at both local and national levels must also be taken into account in the context of planning authorities.

The organisational context and political factors must be considered in relation to the degree of instability within an organisation. Frequently at the point when problems appear to be diminishing conditions change, modifications become necessary and the process of learning must be repeated. Change over time and the impact of computerisation also appears to be complex. Interdependence in an environment where the future components of an organisation are uncertain makes the control of computing facilities difficult and generates unexpected outcomes.

2.46 Summary of the conceptual framework

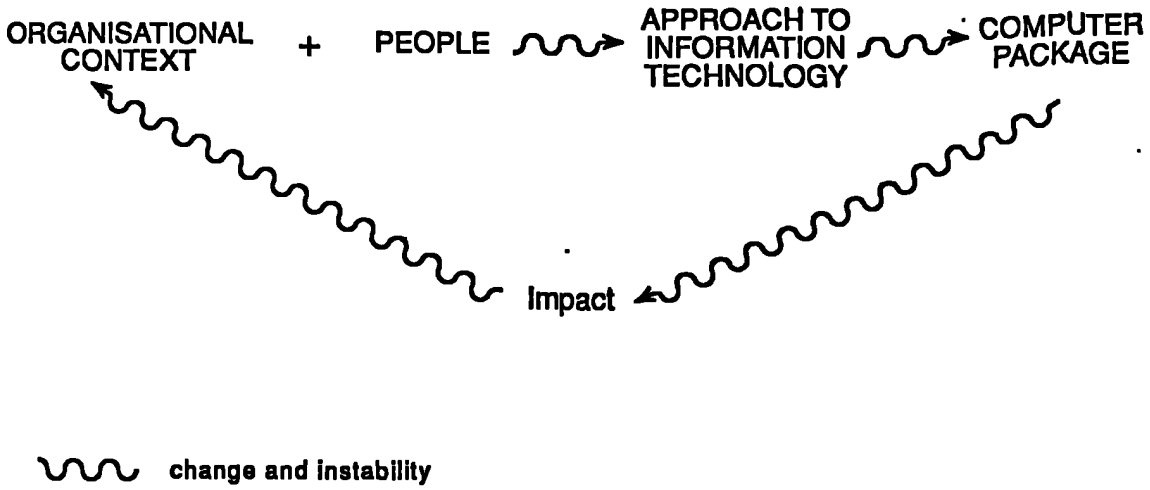

Figure 2.4: The Conceptual framework

The conceptual framework for the research highlights the contribution of (i) the organisational context, (ii) people, (iii) change and instability to an understanding of computer usage in organisations such as local authority planning departments (see Figure 2.4). The manner in which these organisational factors interact with the computer package determines the processes which affect the development and use of automated systems. The conceptual framework suggests a situation of mutual dependency whereby organisational factors influence the operation of the computer package whilst at the same time the technology has various impacts on the organisation. The detailed issues which need to be considered in relation to each element of the conceptual framework will vary between organisations and in time. The identification of the pertinent factors and the manner in which they interact enables greater understanding of the processes affecting the use of information systems than has been possible for analyses based on a systems rationalist perspective.

> Information systems are not technical systems which have behavioural and social consequences, but are social systems which rely to an increasing extent on information technology for their function. (Hirschheim 1985, p.278).

2.5 CONCLUSION

This chapter has examined the assumptions underlying the various perspectives concerned with the use of information systems in organisations. The vast majority of studies based in British planning authorities have adopted a systems rationalist approach. This is surprising given the failure of most planning departments to satisfy the key criteria of stability and consensus. It has therefore been necessary to adapt work undertaken in local government in the United States to the context of British planning authorities. The resulting framework conceptualises technology as a package and suggests that the outcome of computerisation is dependent upon the interaction between computer based systems, the organisational context and people with the degree of instability and the process of change also having an impact.

It is paradoxical that studies of automation in planning departments have largely been based on a systems rationalist perspective. Kling (1983) has suggested that those involved with computer based systems could learn from the planning discipline which considers not only factors such as the distribution of the physical infrastructure but also the underlying socio-economic and political processes which shape the environment. Professional planners are continually concerned with balancing competing interests and coping with uncertainty. However, these assumptions have

not been incorporated into the perspectives underpinning the studies of computer and information use within planning departments. Kling states that,

> Most people are aware that behind the facade of some modern urban developments, many social problems, such as stress, alienation and vandalism have been fostered because traditional patterns of community support and interaction have been broken. Yet few people are aware of the real working conditions that might lie behind the glamorous facade of a computer-based system. (Kling 1983 p.223).

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

The theoretical issues raised in Chapter 2 have important implications for the research design. The assumptions about the nature of technology and the environment in which information systems are located vary considerably between the different perspectives examined. The analysis of planning practice suggests authorities have responsibility for the production of policies on matters of great complexity and are characterised by a dynamic organisational context of frequently uncertain objectives and conflicting personal motivations. As a result the conceptual framework is based on a segmented institutionalist approach rather than systems rationalism which assumes an environment of consensus and stability. The perspective adopted has a significant influence on the formulation of research questions and the range of variables considered. The discrete-entity and web models summarise the main features of the methodologies on which empirical investigations concerned with information management have been based (Kling 1987; Kling and Scacchi 1982). The assumptions underlying the former mirror the systems rationalist approach while the web model reflects those of segmented institutionalism and therefore planning practice. The conceptual framework's emphasis on the contribution of social and political factors to an understanding of the utilisation of information stresses the need to adopt an approach which locates computer based systems within a web of interacting processes.

This chapter examines the research hypotheses and the operational definitions. Consideration is also given to the components of the web model and the application of these methods to research exploring the use of geographical information in British planning authorities. The essential features of the empirical methodology are considered in this chapter while issues specific to a particular case study are discussed in the relevant section of the analysis.

3.2 RESEARCH HYPOTHESES

The central concern of the research is to identify and investigate the factors influencing the extent to which geographical information is used by professional planners in British local authorities. It is vital in this context that the study explores the impact of automated information systems as computers are increasingly employed to store and process planning related data. It has been argued by theorists and practitioners that computerisation offers authorities an opportunity to enhance the rationality of the decision making process and as a result the quality of for instance planning policies (see for example Coulson and Bromley 1990; Gault and Peutherer 1989; Lyon 1989; Simon 1973). This has important implications and therefore the research concentrates on the use of geographical information in the process of formulating policies rather than activities of an operational or managerial nature.

Existing studies based in British planning departments indicate the experiences of authorities and individual members of staff to have been very mixed (Bardon 1985; Campbell 1989; 1987; Farthing 1986b). However, the reasons underlying the varied outcomes of automation and the inconsistencies in the associated utilisation of information are not well

understood. The objectives of the research are therefore to identify and explore the processes which influence the use of information and develop a framework with the explanatory power to account for the differences which the published studies have noted. It is regarded as critical that the value of the conceptual framework is assessed through empirical studies and that the practical as well as the theoretical implications of the findings are evaluated.

Consideration of the issues contributing to the use of geographical information by planning authorities resulted in the identification of three areas requiring detailed investigation. These are:

(i) factors influencing the development of the computer package. It is necessary to examine the processes shaping the components of the computer package as factors which restrict the ability of planning authorities to meet the requirements of practitioners must also have a negative effect on the utilisation of information.

(ii) the role performed by information including automated data in the policy making process. Information system designers have traditionally assumed decision making to be a largely rational process in which information performs a decisive role and as a consequence the individuals involved are eager to acquire and utilise data. It was important to examine through empirical investigations the functions for which planners actually require information as the misinterpretation of this role must influence user satisfaction and therefore utilisation.

(iii) factors directly affecting the utilisation of geographical information including the impact of computer based systems. Given the background provided by the first two issues the last focuses specifically on the detailed factors which influence the propensity

of practitioners to make use of information. Variability in the utilisation of data according to the formal features of the planning authority such as its statutory responsibilities were considered to be of less significance than the social and political processes present in the organisation.

The research questions linked to each of these fields of study reflect the conceptual framework's rejection of a systems rationalist approach and concern about the impact of organisational rather than technical factors on the outcome of computerisation. The resulting hypotheses are listed below.

Hypothesis 1

The development of the computer package in a local authority planning department is dependent upon three sets of organisational factors: (a) the organisational context; (b) people; and (c) change and instability.

Hypothesis 2

Systems rationalist perspectives provide an incomplete understanding of the role of information in organisations such as local authority planning departments.

Hypothesis 3

The utilisation of geographical information is only partly related to the formal functions of the planning authority, more significant are the impacts of the three sets of organisational factors cited in hypothesis 1 and the organisation of the computer package.

3.3 OPERATIONAL DEFINITIONS

A number of key terms which the discussion has so far presumed to be broadly understood are defined in this section. These are: geographical information; local authority planning departments; policy making; and the

concept of use. The interpretations the research has adopted of computer technology, organisations and the decision making process which were explored at length in Chapter 2 are not regarded as requiring further clarification.

3.31 Geographical information

Data and its more processed form of information have been included operationally within the term geographical information. Data is more precisely regarded as unprocessed numbers and/or text which only becomes of value to policy makers when it has been manipulated into a manageable form, defined in the context of the research as information. Reference to a geographical component acknowledges the particular nature of the information utilised by planning authorities (Bromley and Coulson 1989; Cooke 1980; Department of the Environment, 1987). Geographical information therefore refers to phenomena which can be located in space in terms of a point, line or polygon. The most obvious example is the information contained in maps, such as buildings, roads and public utilities as well as both quantitative and qualitative data related to a particular site for instance rateable values, development constraints or land uses. Information of a socio-economic nature linked to broader spatial units such as that derived from the censuses of population and employment are also included within the definition.

Technological developments have focused particular attention on geographical information. However, the field of interest of the research is not limited to systems with the technical sophistication of a GIS as the vast majority of data sets stored in computer files by planning authorities have a spatial component.

3.32 Local authority planning departments

The term planning department refers to the unit individual local authorities designate as responsible for undertaking statutory planning activities. The organisational structure underpinning the distribution of planning related activities varies considerably between authorities. In most instances the unit of study is a clearly defined department but in some cases planning responsibilities are undertaken by a division within for instance a large technical services department. There are in addition significant variations in the nature of the tasks carried out by individual planning departments even within the same tier of local government. It is regarded as sufficient for the purposes of the research that these differences are specified in relation to each case study.

3.33 Policy making

Policy making is regarded as the complex process of selecting the future course of action concerning a particular issue. Policies constitute the formal expression of these activities in local government. Danziger et al. (1982) consider the policy making process to consist of four stages. These are:

- the pre-decision stage involving finding and defining a problem area;
- the decision stage including designing alternative policies, gathering information about alternative approaches and the selection of policy;
- the rationalisation stage during which arguments in support of the chosen policy are prepared;
- the post-decision stage involving monitoring and the evaluation of preferred policies.

This provides a useful framework although it separates processes which are taking place simultaneously and assumes an order to decision making which is not always justified.

The process of formulating policies is also referred to as strategic decision making and should be distinguished from tasks of an operational, managerial or administrative nature. Barrett and Masters (1985) suggest that the demands placed on policy orientated information systems are characterised by ad hoc requests for information often required at short notice in addition to the generation of material through standard monitoring and reporting procedures which is typical of other modes of decision making. Planning authorities are a particularly appropriate context in which to study the formulation of strategic decisions as the balance of activities undertaken is less strongly weighted towards routine decision making linked to service delivery than most other local government departments. All planning authorities regardless of whether they are responsible for preparing structure, local or unitary development plans must for instance analyse the relationship between the existing physical infrastructure and less tangible socio-economic phenomena.

3.34 Use

Use in the context of the research refers to the simple act of employing information within the broad process of policy making. Interest is particularly focused on the extent to which and points in the process when information is utilised as well as discrepancies between the results obtained for automated data compared to material derived from other sources. However, individuals utilise computer based information in very different ways. The research adopts a similar four-fold classification to that developed by Danziger and Kraemer (1986). These groupings are:

- active users who directly access the data they require from computers;
- indirect users who request staff with greater computing knowledge to access the data they require;

- passive users who receive reports containing computer based data but do not actively seek information of this type;
- non-users who have no use for the products of automated systems.

This classification forms a valuable basis for categorising users. Issues concerning the nature of the policies formulated by planning officers were not explored by the research.

3.4 EMPIRICAL METHODS

3.41 Introduction

The discussion of the research questions and operational definitions has identified the area which the empirical studies must investigate. The emphasis of the hypotheses and the nature of the conceptual framework suggest the need to adopt a case study approach. This method provides the most appropriate basis for exploring the complex processes influencing the utilisation of information in organisations (Hirschheim 1985; Mumford et al. 1985; Pettigrew 1988). The two main approaches adopted by research examining information management were considered in Chapter 2 (Kling 1987; Kling and Scacchi 1982)(see Table 2.2). The analysis of planning practice suggested the underlying assumptions of the web model reflected more accurately the conditions found in planning authorities than the discrete-entity approach. It is therefore necessary firstly, to examine the components of the web model and secondly, to consider how this approach could be applied to research investigating the use of geographical information in British local authority planning departments.

3.42 The web model

Empirical investigations based on a case study approach must consider the boundaries of the study and more particularly the relevant variables and appropriate personnel to be interviewed. Research concerned with information management is likely to centre on a particular organisational setting and/or type of system, however, once the focus of the study has been established the web model suggests that the computer package or host environment should not be studied in isolation as significant factors could be overlooked. It is also proposed that the views of staff indirectly concerned with a particular information system should be sought and not simply the individuals with direct experience. As a result Kling (1987) argues that it is inappropriate for studies to define a priori the precise boundaries of the investigation or the participants to be interviewed. It is suggested that the actors and important contextual factors only become evident during the course of the research and as they are likely to vary between organisations it is difficult to establish general guidelines. The boundaries of the web model in contrast to that of the discrete-entity approach are not predefined but are based on informed judgements following a period of study.

It should not be inferred from these comments that the web model adopts a completely unstructured approach to the conduct of research. Kling and Scacchi (1982) have developed a framework consisting of four components. These elements are listed below.

(i) Lines of work and going concerns - Lines of work refer to the actual nature of the work undertaken by staff and going concerns to the goals of the organisation of which there may be several including the possibility of contradictory objectives. Formal job descriptions and departmental reports are regarded as providing only

a first approximation to the situation in practice.

(ii) A production lattice - The network of producers and consumers associated with a given system is referred to as a production lattice.

(iii) Infrastructure - Resources which support information systems and by inference the production lattice such as skilled staff, data checkers, equipment contracts, a supply of electricity and communications links are referred to as infrastructure. These important elements of a system are regarded as often being taken for granted while their availability is perceived to depend upon the status of a particular organisational unit or member of staff.

(iv) Macrostructures - The underlying social and political processes which influence the development and utilisation of information systems are termed macrostructures.

The web model is therefore based on the collection of evidence concerning these four aspects of computer based systems and the environment in which they are located. This approach unlike the discrete-entity model suggests the need to identify and explore the underlying processes influencing the utilisation of information systems rather than concentrating on the equipment and formal procedures present in a given context. As a result the focal computing resource is conceptualised as part of a production lattice which is itself dependent upon the available infrastructure. The development and use of these elements which together approximate to the concept of a computer package are in turn influenced by firstly, the socio-economic and political macrostructures in which they are embedded and secondly the definition of their situation by staff members. It is argued that the infrastructure and macrostructures are responsible for the

computer based services available at each node of the production lattice and since such systems evolve over time they are also affected by historical commitments.

The adoption of the terms, 'lines of work' and 'going concerns' underlines the web model's dissatisfaction with studies which accept job descriptions and departmental strategies as adequate guides to the activities of organisations. Formal job descriptions often bear little relation to the actual tasks undertaken. It is also considered important to examine the goals of an organisation from the perspective of individuals as the motivations of members of staff differ. Practitioners also develop their own views as to the value of their work and the manner in which it should be tackled based to some extent on their personal experiences (Bolan 1980).

The four elements on which the web model focuses reflect the critical factors identified by the conceptual framework, specifically the organisational context and change and instability. The approach is weakest with regard to people as little emphasis is placed on the contribution of personal characteristics to an individual's propensity to utilise information. Direct mention of the impact of interpersonal relationships particularly between user and the technical experts is also absent. These issues are especially important in relation to the formulation of planning policies as the staff involved are generally able to exercise discretion over the precise manner in which they undertake their work. As a result the empirical investigations will give this element a higher profile than is suggested by the web model.

Given these considerations, the web model provides a useful framework to explore the research hypotheses. The approach overcomes the partial analysis inherent in the discrete-entity studies which have dominated research based in British local authority planning departments. The web model avoids the adoption of a single perspective enabling the explanatory power of the interactionist and political traditions to be tapped along with the rational and bureaucratic perspectives. Therefore,

> In contrast to the discrete-entity models, which gain simplicity by ignoring the social context of computing developments, web models make explicit the salient connections between a focal technology and its social and political contexts. (Kling and Scacchi 1982, p.3).

3.43 Application of the web model

The web model has been largely developed as a result of experience gained from conducting studies in local authorities in the United States. This section describes how the approach was applied to research examining the use of geographical information in British local authority planning departments. Consideration is given to the selection of the case study authorities and the structure and conduct of the empirical investigations.

Selection of the case study authorities

A critical issue for research based on an in-depth case study approach is the choice of authorities to be investigated. It is therefore important the selection criteria are considered carefully. However, choosing the case studies on paper is likely to be a futile exercise if thought is not also given to the process of obtaining agreement to conduct the research in the preferred authorities. Given the detailed nature of the empirical investigations and the time and cooperation required from staff within the selected authorities it was recognised at an early stage that successfully negotiating access would need to build on prior contact. As a result the

preliminary phase of familiarisation with the experiences of planning departments formed the basis for both informed decisions concerning the most appropriate selection criteria and initial links to be made with key practitioners in their respective authorities. A variety of sources were utilised for this initial period of data collection including published and unpublished surveys and interviews with planning officers.

The national surveys undertaken in 1982 and 1984 by Barden and Stothers and a more detailed study conducted on behalf of the County Planning Officers' Society (CPOS) in 1987 provided an overview of computing facilities available to planning authorities (Bardon and Stothers 1984; 1982; Biddick 1988). The directories of computer equipment and the associated applications compiled by Bardon and Stothers have their limitations as access to local authority facilities is not necessarily a good indicator of regular use. Rapid change in the availability of information technology within planning departments also made it important to supplement these findings. Given the reservations discussed earlier about the approach adopted, Bardon and Stothers' case studies provided further information on eight contexts (see for example, Bardon, Elliott and Stothers 1985a; 1985b; 1984a), while the survey undertaken on behalf of the CPOS gave a more up to date impression of the experiences of county planning authorities in England and Wales. In the case of the latter access to the completed questionnaires proved valuable as the published reports concentrate on general trends.

Secondary sources were utilised as a guide to the distribution of computing resources but on their own were regarded as an inadequate base for case study selection. As a result this knowledge was augmented by direct contact with practitioners. Background on activities in shire and

metropolitan districts was derived in part from the findings of a study conducted in the first half of 1987 as part of a Masters Degree in Town and Regional Planning (Campbell, 1989; 1987). In addition ten authorities from all local government tiers and with differing approaches to information management were contacted. A series of one day visits to planning departments throughout the country then followed. These preliminary investigations proved very valuable. The findings supplemented and updated the existing surveys as well as confirming the complex nature of the processes influencing the development and use of automated systems. The combination of secondary sources and direct contact with practitioners was regarded as providing an adequate overview of current trends. It was therefore not perceived to be necessary to undertake a further survey.

The findings of the preliminary investigations provided the basis for the formulation of the selection criteria. The objective was to identify planning authorities which would yield a high return rather than necessarily being regarded as typical. Existing knowledge of the full range of experiences would enable the findings to be put into context. Two groups of criteria were chosen as the basis for the first phase of the selection process. These were:

- the statutory planning responsibilities of the authority; and
- the department's approach to information management, including its length and degree of involvement with computer based systems.

A short list of suitable case studies was compiled on this basis with the final choice determined by a third factor, namely the willingness of the preferred authorities to facilitate and support the research.

The statutory responsibilities of planning authorities vary according to which local government tier they are located. Chapter 1 indicated that the work of county and regional authorities is focused on strategic issues while the metropolitan and shire districts prepare more locally based planning documents and undertake development control. Given these differences it was regarded as important to examine whether the statutory context merely affected the content of the geographical information utilised by policy makers or whether it had a more profound influence.

The second selection criterion concerned the overall approach adopted to information management and more particularly the length of involvement and sophistication of the technology utilised by planning authorities. The research's overall objective of exploring the use of geographical information in the context of the growing availability of computers made it important to select environments with a significant presence of automated systems. The preliminary investigations also demonstrated that authorities with the greatest experience of computer based systems were more likely to have addressed the complex issues on which the research is based. It was also important that environments were chosen where the information systems were actually available for use and as a consequence well developed procedures had been established rather than departments engaged with the initial difficulties of development and implementation. A department's general approach to handling information such as, the extent to which resources were decentralised and the degree of dependence on the local authority's central computing section, were also noted.

Identification of prospective case studies was based on the criteria outlined and knowledge of planning practice. An important aspect of the research design was the in-depth nature of the case study approach. It

was therefore decided, given the resources available, that two case studies would be undertaken. Empirical investigations in two authorities were regarded as enabling the detailed findings to be compared and contrasted, while the knowledge acquired through the preliminary phase of data collection and contacts during the research provided a broader context within which to assess the results.

Two short lists were produced one for county and regional authorities and a second for shire and metropolitan districts. It was ajudged that one authority from each of these basic divisions should be examined. The investigations would therefore encompass planning departments with essentially strategic responsibilities as well as those with a more locally based role. These short lists were prioritised with the planning departments of Hertfordshire County and Glasgow District topping their respective categories. These authorities complemented each other as both had considerable experience of utilising information technology but had adopted contrasting overall approaches. The Planning Department in Hertfordshire had favoured a decentralised micro based strategy while the organisational structure of the mainframe orientated approach of Glasgow was more centralised.

Differences in the Scottish local government context and nature of statutory planning responsibilities which distinguished Glasgow from authorities in England and Wales were regarded as a positive asset rather than a disadvantage for the following reasons. Metropolitan counties in the English conurbations largely undertook responsibility for information processing prior to their abolition in 1986. As a result at the time of case study selection the district authorities were attempting to redefine their roles with some laying the foundations for joint facilities, while

others were developing independent services. It was decided that such uncertainty and the absence of well established flows of information would not have facilitated the conduct of the research. An additional factor favouring Glasgow's selection was the considerably longer experience of formal policy generation linked to local plan preparation than their counterparts in England and Wales. Scottish legislation has made it compulsory since 1975 for districts to have complete local plan coverage, while south of the border this has only been the case in the metropolitan areas since the introduction of unitary development plans in 1986. Prior to this plan preparation was permissive with many authorities opting for informal planning guidance rather than statutory documents. The situation in the shire districts remains unchanged. The absence of a shire district from the top authorities short listed reflects in part the issue noted above but also a tendency for them to rely on the services of county councils and as a result have only limited, although admittedly growing, experience of computer based systems. An exception to this are the large urban shire districts but these in many ways resemble the formal characteristics of metropolitan authorities.

The second phase of the selection process involved obtaining the agreement of the preferred authorities for the research to be undertaken. The Planning Departments of both Hertfordshire and Glasgow consented, on the understanding that they would be granted access to the findings. The initial contacts made with key individuals in the respective authorities greatly facilitated this process as they were willing to clear any difficulties with senior management. The highly experienced data processing environments of Glasgow District and Hertfordshire County planning authorities therefore formed the basis for the empirical investigations.

The structure and conduct of the empirical investigations

The empirical investigations in Glasgow and Hertfordshire were based on a phased case study approach. This consisted of two major periods of data collection in each authority succeeded by a follow up stage designed to give key individuals an opportunity to comment on the findings specific to their authority and the overall conclusions. The merits of this structure for research exploring the detailed issues concerned with the use of geographical information will be considered followed by an examination of the aims and methods adopted during the two main periods of data collection as well as the choice of respondents.

An important aspect of the research design was the phasing of the empirical investigations. This framework enabled the first essentially exploratory stage to provide the foundation for the second more structured period of research. Informed decisions could therefore be taken concerning the boundaries of the study and more precisely the issues requiring detailed investigation and the most appropriate individuals to interview. This approach reflects Kling's (1987) experience which suggests research concerned with the utilisation of information systems benefits from an initial period of study which sensitises the researcher to the specific context being examined. As a result the first period of data collection was completed and analysed in both authorities prior to the second being undertaken. These major phases of empirical study took place between May 1988 and February 1989 with the follow up discussions held in September 1989. Changes which occurred after the second phase of fieldwork were not included in the analyses.

The general aim of the first phase of fieldwork was to explore and become familiar with the activities and personnel within each authority. The

second and more focused objective was to construct a profile of the computer package and examine its relationship to the organisational factors highlighted by the conceptual framework. These findings therefore addressed the issues raised by the first hypothesis. The web model was used as the framework for the three week period of data collection in each authority. The results of the fieldwork were assessed at the end of each day with the web model providing a valuable means of structuring the material gathered as well as offering sufficient flexibility to accommodate the differences between the authorities. Documentation such as committee reports concerning the administrative structure, arrangement of the department and the development of information systems was requested and examined prior to the commencement of the fieldwork. These official statements provided useful background which was then amplified and amended during the fieldwork. Exploratory interviews were conducted with at least one member of the main sections of the departments, while most of the professional staff in the groups responsible for preparing policy and processing information were interviewed. Links with external agencies such as other departments or local authorities were examined only in so much as they contributed to an understanding of the development and use of information by planners within Glasgow and Hertfordshire.

The explanatory interviews were designed to enable staff to recount their personal impressions of the department while also covering the key issues listed below.

(i) Issues for all staff:

- the nature of the tasks undertaken by the officer and the role of information in those activities;
- the historical evolution and organisation of the department;
- the aims and objectives of the department.

(ii) Issues for staff responsible for handling information:

- the historical development and organisation of the departmental information processing facilities;
- the content of the data sets held by the department;
- the frequency with which different data sets are interrogated;
- the number of reports routinely produced from a given data set;
- the number of special requests for information;
- the frequency with which information is generated for different groups of users.

(iii) Issues for information users:

- the most useful data sets;
- the type, quantity and quality of information used;
- the degree of satisfaction with the service provided by those responsible for information processing.

The first phase of fieldwork therefore gathered details on the historical evolution of the department, the pattern of information system development, the quantity, quality and nature of the data sets held by the respective departments as well as a crude quantitative guide to the use of geographical information by individual officers.

The second phase of data collection concentrated on gaining an understanding of the underlying processes resulting in the patterns of information usage noted during the exploratory investigations. The aim was to examine the role of geographical information in the policy making process and identify and explore the detailed factors influencing its utilisation. As a result the research focused on the issues raised by hypotheses 2 and 3. In the case of the latter the contextually sensitive studies of the initial period of fieldwork indicated that a number of issues merited particular attention. These were: the level of computer

and information awareness amongst staff; the nature of the relationship between users and the technical experts; the priorities of individual officers with regard to the development of information systems and the role of key groups of individuals in the process of securing resources.

Semi-structured interviews were conducted with policy makers and the staff responsible for processing information. These were based on an interview schedule which allowing for some contextual modifications took advantage of the studies undertaken by the Irvine Group (see Appendix A). This reduced the time required for testing and piloting the questionnaire and also provided a framework for comparing the British findings with local government experience in the United States. The aim was to generate evidence on general trends which would enable direct comparisons to be made between the two case studies while also providing respondents with an important opportunity to indicate the reasoning behind their answers. The interview schedule therefore was designed to act as a framework around which a wider discussion could develop. With this objective in mind the majority of questions took the form of statements to which respondents were requested to select one of five levels of agreement, ranging from strongly agree to strongly disagree. A sixth category was devised for the small number of instances where the subject of a statement was regarded as being outside the experience of the officer concerned. In these cases a 'no response' was noted. This option was not available to the respondent in an effort to avoid individuals evading the issues being addressed. Most of the statements were phrased in a normative form to overcome the problem of officers being forced by implication to criticise colleagues.

An issue of terminology to which attention should be drawn concerns the adoption of spatial data and the shortened version data throughout the

interview schedule. This reflects the initial use of these terms by the research. However, it will be clear from the accompanying definition as well as being emphasised during the interviews that reference was not simply being made to unprocessed numbers and/or text but to material which had been processed into a form which was of use to policy makers. The issue of terminology was addressed at an early stage of each interview to ensure comparability. This was achieved by asking the respondents to describe in terms of their work what they regarded as constituting data and to follow this up with a discussion of the operational definition. Most respondents made no distinction between data and information but in a minority of instances the difference was crucial and in such circumstances the individuals were asked to substitute the wording now adopted by the research, that being geographical information.

The findings of the first phase of data collection provided an informed basis for the selection of issues on which the second would focus. The interview schedule therefore addressed the four areas highlighted by the exploratory studies as well as providing the basis for the collection of structured data on the role performed by information in the policy making process.

The discussion of the empirical investigations have described the main methods adopted. These were exploratory and semi-structured interviews and analysis of official documentation. In addition to these techniques critical insight was gained through observation and participation in the life of the respective departments and attendance at meetings. This was achieved through spending full working days in the respective authorities during the three week period of each phase of the research. As a result when interviews were not being conducted the activities of the department

could be observed. Discussions with key individuals concerning the profiles produced as a consequence of the initial period of fieldwork and the subsequent analysis and conclusions derived from the second, were very valuable both in terms of the research and also fostering cooperation. Pettigrew (1988) has pointed to the potential problem of 'going native' with respect to conducting an in-depth case study approach. The periods spent away from the authorities were designed to avoid this becoming a difficulty.

An important issue for research based largely on interviews is to consider the strategy most likely to ensure accurate results. The comments of staff may be restrained if they perceive their views are likely to be relayed directly to senior management. An attempt to overcome these difficulties was made by ensuring the interviews were conducted in privacy. The profiles produced as a consequence of the initial fieldwork assisted the process of developing confidence by highlighting a full range of comments but not attributing them to a particular individual. Daily presence within the department over a period of at least six weeks was designed to make it difficult for sensitive issues to be obscured.

The final issue to be addressed concerns the selection of the individuals to be interviewed at each stage of the fieldwork. A wide sampling frame was adopted for the first phase of the research in line with the web model. The discrete-entity approach which concentrates on obtaining the views of technical experts and individuals who directly access data from computer based systems was not regarded as adequate for many reasons. First, utilisation of information may take an indirect or passive form as discussed earlier. Second, the presence of non-users raises important questions about the facilities provided. Third, the research is not

limited to consideration of automated data as the use of information from other sources may have important implications. Fourth, the general aim of becoming familiar with the department's goals, activities and personnel made it important to avoid limiting responses to a particular section of the department or level in the professional hierarchy.

The groups interviewed during the first phase are listed below:

(i) senior management;

(ii) professional planners - users;

(iii) professional planners - information and research;

(iv) technical specialists - computer programmers/analysts, statisticians;

(v) technicians - support staff;

(vi) other local authority departments - users;

(vii) the authority's central computing section - technical specialists;

(viii) other local authorities - users.

The main group omitted from this list are clerical staff due to the administrative nature of their work which was beyond the scope of the research. Links with staff outside the planning department were only followed up in instances where they influenced the internal provision of information. During the first period of research the initial contact in each authority performed a key role in facilitating the process of gaining interviews within the time frame of the case study.

Focus on the activities associated with policy making during the second phase led to a reduction in the groupings from which staff were selected. As a result individuals from the first four categories listed above were interviewed. In the case of the grouping termed professional planners - users, it was appropriate given the focus of the research to limit the

investigations to a sub-section involved with the formulation of planning policies. The findings of both phases of interviews were analysed at the level of the individual, the respective grouping and authority wide as it was regarded as potentially misleading to assume departmental or even group consensus.

3.5 SUMMARY

The adoption of a segmented institutionalist perspective has had a substantial influence on the empirical methodology. The research hypotheses focus on the need to explore the impact of organisational factors on the development of the computer package and the utilisation of geographical information as well as considering the actual role performed by information in the policy making process. A phased case study approach based in the planning authorities of Hertfordshire County and Glasgow District has been selected as the best means of achieving the depth of study required to investigate the complex and interrelated processes underlying the use of geographical information. The findings of these empirical investigations will be analysed in Chapters 4 and 5.

CHAPTER 4

THE USE OF GEOGRAPHICAL INFORMATION IN HERTFORDSHIRE COUNTY PLANNING AND ESTATES DEPARTMENT

4.1 INTRODUCTION

Hertfordshire County Council Planning and Estates Department, referred to simply as the Planning Department throughout the discussion, was selected as an appropriate location for one of the case studies. This chapter describes and analyses the findings of the empirical investigations conducted in Hertfordshire. The nature of the computer package and the social world in which it is embedded will be outlined followed by a summary of the overall approach to information management adopted by the Department. Given the discussions in Chapters 2 and 3, this profile provides the basis for the subsequent assessment of the factors influencing the development of the computer package and the utilisation of geographical information by individual officers as well as the role of information in the policy making process. It is necessary prior to reviewing the components of computer package to examine the detailed characteristics of the phased case study investigations undertaken in Hertfordshire.

Exploratory interviews were conducted with thirty-one members of the Planning Department including users, senior management and those involved with the generation of information. A further seven interviews were undertaken with staff in the Education and Social Services Departments as well as the main liaison officer in five of the Hertfordshire district

authorities in order to gain a more complete understanding of the Department's activities. It was not appropriate for interviews to be arranged with members of the private sector as there were no regular flows of information between the Planning Department and organisations of this type.

Seventeen officers were selected as respondents to the semi-structured interviews. The staff were grouped under four headings which are listed below with the abbreviations adopted:

(i) structure planners (SP) - 8 professional planners involved with monitoring, reviewing and implementing the structure plan, including the former head of the Forward Planning Group who had been partially seconded to the South East Regional Planning Conference (SERPLAN);

(ii) senior decision makers (D) - 2 senior decision makers represented by the Chief Officer and the Head of the Service Unit;

(iii) information officers (I) - 4 members of the Information Group in the form of the three section heads and the officer in overall charge of the Information Group;

(iv) computer programmers (P) - 3 computer programmers dealing with systems generating policy related data.

As a result of the unavailability of a member of the Forward Planning Group and the failure of one of the programmers to attend a pre-arranged meeting a total fifteen interviews were conducted. Unfortunately it was not possible to gain access to elected members due to the sensitivity of senior management. Attendance at the Planning and Economic Development Sub-Committee provided an opportunity to observe the final act of decision making and the relationship between the Chief Officers and elected members.

It is not regarded as appropriate for the original data from individual interviews to be included in the discussion due to issues of confidentiality. The findings of the semi-structured interviews are referred to where applicable and presented in the form of aggregated analyses at the level of staff groupings or the whole authority. It was noted in Chapter 3 that the majority of the questions on the interview schedule took the form of statements to which respondents were asked to choose one of five levels of agreement. In the subsequent analyses scores have been awarded to the preferences selected by those interviewed. These range from 1 for strongly disagree to 5 for strongly agree. Based on this scoring system the mean and standard deviation have been calculated for the responses of each of the staff groupings as well as the whole authority. The results of the analyses provide a means of comparison by highlighting the average level of agreement with a particular statement and also the extent of within group variation. However, this is not regarded as a rigorous statistical exercise.

4.2 COMPUTER PACKAGE

4.21 Introduction

This section describes the basic components of the information systems developed by Hertfordshire County Planning Department. Chapter 2 highlighted the tendency for most of the published studies to consider computer technology as simply items of hardware and software. This approach is rejected in favour of regarding technology as a package which includes people and the available techniques as well as equipment and data sets. In relation to techniques the level of computing skills amongst

staff will be discussed separately while important issues related to corporate expectations and shared beliefs concerning the utility of computer based systems will be explored throughout the chapter.

4.22 Equipment

Table 4.1 lists the computing equipment available to the Planning Department including the mainframe facilities which can be accessed throughout the County Council. It is evident that the Department places a strong emphasis on utilising micro computers.

Table 4.1: The equipment element of the computer package available within Hertfordshire County Planning Department

Equipment	Comment
Computers:	
- Mainframe	Access to the authority's IBM 4341 via 3 terminals
- Micro	20 IBM standard micro computers including 1 dedicated to the digital mapping pilot and 1 to desk top publishing
Accessories:	
- Printer	1 printer linked to each micro including 2 laser printers and 1 printer linked to a mainframe terminal
- Digitiser	1 digitiser
- Plotter	1 plotter associated with the digital mapping pilot

4.23 Techniques

The significant contribution of micro computers to the development of information systems by practitioners in Hertfordshire is stressed by the types of software available within the Department (see Table 4.2). It has become accepted practice in Hertfordshire for data sets to be stored in micro computer based information systems which utilise standard business packages for data manipulation. The systems designed to process the results of the Census of Population and the findings of very large surveys are currently the main exceptions, although with the increasing capabilities of micro technology it was suggested this situation was likely to change.

Table 4.2: The software element of the computer package in Hertfordshire County Planning Department

Hardware	Software	Comment
Mainframe	SPSSX	statistics package
	SASPAC	statistics package
Micro	Lotus 123	spreadsheet package
	Dbase III+	database package
	Freelance	graphics package
	Datamap	digital mapping system holding a small number of digital maps

4.24 Information systems/data sets

A substantial number of micro computer based information systems have been developed by the Planning Department (see Table 4.3). A large proportion are self contained holding relatively small data sets with the main exception the system designed to store details of the planning

Table 4.3: Information systems developed by Hertfordshire County Planning Department

Contents of data set	Mainframe	Micro
Land statistics:		
- Planning applications		+
- Residential land availability		+
- Circular 15/84 sites		+
- Hertfordshire dwelling statistics		+
- Employment land availability		+
- Commercial property on the market		+
- Land use data	+	+
- Firms by industrial areas		+
- Firms by central areas		+
- New industrial and commercial developments		+
Demographic statistics:		
- 1971 Census of Population	+	
- 1976 County household survey	+	
- 1981 Census of Population	+	+
- Population and household projections		+
- Activity rates		+
- Headship rate projections		+
- Census of Population analyses		+
- Birth/death rate calculations		+
- Employment change analysis		+
- Housing needs of mature households		+
- 1986 household survey	+	+
Employment/unemployment statistics:		
- 1980 county employment survey	+	
- Census of Employment	+	+
- Monthly unemployment bulletins		+
- JUVOS unemployment statistics by ward	+	+
- National On-line Manpower Information System (NOMIS)		
Environmental Statistics:		
- Historical environment/archaeological sites		+
- Hertfordshire tree scheme		+
- Minerals system		+
- Ancient and special woodlands		+
Transport statistics:		
- Car parking duration system		+
- Public transport survey analyses		+
- Public transport systems		+
- Bus survey schedule system		+
- Public transport management information system		+

applications submitted within the County. The development of numerous single topic systems contrasts with Glasgow's approach based on large interrelated data sets as will be shown in Chapter 5.

4.25 People

The Information Group is responsible for the provision and handling of the data resources of the Department and is located within the Services Unit. The Group is divided into three main sections each led by a team leader accountable to the overall Group head. The Survey Section largely undertakes data collection while the Information Section analyses data, produces documents and provides technical support, lastly the Mapping and Special Projects Section takes responsibility for data presentation and map related issues. An important sub-section of the latter is the Terrier and Land Survey which collates information on the property and land owned by the County Council. Members of both the Information and Mapping and Special Projects sections also perform an important function as intermediaries between users and the computer programmes.

The Information Group is headed by a qualified planner whose interests focus on the effective utilisation of information. The Group consists of thirty staff in addition to a pool of individuals who take part in the surveys conducted by the Department. Twenty per cent of the permanent staff are part-time with no formal planning qualifications. These individuals mainly undertake administrative tasks. There is a tendency for the posts of planning officers to have relatively low grades although most of the staff have considerable experience of the Hertfordshire context.

Planning employs four computer programmers unlike other County Council departments in Hertfordshire. The programmers work closely with members of the Information Group and are dispersed throughout the Department rather than forming a separate section. Each programmer has been given an area of specialist skill in addition to general responsibility for resolving the technical difficulties of users. These specialisms include: the development of small micro based systems; the maintenance of larger data sets for instance the planning applications system as well as automated mapping; project work on the mainframe such as processing the household survey; and administrative systems.

The use of micro technology and the appointment of programmers to the staff of the Department leads to almost complete independence from the authority's central computing section. Sophisticated computing skills are limited to the technical experts but some officers possess sufficient knowledge to access the data they require as well as being able to use spreadsheet, data base and graphics facilities.

4.26 Summary

The computer package in Hertfordshire County Planning Department is dominated by micro computers and the use of standard business packages to provide a diverse range of information systems based on original data collection as well as secondary sources. The development and utilisation of such systems requires a relatively low level of computing skills while complicated technical problems can generally be resolved by the programming staff employed by the Department. The next section explores the wider social world into which the use of these information systems is embedded.

4.3 THE SOCIAL WORLD

4.31 Introduction

Chapter 2 indicated the importance of exploring the social world in which information usage takes place in order to gain an understanding of the factors influencing the development and utilisation of a computer package. The first part of this section examines the external environment and the County Council context as well as the historical evolution of information provision and the nature of the activities undertaken by the Department. The second half focuses on the arrangements for the acquisition and provision of data in addition to assessing the extent to which information is used by groups within and outside the Department. The discussion aims to avoid concentrating solely on the information providers at the expense of those for whom the service is being supplied.

4.32 The external environment and the local government context of Hertfordshire County Planning Department

The external organisational context

Hertfordshire County Planning Department serves a population of around 980,000 in the increasingly prosperous South East of England. In July 1989 the average level of unemployment in the County was three per cent which reflects rapid growth in the service sector and the renewed strength of a restructured manufacturing sector dominated by high technology and in particular defence related industries. The main issues facing the Planning Department are associated with prosperity and growth. As a result planners in Hertfordshire have to balance the rising demand for industrial and residential land against the need to conserve the local environment, while at the same time protecting the interests of the less

prosperous sectors of the community with respect to, for instance, affordable housing. Increasing levels of road congestion is also becoming a significant issue.

This very brief overview provides an indication of the socio-economic context in which the Planning Department's activities take place and is in marked contrast to the circumstances facing planners in Glasgow. It is likely that Hertfordshire's population and therefore a number of the elected members will have had greater exposure to technological developments than is the case in most authorities. At a practical level the negative effects of the rising cost of living are making it increasingly difficult to recruit staff into the public sector. The ten District councils with which the County has joint working arrangements for the provision of data are facing severe staff shortages while at the same time the quantity of planning applications is growing. These issues will be expanded in the course of the chapter.

Central government currently represents the most significant external influence on the County Council. Proposals for the reorganisation of local government and more specifically suggested modifications to the work of county planning authorities have affected the organisation of service provision. There has been uncertainty over the future of county councils as the strategic level of local government in Britain. Hertfordshire's response has been to develop self contained services such as the countryside rangers or the team dealing with archaeological matters. Competitive tendering has also influenced the approach adopted by a number of departments. This legislation prompted the central computing section to be separated from Finance forming a new Department known as the Information Systems Directorate (ISD) in 1989. This new body also

includes staff from the Management Services Unit and the computer programmers from the Highways Department. ISD is designed to perform a consultancy role for which departments will pay a fee.

The proposals which impact most directly on Planning concern the suggestion that the statutory responsibility for the preparation and update of structure plans should be replaced by county statements. This challenge to the traditional responsibilities of planning has led to a decline in the resources allocated by the Department to the structure plan process. The number of staff working in this area has been reduced from twenty-three to nine. It must be acknowledged that these figures exaggerate the overall level of decline as they include the relocation of staff to other sections. However, the general trend is clear with the Department at the same time developing a number of high profile service oriented activities which deal with issues such as the countryside, archaeology, transport, town centres, management of the County Council's land and property holdings and provision of information. This represents an attempt to ensure the Department's continuing relevance and viability in the face of changing external circumstances.

The local government context

The provision of services by the County Council has been traditionally centred on individual departments with chief officers performing a prominent role. In an attempt to forge a more cohesive overall approach the Policy Coordination Unit was established as part of the Chief Executive's Department at the end of 1987. The impact of this unit has not been particularly significant and as a result the activities of the County Council remain highly departmental in nature.

Elected members are not encouraged by chief officers to take a prominent role in decision making and they appear content with this situation. Councillors are generally presented with a single recommendation rather than several options which would require greater thought as to the most appropriate course of action. The relationship between less senior officers and elected members is guided by an informal set of rules. All requests for information from councillors are channelled through the relevant chief officer who takes responsibility for ensuring their requirements are satisfied. Departmental heads are protective of their intermediary function and as a result direct contact between officers and members is extremely rare.

A critical issue in terms of the potential availability of resources and scope for action is a department's position within the local authority hierarchy. The attainment of respect and status is largely a consequence of obtaining the confidence of elected members and the political manoeuvrings between chief officers. The Planning Department has secured a prominent position within the County Council in the last ten to fifteen years through high profile initiatives and emphasising the importance of the activities being undertaken by planning officers. An illustration of the perceived significance of the Department's work has been the inclusion of planning issues in the manifestos of the political parties prior to current concern about the preservation of the environment. It will become increasingly clear from comments throughout the chapter that the contribution of the Chief Planning Officer to the current status of the Department should not be underestimated.

Two phases of County Council reorganisation have affected the Planning Department. The first of these was the merger of Planning with the

smaller Estates Department. The amalgamation resulted in the appointment of planners to most of the senior management positions including the post of chief officer. The merger had the important effect of enabling planning to become associated with the financially and therefore politically significant activity of managing the County's substantial stock of land and property. It would, however, be wrong to assume that members of the former Estates Department have been completely satisfied with the merger.

The second important change to the authority's organisational structure has been the formation of the Information Systems Directorate. It is interesting to note that while the computer programmers of the Highways Department have been absorbed into this agency the same fate has not befallen the technical staff presently employed by the Planning Department. The direct impact of the newly privatised Directorate on the development of information systems by the Planning Department is currently unclear but there has been one practical consequence of immense significance. The formation of ISD compounded an existing shortage of space at County Hall. The solution has been the temporary relocation of one of the four units of the Planning Department to a redundant school in Ware which is about six miles away from County Hall. As a result from the start of 1989 the Information Group has been physically separated from its main internal client the Forward Planning team.

The discussion of the external environment and the County Council context provide the background against which the activities of the Planning Department take place. The explanatory power of these influences with respect to the development of the computer package will be explored in Section 5.

4.33 The historical context and organisational structure of Hertfordshire County Planning Department

A historical overview of the development of information provision

Planner's in Hertfordshire perceive that a good information base is required to support strategic planning and to that end substantial resources have been allocated to the process of collecting, analysing and supplying data. An information service with particular responsibility for developing a computer based system designed to handle details of planning applications was established prior to local government reorganisation in 1974. The increased responsibilities of district planning authorities after this date led to a demand for more staff, with many of the County's employees recruited by the Districts. Given the existing personal relationships it was agreed that both the County and the Districts would benefit from close working arrangements for information handling. These arrangements have been formalised and are still regarded as important.

In the late 1970s economic circumstances led to several periods of departmental reorganisation which aimed to reduce staff numbers. Three separate teams were initially established known as the Structure Plan, Special Plans and the Special Monitoring teams. The latter developed into the Monitoring Unit which had responsibility for overseeing the activities of the Department and based on performance indicators assessing the progress being made towards the implementation of the Structure Plan. However, by 1980 the luxury of the Monitoring Unit had to be foregone. The Structure Plan and Special Plans teams were merged to form Forward Planning with a team of officers responsible for information linked to this Group. The present structure results from the amalgamation of the departments of Planning and Estates in 1986 which prompted the establishment of separate Forward Planning and Information Groups. The

main clients of the Information Group are still the forward planners but data is now additionally supplied to a disparate group of internal users and external organisations. The provision of information has remained a high priority throughout the organisational changes which was reflected in the Chief Officer's suggestion that a third of departmental resources are expended on this activity.

Technological experience was first acquired in Hertfordshire as a result of experimentation with land use transportation models in the late 1960s and early 1970s. The first programmer was employed by the Department in 1968 and had the specific task of developing a system to store information on the planning applications received by the County. The number of computing staff increased to six in the mid 1970s falling to four during the 1980s. The programmers initially concentrated on designing mainframe based systems which entailed cooperation with members of the authority's central computing section. The increasing capabilities of micro computers led to a change of technological emphasis in the 1980s. An important advantage of these systems was the reduction of delays and inconvenience which had been a symptom of dependence on personnel from another department.

The technical specialists within the Planning Department relish the independence which results from the micro based approach but are rather less enthusiastic about the associated strategy of decentralising computing skills which has been partially responsible for their loss of recognition as a separate section. The Head of the Computing Section's increasing involvement in activities outside the Department and his eventual retirement provided management with an opportunity to reorganise. The Head of the Section was not replaced and the four remaining computing

staff were dispersed throughout the Department. However, the programmers maintain a separate identity reflected in the quarterly meetings of what they term the 'Computing Section'. More practically they feel that their physical separation reduces the informal contact and sharing of expertise which facilitates the process of solving complex technical problems.

The justification for devoting resources to information provision has been based on the needs of strategic planning. During the 1970s it was felt that substantial data reserves were required to support the authority's policy of attempting to limit development. In the changing economic circumstances of the early 1980s information was regarded as an important aid to enhancing employment prospects within the County. In recent years emphasis has returned to policies of constraint and efforts to conserve the environment. Information is still perceived to have a significant role in this strategy but in addition to fulfilling internal needs attempts are also being made to produce data in a form which will be of value to external agencies.

Information is increasingly viewed as a commodity. The Planning Information Service Initiative known as Planis which was started in 1985 represents an effort to tap the commercial value of the data held by the department. The aim of the initiative is to exploit the existing information systems to supply external organisations such as the District Councils and the private sector with data in the form of well presented reports and factsheets. The private sector is required to make a contribution towards the production costs while the Districts pay an annual sum in return for the Planis documents and other services such as technical support. Members of the all party Policy Advisory Group which was established to review the current work and future direction of service

provision by the County Council, supported the activities undertaken as part of this Initiative in 1988. They emphasised the continuing importance of strategic planning but suggested that the Information Group should combine meeting the needs of internal users with a more outward looking approach. Members were pleased with the existing attempts made to market data through the Planis initiative but felt that it should be developed further. Three areas of information provision were identified as priorities. These were: supplying the information required to assist the process of reviewing and implementing the Structure Plan; developing the existing systems as a corporate resources; and devising a more commercial strategy as the basis for marketing data and the generation of income.

The increasing emphasis on serving external users is not simply a reflection of a general trend towards the commodification of information but is also a response to the uncertainty surrounding the future of county planning departments. It is hoped that such activities will raise the profile of planning demonstrating the department's contribution to the work of the County Council and as a result justifying its future existence even in the possible absence of structure plan responsibilities.

The organisation and nature of the activities undertaken by Hertfordshire County Planning Department

Figure 4.1 provides a detailed description of the structure and hierarchy of the Department. It illustrates the groups into which the Department's activities are divided and indicates the organisation of the personnel in the sections where staff were interviewed. The County Planning and Estates Officer and his Deputy have overall responsibility for the Department with the work load divided between four Units termed Develop-

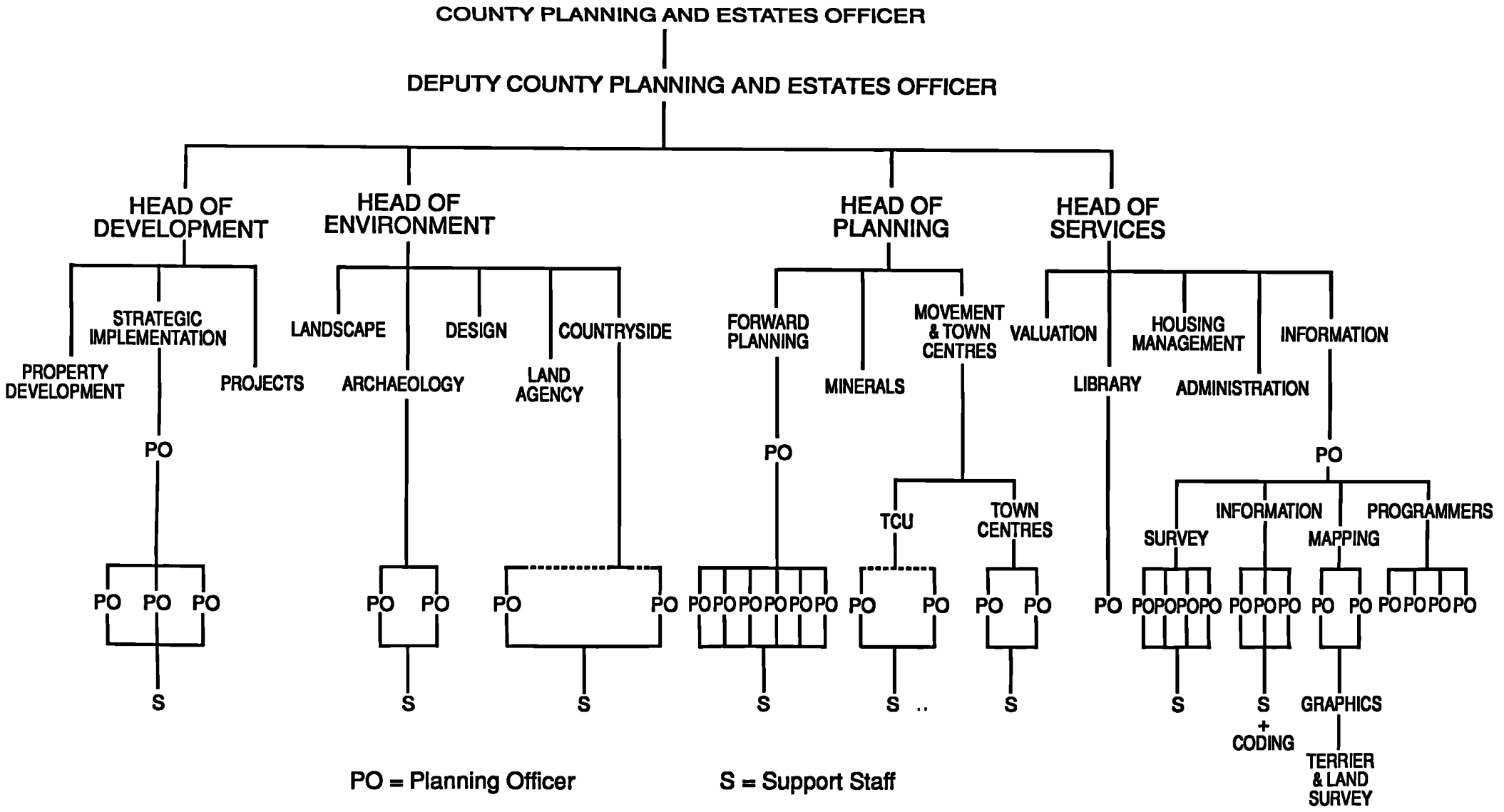

Figure 4.1: Structure of Hertfordshire County Planning and Estates Department (October 1988)

ment, Environment, Planning and Services. Each Unit is further sub-divided into a number of groups. This section examines the nature of the activities undertaken by the respective Units and more particularly the priorities of the groups which utilise the existing information systems. Detailed consideration will also be given to the responsibilities of the Information Group.

(a) Development Unit

The Development Unit brings together the elements of the former Estates and Planning Departments which were concerned with the development or disposal of the County Council's land holdings and the implementation of schemes of strategic importance.

Strategic implementation - The primary function of the Group is to implement the policies of the Structure Plan. With this objective in mind the Group liaises with the local business community providing a one stop service for information on training and the products produced by local firms as well as an on-line data base of the sites and premises available in the A1 corridor. The Group also assists with the preparation of major County Council planning applications concerning the industrial, housing and leisure sectors.

(b) Environment Unit

The Environment Unit brings together specialist skills concerning the conservation and promotion of the environment. The combined expertise of the Groups includes landscape architects, archaeologists, architects and ecologists.

Archaeology - The Group is concerned with all aspects of the County's archaeology including conservation, promotion, liaison and the provision of advice and information. A data base which includes records of all the archaeological sites in the County has been developed on a micro computer.
Countryside - This large Group is responsible for issues associated with the countryside such as the depletion of ancient woodland and the maintenance of public rights of way. It is divided into the countryside managers who mainly work in the field and a team of officers who provide support and technical skills.

(c) Planning Unit

Statutory county planning functions are largely the responsibility of the Planning Unit. These Groups deal with matters concerning the Structure Plan and process planning applications for the exploitation of mineral reserves as well as proposals for the development of land owned by the County Council. Public transport and the promotion of traditional town centre retailing are issues of further concern to the Unit.
Forward Planning - The Group undertakes work associated with traditional strategic land use planning including monitoring and reviewing the policies of the Structure Plan and analysis of population trends.
Transport Coordination Unit (TCU) - TCU is primarily concerned with the management and coordination of bus services within the County.
Town Centres - The work of the Group focuses on improving the environmental quality of the County's town centres as a means of encouraging investment and the enhancement of facilities for those unable to benefit from changes to the structure of retailing.

(d) Services Unit

The Services Unit embraces a disparate set of activities. Comments will focus on the tasks undertaken by the Information Group and the sections into which it is divided.

Information Group - The function of the Group is to provide the Planning Department as well as increasingly external agencies with information. This service is based on the maintenance and development of a substantial number of largely micro computer based information systems. The Information Group handles major computing projects and processes large data sets, while a number of self contained data bases have been designed which with the exception of technical support are the responsibility of the user. Each of the three sections which form the Information Group undertake a separate task, these being the collection, analysis and presentation of information. The work of these Sections is supported by the technical skills of the computer programmers but there is a surprising absence of statistical expertise. The work of the individual sections is discussed below.

Survey Section - The main responsibilities of the Section are the collection and input of data into the Department's information systems. Routine data collection covers issues such as employment and residential land availability, public transport, land use, commercial property on the market and the activities of firms occupying the main industrial and town centre locations. Ad hoc surveys requested by groups within the Department are also undertaken and advice given on survey design.

Information Section - The Information Section has responsibility for the analysis of the findings of surveys conducted by the Department and national data sets such as the Census of Population and employment statistics. Spreadsheet and graphics facilities are used as a means of restructuring data into a tabular or visual form which can be easily

digested by users, however, data interpretation is beyond the remit of the Section. Members of the section prepare the Planis documents and are the first point of contact for internal and external enquiries about information. The staff responsible for coding and inputting the details of planning applications are administered by the Section. The returns the district authorities' are required to make to the Department of the Environment are derived from this data base.

Mapping and Special Projects Section - The main function of the Mapping and Special Projects Section is the presentation of data using cartographic skills and computer graphics. The activities of the Section centre on promoting the work of the Department through high quality presentation with the impression created regarded as important as the figures illustrated. Members of the Section are also involved with raising general computer awareness through educating users as to the simplicity of micro based technology. Information on land and property owned by the County Council is administered by a sub-section termed the Terrier and Land Survey. Corporate responsibility for issues associated with mapping is an increasingly significant part of the Section's work and it has been closely involved with the lead the Planning Department has taken in the areas of automated mapping and GIS. Members of the Section and a computer programmer investigated the potential of a relatively simple micro based system and as a result of this experience were asked to identify the opportunities offered by the technology. A number of pilot projects were undertaken including a study for the Emergency Planning Department on the distribution of dwellings and institutions resilient to nuclear fallout and work for groups within the Department such as developing a digitised record of the County's rights of way and sites of archaeological importance. The results of these projects were used to demonstrate the potential of GIS to politicians and other Departments.

Members of the Section have also participated in discussions with middle ranking officers throughout the authority which have aimed to establish the level of interest in GIS and the problems associated with devising a county wide spatial referencing system. Overall this work has so far culminated in the allocation of funds for the purchase of Ordnance Survey digital map data and the necessary equipment starting in the 1989-90 financial year and finishing in 1994. The expenditure has been justified on the grounds of the operational benefits which will accrue from the development and maintenance of a corporate data base storing information on the County Council's land and property holdings. The financial implications of the management of these resources made this an important issue for elected members.

The organisation of the Information Group into separate task areas leads to reliance on informal contacts to enable those involved with the various information processing activities to appreciate how their work contributes to the whole. This can lead to problems as those collecting the data may not be certain as to the nature of the final product, while the staff analysing and presenting information may not be entirely clear as to how the data was collected or the definitions adopted. Communication has not been assisted by the physical separation of the Survey Section from the rest of the Planning Department although following the reorganisation at the start of 1989 this situation has been rectified.

4.34 The provision and utilisation of information in Hertfordshire County Planning Department

The collection, analysis and provision of information

The Information Group has formal responsibility for handling the information associated with strategic planning. However, in the case of

specialist information such as ecological data it is regarded as more appropriate for these activities to be undertaken by the relevant group. A number of individuals prefer to collect their own data as this gives them greater flexibility than would result from reliance on the Information Group. These officers suggest that the conduct of small scale surveys also perform part of a learning process about the issue under consideration. Officers outside the Information Group hold a great deal of information acquired through personal observation and experience but the general departmental approach is that the time of professional staff should not be occupied with formal data collection.

The Information Group divides the collection and analysis of information into routine tasks performed on a regular basis such as the preparation of data concerning the availability of residential land and ad hoc projects, for instance a survey of tourism in the County. Groups make annual requests for surveys to be undertaken most of which are granted, although sometimes in a slightly modified form. The annual allocation of resources to non-routine activities enables the Information Group to respond to the ever changing pressures on the planning system. A large proportion of the documents produced by the Information Group are based on original data collection and as a result the validity of the information being provided depends on the manner in which the surveys were conducted. Human error is to be expected especially in the case of the lengthy and tedious tasks such as plotting the details of planning applications where for instance it is all too easy to count the same site twice by including both the outline and detailed permissions. Senior staff undertake thorough manual checking in an effort to reduce the level of inaccuracy to acceptable limits. The resources available to the Survey Section particularly in terms of personnel enable very large projects to be conducted without the

need to commission a market research organisation. A mid census survey of ten per cent of the households in Hertfordshire, referred to as Herts '86, highlights the Section's capabilities.

The Information Section is responsible for the first stage of data analysis. Little complex data manipulation is undertaken with standard business packages used to reorganise the raw data into tabular form, while interpretation of the information is left to users. An attempt is also being made to encourage users to access directly the information they require and to exploit the facilities offered by computer based systems.

The provision of information to users inside and outside the Department results from the circulation of reports or answers to special requests. It is difficult to quantify the frequency with which information is supplied to users as several requests may be made in a single month and none for the rest of the year. Table 4.4 provides an indication of the number and source of requests but no account has been taken of the amount of time required to produce the information. Wherever practicable an attempt is made to supply the data requested by councillors or staff within the Department. The precise number of requests made by elected members is uncertain as they are not encouraged to contact staff directly rather to inform the Chief Officer of their requirements. The Forward Planning Group make the greatest demands for information of all the sections within the Department.

The primary function of the Information Section is to meet internal needs but an increasingly significant amount of time is being spent attending to inquiries from external organisations. The Information Section received at least ten to fifteen requests a week from external agencies in 1988.

Table 4.4: The frequency user groups request data from the Information Group

User groups	Frequency of information requests
Planning staff	
- Chief Planning and Estates Officer	2
- Forward Planning	6
- Strategic Implementation	2
- Other groups	2
Elected members	[1]
Other Hertfordshire County Council departments	2
Hertfordshire District Councils	1/2
Private Sector	6

Scores: 1 - about once a year or less
2 - several times a year
3 - monthly
4 - less than once a week/more than monthly
5 - less than daily/more than weekly
6 - daily or more frequently

An administrative practice has developed whereby inquiries are answered if they can be handled within thirty minutes, otherwise approval of a senior member of staff is required. The generation of income is an important aspect of these activities. It was calculated for a three month period in 1988 that the sale of publications raised £1,519. Table 4.5 indicates the reports and factsheets regularly produced as part of the Planis initiative. It was estimated in 1988 that a total of 2,500 documents were distributed to 750 individuals and organisations. These reports are largely factual in nature allowing the recipients to interpret the

material. In the case of ad hoc surveys the Information Group provides the raw data while the client group is responsible for the evaluation of the findings and production of summary reports.

Table 4.5: Reports and factsheets published regularly by the Information Group

Documents	Approximate frequency of revision
Planis reports:	
Commercial property register	Quarterly
Firms by industrial areas	Ad hoc
Firms by town centres	Ad hoc
Major firms in Hertfordshire	Annually
Population statistics	Every 5 years
Dwelling statistics	Annually
District profiles	Annually
Planis factsheets:	
Residential land availability	Annually
Dwelling statistics	Annually
Employment land availability	Annually
Commercial property	Biannually
Trends in employment/unemployment	Monthly
Changing land use	Annually
- by type of land	Annually
- decline in residential land	Ad hoc
- ten year comparison	Ad hoc
- changes in status of Hertfordshire CC owned land	Ad hoc
Information bulletins	Quarterly

The utilisation of information by groups within the Planning Department

Table 4.6 provides an impression of the extent to which the available information systems are used by groups within the Department. Three forms of information use have been distinguished. These are the level of direct

contact with computer based systems, the number of requests made to the Information Section and the quantity of reports received. The groups selected for analysis represent those which have contact with the Information Section. It is possible that the needs of other groups are not being met but this was outside the scope of the research. The figures in the table should be regarded as approximations as the utilisation of information systems does not follow regular patterns. The findings suggest that direct use of computer based information is associated with the groups which possess their own systems. These data bases have been

Table 4.6: The frequency information systems are used by groups within the Planning Department

User Group	Direct use of computer based systems	Requests for data from the Information Group	Receipt of reports from the Information Group
Forward Planning	1	4	3
* Strategic Implementation	6	-	2
* Countryside	4	1	1
* Archaeology	6	1	1
* Transport Coordination Unit	6	2	1
Town Centres	1	1	1

Scores: 1 - about once a year or less
2 - several times a year
3 - monthly
4 - less than once a week/more than monthly
5 - less than daily/more than weekly
6 - daily or more frequently

* - Groups with their own computer based information system

developed on micro computers and serve the function of intelligent filing cabinets, facilitating the process of record keeping and restructuring. The Information Group's traditional role as the provider of information for the forward planners is also clearly demonstrated. Subsequent comments will examine in more detail the information needs of these groups.

(a) Forward Planning Group

Forward Planning is the main client of the Information Group with officers expressing a virtually insatiable desire for material concerning all aspects of housing, employment, demography and the environment. The forward planners submit the majority of requests for ad hoc surveys while at a more routine level the Information Group largely supply the data required for monitoring the key numerical policies of the Structure Plan. Monthly meetings are held between the senior officers in the two Groups to discuss issues of mutual concern. The Information Group is not the only source of material for forward planning as individual officers also utilise information from committee reports and journals as well as collating more specific data on for instance factory openings and house prices as a means of assessing the appropriateness of the current direction of policy.

The ability to respond quickly to changes in the environment is an important issue for the Forward Planning Group. Ad hoc surveys provide one means of obtaining information on a new area of concern, although inevitably there is a significant time lag between the request being made and the availability of the findings. The Information Group generally produce figures concerning a particular topic on an annual basis.

However, for issues undergoing rapid change it was emphasised that quarterly and even monthly data is required as the basis for policy making and more particularly providing evidence at planning appeals.

The work of the Forward Planning Group centres around the 'monitoring year' starting in April. Their first requirement is for details on the availability of land for housing and industry which are supplied by the Information Group. The aim is for these figures to be prepared by the end of May but frequently work is not completed until June or even July. This causes problems for the forward planners as the technical reports have to be ready for consultation in August, followed by a series of seminars in September, a report to committee in October and the final Structure Plan Statement in January. A rigid timetable such as this means that a delay at the start creates considerable pressures during the rest of the process. In an attempt to avoid the frantic efforts associated with preparing the end of year figures procedures for the continuous updating of the relevant data sets were introduced in the second half of 1988.

The work of Forward Planning unlike most other groups is highly dependent on the receipt of information at a specific time. Past experience shows that if their needs are not met individuals will develop their own information systems. Staff have been determined in recent years to avoid any duplication of activity but the relocation of the Forward Planning Group to Ware and the resulting loss of contact between officers has jeopardised the working relationships which had been developed. Officers from both Groups described the physical separation as a 'disaster'.

(b) Strategic Implementation Group

Strategic Implementation rely on the Information Group for data on the availability of industrial land and premises which forms the basis of the A1 Corridor Initiative. Officers stated that generally they utilise information gained as a result of experience and personal contacts, although the prospects that the Information Group could supply supporting evidence was said to instil confidence when for instance negotiating with developers.

The most important data set supplied to the Strategic Implementation Group is the quarterly A1 Corridor Property Register. The credibility of the service depends on the rapid and accurate production of this Register. It is based on the returns of estate agents and requires no analysis. Strategic Implementation have also requested ad hoc surveys on tourism and leisure facilities in the County. However, these projects have floundered as officers in the Strategic Implementation Group have had insufficient time to analyse the substantial amount of computer printout generated by the tourism survey while the completion of a leisure resources data base by the Information Group has been inhibited by pressure of work. The example of the tourism survey indicates the need for the group commissioning the study to allocate resources to the often lengthy process of evaluating the findings. Overall officers suggested it was important to avoid starting projects which could not be completed as the data rapidly becomes out of date.

(c) Countryside Group

The Countryside Group is supplied with very little information from within the Planning Department except for land use details. The majority of the data required by the Group is provided by the Biological Records

Office and an aerial photography survey commissioned every ten years to coincide with the Census of Population which is added to local knowledge and experience. Survey work is also undertaken by the Group due to the specialist nature of the data with the Survey Section consulted on the most appropriate sampling frame and methods for analysis. As a result, Countryside tend to utilise the skills available within the Information Group, such as programming and survey expertise rather than the available information. A departmental policy of decentralising computing resources led to the Group obtaining a micro computer at the start of 1988. The systems so far developed have been designed to facilitate the conduct of existing tasks such as the monthly monitoring reports for the Countryside Commission, data on public rights of way and the distribution lists for leaflets. It is expected that familiarity with the technology will increase the range of facilities which are used.

(d) Archaeology Group

Archaeology and Countryside utilise the resources offered by the Information Group in a very similar manner. Details of planning applications are supplied on a daily basis and a Sites and Monuments Record has been established on a micro computer. The data base enables inquiries to be answered within twenty-four hours, therefore giving officers more time to spend on other work.

(e) Transport Coordination Unit

The Transport Coordination Unit is reliant on the Information Group for the biannual collection of data on bus usage and service reliability. The Unit maintains its own data sets on services and the location of infrastructure such as bus stops and termini. Two micro computers are used to hold data on the County's bus service although the Unit is

investigating the potential of a number of packages to store and manipulate its substantial data reserves. Planning officers expressed disappointment at the reluctance of members of the Transport Coordination Unit to share their considerable knowledge and information.

(f) Town Centres

Members of the Town Centres Group generally collect the information they require, partly as an aid to familiarising themselves with the issues facing a particular locality. The Information Group has undertaken parking surveys and supply a list of current planning applications. Overall officers in this Group regard personal experience and knowledge of the most appropriate people to contact as of greater value to their work than the formal information sources available within the Department.

General observations

The method adopted for generating information has developed from procedures designed to supply the County's traditional structure planning needs. These practices are now being used to provide the fast and accurate data required by many groups within the Department. Staff responsible for providing a service such as the availability of commercial property in the A1 Corridor require basic raw data in contrast to the forward planners which utilise information which has undergone a considerable amount of analysis. Evidence suggests that most Groups requesting surveys do not have sufficient resources to analyse large quantities of raw data and as a result more limited surveys providing a rapid indication of broad trends were regarded as of greater value. In general users were satisified with the accuracy of the data supplied by the Information Group. The preparation of factsheets highlighting key issues helped to avoid the confusion which can result from attempts to interpret data

without a detailed knowledge of the method by which figures had been generated. The critical issue for groups throughout the Department was the timely availability of information as the value of accurate data is considerably diminished if it arrives too late to be of any real use. It must also be acknowledged that users were not always fully appreciative of the time required to answer an apparently simple request for information. Planning officers also expressed uncertainty as to the nature of the information available within the Department. The Information Bulletin produced quarterly attempts to overcome this problem but is not being entirely successful. Knowledge about the available data sets is the responsibility of both the Information Group in terms of promotional activities and also users as they must be receptive to such efforts. The findings suggest that many officers are not very concerned about the nature of information held by the Department.

The discussion has so far inferred that the use of information depends on the type of work being undertaken. However, officers with virtually the same work load differed in the extent to which they utilised information. Evidence suggests an individual's network of friends contributed to knowledge of the types of data sets and facilities available and as a consequence the frequency with which requests were made to the Information Group. These issues will be explored more fully in Section six of this Chapter.

4.35 The relationship between the Information Group and other public agencies

This section explores the relationship between the Information Group and other agencies with respect to first the process of developing computer based systems and second the supply of information. Information and data

handling skills are provided to a large number of public and private agencies by the Planning Department. The Planis initiative was designed to meet some of the requirements of the private sector with data supplied in response to ad hoc requests. There is a more formalised flow of information between the Planning Department and other public sector agencies. The provision of information to County Council departments, the District Councils in Hertfordshire and the South East Regional Planning Conference (SERPLAN) represent an important element of the Department's work and as such is worthy of review.

Information generation and other organisations

The strategy adopted by the Planning Department enables information to be generated with a large measure of independence from other organisations. The direct involvement of computer manufacturers and suppliers in the process of developing information systems has been avoided. Since the early 1980s reliance on the County Council's Computing Section for data generation and system development has also been side stepped by favouring the adoption of micro computers and as a consequence has given the Planning Department considerable flexibility in which to act. It was suggested that this has led to an uneasy relationship between the two sections as the central computing group would have preferred to have complete control over the County's technical resources. The presence of programming expertise within the Department has allowed the purchase of what the planners regard as the most appropriate equipment to meet their needs rather than the hardware and software recommended centrally. As a result the Planning Department utilises a different data base package from the rest of the authority. The development of a GIS is likely, however, to reduce the capacity of the Department to act independently. The impact

of the slightly modified status of the new Information Systems Directorate on the relationship between departments is not as yet clear.

Planning information as a corporate resource

The Planning Department provides the County Council with general socio-economic information and responds where appropriate to individual departmental needs. The Information Group has authority wide responsibility for processing a number of national data sets such as the Census of Population and unemployment/employment statistics. The results of this work are circulated in the form of the Planis documents which occasionally prompt requests for further information. The findings of surveys conducted by the Planning Department are also made available to other County Council departments. In the case of a major study such as the Household Survey interested departments are required to make a financial contribution and in return may request the inclusion of additional questions as well as having access to the findings. Generally the work of other departments is not dependent on the supply of data by the Planning Department. However, in circumstances where planning data represents a key resource, special arrangements for the regular flow of information have been established. For instance, to meet the needs of the Education Department a printout is produced every three months concerning the status of planning applications for one or more units of housing in addition to details on residential land availability for use in estimating school rolls.

The Mapping and Special Projects Group has responsibility for meeting the authority's cartographic needs. These activities include the update of administrative boundaries and the presentation of map based data. Work requested by departments other than Planning occupies approximately 15-20 per cent of the Group's time.

The provision of information to other County Council departments contributes to maintaining the profile of the Planning Department within the authority. The level of use of the service as with the utilisation of data within the Department depends on officer awareness. The findings suggest knowledge of the available data sets is more closely linked to an individual's network of friends rather than the formal mechanism of officer working parties.

Members of the Planning Department are involved with a number of authority wide working groups concerned with information management in general and more particularly population trends. These are listed below. Population projections are produced by each Department with the Steering Group on Intelligence and Resources (STIR) and the Population Working Party providing a means of coordination. This fragmented approach results from the discrepancy between the assumptions favoured by the different departments. Planning base their calculations on the hoped for level of growth while the service departments adopt a higher figure in line with the likely population increase. Such circumstances indicate the difficulties in attempting to obtain agreement between departments with varying interests. This is further illustrated by the complicated situation faced by the GIS Liaison Group which was formed at the

instigation of the Planning Department with the aim of developing a common basis for spatial referencing throughout the authority as a precursor to the development of a corporate GIS.

Authority wide groups:

- STIR (deputy chief officer level)
- Population Working Party (middle management)
- Informal Research Group (middle management)
- GIS Liaison Group (middle management)
- Computer Management Group (middle management)

The provision of information to public sector agencies

The Information Group supplies data to the regular meetings of SERPLAN which is the agency designed to coordinate planning in the South East. Of more significance is the close relationship which has developed between the Information Group and the ten Hertfordshire districts. Formal arrangements exist whereby each district contributes £3,500 a year to the County in return for the Planis publications, access to the County's information systems, copies of updated maps and technical advice on computing and the conduct of surveys. The County allocates 1,000 staff hours a year to meeting the needs of the district councils. The district planning authorities rely on the County for the analysis of central government data sets such as employment and unemployment statistics and the Census of Population as they lack sufficient resources to process these large data sets. The Districts are also unable to devote staff time to original data collection but are willing to cooperate with the County. The difficulty of recruiting officers at the same time as increasing pressure on development control is inhibiting the introduction of information systems at a district level.

Much of the information generated by the County the Districts regard as interesting but not essential to their work. The main exception is data on the take up of land for residential and industrial development. The introduction of procedures for the continuous update of records on planning applications should help to enhance data relevance during the current period of rapid change. However, in the interim a number of Districts have introduced their own systems. Some authorities have been concerned about the increasing amount of work the County has undertaken for the private sector, particularly in the case of consultants involved with planning appeals. The County argues that by notifying the Districts of the information provided, problems should be avoided. Regular meetings are held between members of the County's Information Group and representatives of the District Councils to discuss such issues.

The District Councils both receive information and also provide the County with raw data. The County is notified of all planning applications and the eventual decisions with these details forming the basis of the land use statistics. The County has taken responsibility for the preparation of the PSII and PSIII returns to the Department of the Environment as a means of encouraging the prompt submission of the required information. It is in the interests of the Districts to act quickly as the PSII returns are used by central government to compile the league table of authorities processing planning applications within the statutory eight week period. The Information Group consults the Districts before documents are published in an effort to increase overall accuracy, although this process adds significantly to the time taken to generate final reports.

Many Districts regard the exchange of information as less important than the computer expertise provided by the County. The Districts favour utilising the County's technical specialists to develop the software for micro computer based systems rather than relying on the central computing skills available from within their own authorities. A number of planners in the Districts are also keen to attend training courses on software packages which the Information Section organise in conjunction with the County Council.

The level of use of the facilities offered by the County depends to a large extent on the individuals involved. Some authorities simply receive the Planis publications and attend the regular meetings, others with a greater awareness of the information available make frequent ad hoc requests. The free flow of data between computers has been hampered by the incompatibility between the County's IBM micros and the ICL equipment purchased by the majority of Districts in line with a commitment to buy from local manufacturers. These problems appear to be short term as a result of the production of a compatible micro by ICL. However, agreement on a common system for data collection and referencing is likely to prove more problematic than these technical difficulties.

4.36 Summary

This section provides a profile of the social world into which the computer package is embedded. This reflects the underlying conceptual framework which suggested the need for studies examining the development and use of information systems to look further than the characteristics of the available equipment. The description of the social world provides the basis from which the key explanatory variables in relation to the develop-

ment of the computer package will be drawn in section five. Findings concerning the differential use of information by officers also raise important issues about the appropriateness of the systems rationalist perspective to the actual practice of decision making in organisations. The next section focuses on the overall approach to information management adopted by Hertfordshire County Planning Department.

4.4 THE OVERALL APPROACH TO INFORMATION MANAGEMENT ADOPTED BY HERTFORDSHIRE COUNTY PLANNING DEPARTMENT

4.41 Introduction

The strategy adopted by Hertfordshire is based on the underlying assumptions that information represents an important resource for strategic planning and given this situation computer based systems offer valuable facilities for storing and manipulating data. The approach developed in Hertfordshire has been summarised in terms of three components. These are firstly, the combination of providing operational data for day to day use with the provision of strategic information; secondly, the exploitation of existing data sets to meet external as well as internal needs; and thirdly, the emphasis placed on the development of micro computer based systems. Each of these elements will be examined in more detail.

4.42 Information priority areas

The functions for which information is employed can be divided into two types. These are day to day use for operational decision making and the utilisation of such resources as a basis for longer term strategic choices. The balance of information requirements has changed in the last ten to fifteen years due to modifications and additions to the activities

of the Department. The newer service oriented activities tend to utilise raw data as the basis for their day to day tasks, while information derived from lengthy analysis is required by those responsible for the more traditional activities associated with strategic planning.

The production of the Commercial Property Register and the micro handling archaeological records typify the information systems designed to supply operational data. The value of these systems lies in an ability to sort large amounts of raw data very rapidly. Data analysis is not required, however, it is crucial that the data set is accurate and up to date in order to ensure credibility. In contrast to these self-contained data sets the Information Group maintains the extensive network of information systems required by the forward planners. The provision of information for strategic planning in Hertfordshire requires substantial amounts of data to be collected and analysed on a continuous basis.

4.43 The needs served by the provision of information

The Information Group give priority to satisfying internal needs but senior staff and elected members are also aware of the value of the Department's information resources to the private sector. The provision of information to outside agencies also helps to project the Department's activities as well as generating income. The Planis initiative exemplifies the trend towards a more outward looking approach with emphasis placed on a well presented product. In some respects the details contained in the documents produced by the Information Group is less important than the image created.

The value organisations external to the Planning Department attach to the available information is reflected in the current dilemma facing the Group. The success of the Planis initiative has started to undermine the Group's main priority of providing internal users with the information they require. In a commerical local government climate the potential financial returns make it tempting to increase the resources devoted to work for external organisations. The dilemma is compounded by the fact that the Group and in a broader context the Department gain more status from supplying information to the private sector, the general public and the District Councils than meeting internal needs. The emphasis the Policy Advisory Group place on the need for a more commercial approach demonstrates the greater kudos the County Council attaches to the presence of 750 individuals on the Information Group's mailing list than the receipt of the land availability figures by the forward planners.

A number of individuals are beginning to question whether the provision of information to the commercial sector is affecting the service provided to traditional strategic planning activities. As a result of the changing emphasis of the Information Group's work some officers are starting to feel uneasy about their future role as well as being both disinclined and ill-equipped to perform more of a marketing function. The concerns of the authority appear to encourage the Group to develop its commercial activities while past experience with regard to the provision of data for the Forward Planning Group suggests that failure to meet internal needs will lead to a fragmented network of systems. It is likely the Group will continue to attempt to satisfy the dual objectives of meeting the requirements of internal users while at the same time promoting the information available within the Department to external agencies.

4.44 Information technology strategy

A policy of developing information systems on micro computers has been favoured since the early 1980s. Data sets initially stored in the authority's mainframe have been transferred to micros including large data sets such as the details of planning applications submitted in the County. The development of these systems has enabled the Department to avoid the constraints inherent in reliance on the central computing section. Senior staff are concerned that the information produced meets user needs rather than the sophistication of the technology employed. The overall approach is based on the assumption that the facilities used to store information should be relatively easy to operate. One of the main aims of the Information Group is to demystify technology and therefore enable users to exploit the potential of the Department's information reserves. With this objective in mind computing resources have been decentralised with the improved accessibility to information encouraging interested staff to make greater use of the available information as well as offering access to word processing, graphics and spreadsheet facilities. However, in the case of large and complex data sets which require continuous maintenance close supervision by the Information Group is regarded as the most appropriate approach.

4.45 Summary

The overall approach to information management in Hertfordshire is characterised by the generation of operational and strategic data increasingly to serve external agencies as well as internal needs utilising micro computers which wherever possible are decentralised to the user group. This strategy contrasts considerably with that adopted in Glasgow as chapter 5 will demonstrate. This discussion raises the

question as to why such an approach and the resulting computer package have developed in Hertfordshire. This issue will be examined in Section five.

4.5 FACTORS INFLUENCING THE DEVELOPMENT OF THE COMPUTER PACKAGE IN HERTFORDSHIRE COUNTY PLANNING DEPARTMENT

4.51 Introduction

This section identifies and explores the factors influencing the development of the computer package in Hertfordshire. There are always limits to an organisation's capacity to secure resources and the range of approaches which can be adopted, with many of the restrictions the result of circumstances outside the organisation's control. In the case of Hertfordshire County Planning Department the existing constraints are rather fewer than most similar organisations as will be seen in the context of Glasgow. An examination of the factors which place the Planning Department in its current favourable position will be followed by consideration of the changing conditions which suggest there is likely to be an increase in the number of limiting factors.

4.52 Factors facilitating the development of the computer package

The status of the Planning Department in relation to the priorities of Hertfordshire County Council

The Planning Department occupies a prominent position within the authority. Political interest in planning has been stimulated by efforts to communicate the work being undertaken and partly as a consequence all the political parties included statements on planning related issues in their manifestos prior to the current concern about the environment. The

standing of the Department helps to ensure a relatively well resourced Information Group.

The role of the Chief Planning Officer

The status of the Department is largely a reflection of the activities of the Chief Officer who has the respect and confidence of senior politicians. The proposed abolition of structure plans and uncertainty over the nature of the replacement documents has led to the erosion of the tasks formally described by the term 'planning' in many County Councils. The response in Hertfordshire has been to diversify the work of the Department particularly into high profile activities. The increasingly outward looking approach of the Information Group reflects these trends with the products of their work providing a means of communicating the Department's activities to a large audience. The importance senior management attach to information as an aid to supporting the work of the Department has a very significant influence on the development and utilisation of the computer package. Technology is perceived to facilitate the process of manipulating data and therefore senior management actively assists the Information Group's efforts to secure resources as well as creating favourable conditions for their use. The staff interviewed suggested the Chief Officer made a highly significant contribution to obtaining the resources necessary for the development of computer based information systems in Hertfordshire.

Political parameters

Hertfordshire County Council has been traditionally dominated by a Conservative majority, although there have been periods during the 1980s when no party had overall control. There is generally party political consensus on planning issues and therefore political instability has not

affected the overall direction of policy. The Conservative orientation of the authority can be seen in the encouragement of a commercial approach to information. It should be acknowledged that the Labour group has also endorsed this strategy on the grounds that as much income as possible should be generated from the private sector. The political parties are agreed that the financial contribution made by the local electorate is insufficient to cover the cost of handling information and as a result it is necessary to charge an additional fee. The contrast with the reasoning adopted in Glasgow will be highlighted in the next chapter. A minority of politicians are interested in computer related issues due to experience in the field but in general decisions about such matters are left to officers. The comments of staff suggest the acquiesence rather than active involvement of councillors is required for the expansion of computer based systems.

New technology and the Unions

The introduction of new technology is not a matter which provokes organised dissent in the County Council. Staff were willing to cooperate with the implementation of computer based systems without the need for prior union approval. There was little evidence of rigid job demarcation with even the development of more sophisticated systems unlikely to lead to dispute.

Working with other County Council departments

The dominance of micro based systems enables the Planning Department to handle information without depending on the resources of other departments, indeed at present a number of departments rely on Planning to supply them with information. Maintenance of equipment is the main area

in which the Department has to call on the services of outside agencies in the form of the authority's central computing section or in certain circumstances the manufacturer.

Reliance on computer manufacturers and suppliers

The Planning Department has maintained a high degree of independence from computer and software manufacturers. The programmers employed by the Department are able to undertake virtually all the work required to develop micro based information systems. This therefore avoids the delays and inconvenience which are associated with dependence on external organisations.

People

The large number of factors which facilitate or rather fail to hamper the generation and provision of information in Hertfordshire are largely the result of the work of the Chief Officer. His vision and leadership has maintained the relevance of the Department's activities in the face of external pressures as well as most importantly gaining the respect of politicians. The creation of a favourable local government context has enabled the Information Group to develop systems free from many of the constraints faced by other authorities. Planners in Hertfordshire unlike many contexts, enter negotiations for resources in a relatively favourable position. The Head of the Information Group can be confident of the support of senior planning staff when competing with other departments for a share of the limited local government resources.

The leadership of the Chief Officer has been vital in facilitating the development of the computer package but this process has also been supported by the work of middle management. The activities of officers

performing the function of intermediaries between the programmers and the non-technical staff has been an important aspect of the strategy of encouraging the utilisation of decentralised facilities. In this connection an individual with enthusiasm and an ability to communicate with the full range of staff has been a very valuable resource.

4.53 Constraints on the development of the computer package

Internal organisational changes

The findings indicate that the present status and organisation of the Planning Department is largely a reflection of the aspirations and skills of the Chief Officer. However, it was unlikely that fellow chief officers would ignore the enhancement of the Department's status. The increasing shortage of space at County Hall resulted in proposals to relocate the Planning Unit to a redundant school about six miles away. A number of staff suggested that the issue of accommodation had provided an opportunity for those outside the Department to attempt to check the activities of the Chief Officer. The resultant reorganisation has led the groups concerned with statutory planning functions to be relocated to Ware. It is likely the Chief Officer selected these groups as it would be difficult for them to be absorbed into another Department during any future rounds of reorganisation. However, the physical separation of the Information Group from their major client, Forward Planning, has important practical implications for the provision of data within the Department. Overall this situation suggests that the manoeuvrings between chief officers in Hertfordshire have a more significant impact on the activities of departments than the actions of politicians.

The preceding section emphasised the important role performed by individuals with respect to both the development and utilisation of

information systems. Closely associated with this is the instability that results when these members of staff leave. The resignation of one such individual at the end of 1988 led to some disruption of activities as even in a situation where the replacement is of equal calibre it takes time for new working relationships to be formed.

Central government policies

The policies of central government create an additional layer of uncertainty. The discussion papers on the future of county councils and more particularly structure planning have had a profound impact on activities in Hertfordshire. Legislative changes also make amendments to existing computer based systems necessary. For instance changes to operational definitions and alterations to the format required for PSII and PSIII returns to the Department of the Environment have resulted in modifications to established systems. Financial constraints and ambiguity over future levels of funding are also highly significant in both limiting resources and making long term planning difficult.

Working with other County Council departments: the future

It is generally accepted that the introduction of sophisticated technology such as a geographical information system is beyond the means of a single department, while many of the benefits accrue from an ability to manipulate data sets from different sources (Gault and Peutherer 1989). In the Hertfordshire context the Planning Department has led investigations into the potential of this type of technology. The formation of an authority wide liaison group on GIS indicates the need for departments to cooperate over the organisation of information as well as the acquisition of equipment. In these circumstances it is difficult to envisage the Planning Department being able to maintain its current level of freedom.

The policy of independence may in many ways hamper the development of an authority wide GIS as the Department has not had to consider issues concerned with data and equipment compatibility.

It would be unrealistic to suggest that achieving cooperation between departments is a straightforward process. Officers indicated that while the development of sophisticated computer based systems requires departments to work together, attempts at realising such a goal were liable to have the unintentional effect of emphasising the different interests in the authority. It was suggested that complex issues concerning the ownership and responsibility for data would be raised with some departments perceiving the development of such systems to threaten their interests and therefore be unwilling to cooperate. Departments are likely to examine very closely the organisational arrangements for a corporate information system with opposition voiced at the dominance of any single department such as Planning. As a result of these circumstances the involvement of Planning in the development of a GIS is liable to reduce the Department's current level of flexibility while at the same time raising many complex interdepartmental issues. However, if the Planning Department was to forego its present central role it would be open to the dictates of departments with very different interests.

Working with the District Councils in Hertfordshire

There is a significant flow of information between the District Councils and the County at the present time. The Districts are consulted before the publication of most documents, although it only requires a slow response by one authority for the whole document to become out of date. These operational difficulties appear of little importance in the face of the potentially profound changes likely to take place in the relationship

between the two local government tiers. Some of the District planning authorities are introducing their own information systems aware of the uncertainty regarding the future of county councils. Given these circumstances it seems likely that the County will develop separate arrangements with each District over information related issues. These relationships could evolve in one of three directions. Firstly, each could devise their own systems therefore reducing the justification for the financial contribution the Districts currently make to the County. Secondly, rather than developing independent systems a joint approach could be favoured with the long term goal of a fully networked system allowing the two-way exchange of data. Thirdly, the current arrangements could be maintained which are somewhere between the first two positions. The recruiting difficulties facing Districts particularly in the South East encourages the status quo, as limited resources lead staff to be withdrawn from research and information into development control activities. In these circumstances the Districts become increasingly reliant on the County for information.

It is likely the existing arrangements between the County and individual Districts will change, possibly constraining the information and financial resources available to the Information Group. In the short term the nature of the relationship will vary according to the district council involved and the pace at which information systems are developed.

4.54 Summary

The Hertfordshire findings indicate the influence of organisational factors on the development of the computer package. The acquisition of resources and the manner in which they have been deployed is a striking consequence of a favourable internal organisational context which is

itself largely a result of the activities of the Chief Officer. Given this situation factors which impinge on the development of information systems in some planning environments such as the status of the Department and the role of the directorate have a positive effect in Hertfordshire. However, no situation is static and changing circumstances can rapidly alter conditions such as the physical reorganisation of the Department, staff changes and the potential reduction in the level of departmental independence. Additionally external pressures which are beyond the Department's control can have a significant influence such as the activities of central government. These findings therefore suggest the importance of locating information technology within a complex web of social and political processes.

4.6 THE UTILISATION OF GEOGRAPHICAL INFORMATION BY INDIVIDUAL PLANNING OFFICERS

4.61 Introduction

It was suggested in Section three that the utilisation of information systems in Hertfordshire varies according to the individuals involved. This discussion explores the extent to which practitioners possess the capacity as well as a willingness to use computer based systems and also information. Consideration will be given to the level of computer awareness and technical skills amongst staff and whether such knowledge is linked to the particular characteristics of an individual such as age, sex and qualifications. The relationship between users and the technical specialists will also be examined as a practitioner's lack of technical skills does not necessarily preclude the utilisation of information if there are staff within the authority who can access the required material. Finally the issue of general information awareness will be examined. The

quantitative findings which support this discussion are drawn from the semi-structured interviews and therefore attention is focused on the utilisation of information for strategic decision making.

4.62 Computer awareness and technical skills amongst practitioners

There is a strong link between computers and particularly the generation of numerical data for the structure plan process in Hertfordshire. The overall approach to information management reflects an awareness of the need to create conditions in which users are encouraged both to utilise technology and also the information resources available within the Department. The decentralisation of micro computers and the introduction of intermediaries represent important elements of this strategy. However, even in this relatively supportive environment some users expressed misgivings and a degree of apprehension about technology. In an attempt to examine this issue a set of questions was devised as a framework for assessing the level of computer awareness amongst staff.

There is a relatively high level of computer awareness amongst staff in Hertfordshire including users and those occupying senior positions (see Tables 4.7 and 4.8). With the exception of one officer all the staff interviewed had attended at least one course on information management or computer related issues with two-thirds of these individuals receiving skills training within the last two years. Eighty per cent of the staff interviewed had gained further knowledge about computers through reading magazines, often sent free of charge to the authority or by purchasing their own home computer. Only one individual suggested they possessed no keyboard skills, and of the remainder four indicated they could type. Two of those with typing skills were keen to dispel the idea that they

Table 4.7: Indicators of computer awareness amongst officers in Hertfordshire County Planning Department

Question	Staff grouping	Response Yes	Response No
Have you ever attended a course on information management or computer related issues?	All [15]	14	1
Have you attended a course on information management or computer related issues in the last 2 years?	All [15]	10	5
Do you read computing magazines?	SP [7]	1	6
	D [2]	2	-
	I [4]	3	1
	P [2]	2	-
	Total [15]	8	7
Have you bought a magazine about computing in the last year?	All [15]	1	14
Have you any keyboard skills?	All [15]	14	1
Do you have your own home computer?	SP [7]	4	3
	D [2]	-	2
	I [4]	2	2
	P [2]	2	-
	Total [15]	8	7

SP - structure planners
D - senior decision makers
I - information officers
P - computer programmers
[ ] - total number of staff interviewed in the grouping

Table 4.8: Detailed indicators of computer awareness amongst officers in Hertfordshire County Planning Department

Question	Use	No. of staff	Staff grouping
What is your home computer used for?	- Word processing - Spreadsheet - Small programs - Games	1	SP
	- Spreadsheet - Small programs - Games	1	SP
	- Small programs - Games	2	P,I
	- Games	2	P,SP
	- Not used	2	I,SP

Question	Staff grouping	Organising body	Subject of course
What courses have you attended on information management or computer related issues in the last 2 years?	D	RTPI	Use of PC's in local government
		Oxford Poly	Information management
	SP	Herts CC	Lotus 123
		Herts CC	Introduction to PC's
	SP	Herts CC	Lotus 123
	SP	Herts CC	Lotus 123
	SP	Wandsworth BC	Introduction to computers
	I	Herts CC	Lotus 123
		RTPI	Use of PC's in local government
		SAUS	Information management
	I	RTPI	Use of PC's in local government
	I	SAUS	Information management
	P	IBM	Networking
		Computer manufacturers	Exhibitions
	P	Software manufacturers	Dataflex programming language

N.B. Abbreviations see Table 4.7

were either keen or had the knowledge to use computers. It is important to explore these indicators in more detail to discover the extent of computer awareness amongst those interviewed.

It can be seen in Table 4.8 that half the owners of home computers either had no use for the equipment or utilised it solely for games, while about half of those who read computing magazines stated that if they were not freely available within the Department they would not purchase such material (see Table 4.7). The responses of officers indicate that training in computer related fields is not limited to those whose day to day work depends on the possession of such skills (see Table 4.8). Cost prohibits attendance at courses organised by agencies outside the County Council unless individuals are presenting papers or demonstrating systems as in the case of members of the Information Group and the Chief Officer. Training is provided by the authority as well as the Department which has arranged informal lunchtime sessions. Staff are therefore given the opportunity to develop the skills which would allow them to access and manipulate automated data. However, users noted that as such skills were rarely needed the substance of the courses was soon forgotten. It is possible from these findings to place staff within three bands of computer awareness which are listed below. The programmers have been omitted from this analysis but showed a tendency to focus on equipment and view computing as a job of work rather than a leisure time pursuit.

(i) Enthusiasts: a small minority who are keen and enjoy using information technology and have largely taught themselves the necessary skills. Computing for these individuals has become a hobby as well as a skill used at work.

(ii) Pragmatists: the majority of staff whose interest in technology is related to their work. They are not naturally enthusiastic about computers but perceive a knowledge of information technology may be advantageous to the work of the Department as well as career advancement.

(iii) Unwilling learners: a minority of users who actively avoid interacting with computers and also show little willingness to learn.

The relationship between these stereotypes and the age, length of service, sex and subject of further education qualifications was examined. The findings suggest there was little link between an individual's level of computer awareness and their age, length of service or the subject of qualifications. The two female officers interviewed had rather less experience of computers than the average but given the size of the sample it is unclear whether this is particularly significant. An individual's personality appears to have more influence on their attitude towards technology than formal characteristics.

These results indicate that while the overall level of computer awareness in Hertfordshire is relatively high amongst all staff groupings it would be inappropriate to assume all users are willing or possess the necessary knowledge and perhaps more importantly confidence to access automated data. However, the utilisation of information held in computer based systems is not dependent on users directly interacting with the technology as practitioners can request data to be accessed by the staff possessing specialist skills on a regular or ad hoc basis.

4.63 The relationship between the technical specialists and users

The relationship between the technical specialists and users is likely to have a significant impact on the utilisation of information. Mutual understanding between these groups will encourage practitioners to request information in the knowledge that there is a high degree of probability that it will be supplied in the form they require, as well as influencing the extent to which the information systems developed are able to satisfy the data needs of users.

The findings indicate that the perspectives of the computer experts and users are very different with respect to technology. The non-technical staff suggested that the computer specialists used too much technical language and that they were more interested in what the computer could do than providing data for the planning process (see Table 4.9). Those officers whose work involved the greatest contact with the computer programmers most strongly endorsed this view, while others suggested that such difficulties were an inevitable result of the interests of the individuals involved. Users on the other hand were perceived by programmers to find difficulty expressing their requirements with Planning regarded as a vague discipline. There was also a difference in the priorities of staff with respect to the development of computer based systems (see Table 4.10). The key distinction concerned the timely production of information with users and more particularly senior management regarding this as paramount. It was emphasised that this issue was more critical than data accuracy once a reasonable standard had been achieved as in Hertfordshire. In contrast the individuals most closely involved with processing and collecting data felt that time expended on increasing accuracy was worthwhile. As a consequence of these differing perspectives and priorities there is a tendency for a mismatch between the

Table 4.9: Perspectives on the relationship between users and the technical specialists

Statement	Staff grouping	Mean	Standard deviation
Computing staff tend to use a lot of technical language	SP [7]	3.29	0.70
	D [2]	3.00	1.00
	I [4]	4.25	0.43
	Total [13]	3.69	0.72
Computing staff tend to be more interested in what the computer can do than providing data	SP [7]	3.43	1.05
	D [2]	4.50	0.50
	I [4]	3.75	1.09
	Total [13]	3.69	1.07
Frequent meetings should be held between the producers of computer based data and data users	SP [7]	4.29	0.45
	D [2]	4.50	0.50
	I [4]	3.25	1.30
	P [2]	3.00	1.00
	Total [15]	3.87	1.02

SP - structure planners
D - senior decision makers
I - information officers
P - computer programmers
[ ] - total number of staff interviewed in the grouping

Scores: strongly disagree = 1; disagree = 2;
neither agree nor disagree = 3;
agree = 4; strongly agree = 5

Table 4.10: Priorities of staff groupings with respect to the development of information systems

Priorities	SP [7]	D [2]	I [4]	P [2]	Total [15]
Accuracy of data	100%	50%	50%	100%	80%
Timely production of data	100%	100%	100%	-	87%
User involvement in system development	57%	50%	100%	100%	73%
System reliability	43%	50%	75%	100%	60%
Extension of available applications	43%	50%	25%	-	33%
Organisation of the Information Group	-	-	-	-	-
Training of non-technical staff in computers	14%	-	-	50%	13%
Reduction of data acquisition costs	14%	-	-	-	7%
Financing development of computer based systems	14%	50%	25%	50%	27%
Data acquisition	57%	50%	75%	-	53%
Increasing staff access to data	43%	100%	25%	100%	53%
Ensuring confidentiality	14%	-	25%	-	13%

N.B. - Staff were asked to select their top five priorities
- Abbreviations as Table 4.9

system or information users thought they had requested and the eventual result.

It was suggested by a number of individuals that the variation in perspectives between the different staff groupings has been exaggerated by the present insecurity of the computer specialists. The increased use of micro computers has posed a dilemma for the technical staff, for while the programmers relish the independence this gives them from the central computing section, micros challenge their traditional role by providing users with the opportunity to access information and develop their own systems. The policy of decentralising computer resources inevitably erodes the programmers role as keepers of a specialist set of skills recasting them as enablers advising users as to the most appropriate method for system design. The programmers tend to associate the changing emphasis of their work load with a loss of status. Some planners felt that the process of decentralising computing skills and resources was being hampered by the programmer's desire to use unnecessarily complicated software. These individuals linked the approach adopted by the computer specialists to an attempt to ensure their involvement in future modifications given the perceived threat to their status. It is likely even in the absence of these circumstances that staff possessing computing expertise would favour more sophisticated technology with the additional facilities these offer to simple software which may be difficult to adapt.

The frustration felt by users is reflected in their strong support for the idea that frequent meetings should be held between the producers and consumers of computer based data (see Table 4.9). The non-technical members of the Information Group emphasised the value of informal meetings from the more problematic merits of formal working parties. Senior

management acknowledged the difficulties of communication between the different staff groupings and were anxious to avoid a cultural divide developing in the Department. The introduction of intermediaries reflects an attempt to facilitate mutual understanding between staff with differing levels of technical skills.

The Hertfordshire findings indicate that the perspectives of the computer specialists and users differ in relation to technology and the provision of information. These comments have been generalised across staff groupings, however, the interviews suggested that the interaction between personalities plays a critical role in the individual experiences of users. Given these findings an interesting feature of the current relationship between the County and Districts is the latter's preference for utilising the programming skills available within the County Planning Department rather than the resources within their own authorities. This reflects the value of technical staff which have at least some experience of the planning discipline and also the generally low priority of planning in the district context.

4.64 General information awareness amongst planning practitioners

This discussion takes a step back from issues concerned with computer awareness to consider the extent to which practitioners possess the necessary skills to absorb and interpret data and also whether staff regard information as making a positive contribution to their work.

Table 4.11 presents the responses of officers to statements concerned with the comprehensibility of automated data. It should be noted that the vast majority of staff made very little distinction between computer based information and data derived from other sources, as most planners receive

Table 4.11: The perceived level of understanding of computer based information

Statement	Staff grouping	Mean	Standard deviation
Generally those with experience of local government planning matters understand the computer based data generated by the Department	SP [7]	3.29	0.88
	D [2]	4.00	0.00
	I [4]	2.75	0.83
	P [2]	3.00	1.00
	Total [15]	3.20	0.91
Generally elected members understand the computer based data generated by the Department	SP [7]	2.29	0.88
	D [2]	3.00	1.00
	I [4]	2.00	0.00
	P [2]	3.00	1.00
	Total [15]	2.40	0.88
Generally those with no experience of local government planning matters understand the computer based data produced	SP [7]	1.86	0.64
	D [2]	2.00	0.00
	I [4]	2.00	0.71
	P [2]	3.00	1.00
	Total [15]	2.07	0.77
Many people find computer based data incomprehensible	SP [7]	3.86	0.83
	D [2]	3.50	1.50
	I [4]	4.00	0.71
	P [2]	4.00	0.00
	Total [15]	3.87	0.88

N.B. Abbreviations and scores see Table 4.9

the former as hard copy. Officers were asked to comment on the extent to which professional planners, elected members and the general public understood the computer based data produced by the Department. The results showed that of the three groups involved with the policy making process officers perceived the level of understanding to decline from professional planners through elected members to the general public. The average response even with respect to officers was not very positive. The broad trends indicate user groups were more firmly of the opinion that planners comprehend computer based data than were staff in the Information Group or the computer programmers. The average response of the computer specialists resulted from a distinct division of opinion. One officer regarded computer based data as straightforward and easy to comprehend while the second was sceptical about the level of numeracy amongst non-technical individuals. Senior management emphasised the need to educate staff so that they are able to extract intelligence from a mass of data. However, it was felt overall that the ability to select relevant information and combine that with knowledge of its limitations due to the method of acquisition was rare.

Generally elected members were not felt to understand automated data, although senior management who have most contact with these individuals emphasised that the capabilities of councillors should not be underestimated. It was suggested that in a county like Hertfordshire elected members were more comfortable and attached greater importance to information than in some other contexts. It was largely felt that the general public had a poor understanding of computer based data.

The difficulties associated with ensuring planning officers and to a lesser extent elected members and the general public understand the

information produced by the Department was recognised by members of the Information Group. Resources therefore have been devoted to presentation as a means of communicating the trends revealed by the information processed by the Department. Emphasis has been placed on the preparation of graphs and summary tables as well as using proper English rather than codes.

These findings question the extent to which those involved with the policy making process possess the skills necessary to absorb and interpret information. The interviews also suggested that practitioners must see value and be inclined to utilise information in their work. It is possible that a propensity to employ information is related to an individual's data handling skills and therefore their personal confidence with regard to such material. It was found in addition that a willingness to use information was dependent on an individual's perception of the policy making process. Section seven will examine this process in more detail but it is appropriate at this point to highlight the stereotypes which were found in Hertfordshire.

(i) Rationalists: individuals who view decision making as a rational process in which information has a significant and perhaps even decisive role.

(ii) Determinists: individuals who perceive the decision making process to be dominated by 'politics' in which the role of information is incidental to the manoeuvrings of the leading actors.

(iii) Pragmatists: individuals who acknowledge that the policy making process has a political element but regard information as performing a valuable function in supporting their case.

This analysis indicates that officers holding the first or third conception of the policy making process are likely to have a greater

propensity to make use of information.

4.65 Summary

The Hertfordshire findings cast considerable doubt on the assumption underlying the systems rationalist approach that policy makers are willing or have the skills to utilise technology and information. Some staff lack the necessary knowledge to unlock data held in computers and a few have little inclination to learn. The differing perspectives and priorities of the technical specialists and users is a significant factor influencing the design and utilisation of computer based information systems. A striking feature of these findings concerns the underlying level of information awareness amongst professional staff. This issue must be tackled before staff can be expected to utilise information effectively. Many of these issues have been recognised in Hertfordshire and although the full range of stereotypes existed there were fewer of the more negative views. Senior management are aware of the need to educate staff about data handling skills while the supportive computing environment centred around easy to use technology, has encouraged staff to at least consider the opportunities offered by automated techniques.

4.7 THE ROLE OF GEOGRAPHICAL INFORMATION IN THE POLICY MAKING PROCESS OF HERTFORDSHIRE COUNTY PLANNING DEPARTMENT

4.71 Introduction

The analysis undertaken in Chapter 2 suggests there are several conceptualisations of the role performed by information in the decision making process (see Tables 2.1 and 2.3). This section considers this issue with respect to the findings of the Hertfordshire case study. The research examines the assumptions underlying the systems rationalist

perspective and therefore focuses on the extent to which practitioners regard information as performing a substantive function and more particularly whether computerisation is considered to increase data accuracy and availability and as a result have an impact on the decision making process. The role performed by information will be explored by examining the stages of the policy making process where the staff interviewed indicated that information was employed. The structure of the analysis is based on the four stage decision making process identified by Danziger et al. (1982). These are the pre-decision, decision, rationalisation and post-decision stages. This provides a useful framework although it is appreciated that such a classification separates processes which are taking place simultaneously and presumes an order to decision making which is not necessarily justified. Consideration is also given to the function performed by computer based data and the associated issues of accessibility and availability. The findings presented in this section will be compared in Chapter 5 with those derived from Glasgow as a basis for assessing whether there is any difference in the overall utilisation of information in the two authorities and if so the nature of the factors accounting for this disparity.

4.72 The pre-decision stage

Problem finding

Exception reporting or the formulation of performance indicators provide a means of highlighting the need to develop or modify policy. There was little evidence in Hertfordshire that such routine procedures were currently being used (see Table 4.12). The production of data for the annual cycle of monitoring was regarded as enabling the forward planners to quantify trends which had been previously identified. In many instances it was possible for the individuals involved with the process to

Table 4.12: Perceptions of the role of information in the policy process: the pre-decision stage - problem finding

Statement	Staff grouping	Mean	Standard deviation
Personal observation and experience is more important than data in identifying planning problems	SP [7]	3.29	0.88
	D [2]	3.00	1.00
	I [4]	3.50	0.50
	P [2]	3.00	0.00
	Total [15]	3.27	0.77
Data provides surprising results	SP [7]	3.29	0.70
	D [2]	4.00	0.00
	I [4]	3.00	0.71
	P [2]	4.00	0.00
	Total [15]	3.40	0.71
Data stimulates discussion	SP [7]	4.14	0.34
	D [2]	5.00	0.00
	I [4]	4.00	0.00
	P [2]	4.00	0.00
	Total [15]	4.20	0.40

N.B. Abbreviations and scores see Table 4.9

prepare the text of reports leaving gaps for the exact figures. Officers suggested that overall personal observation and experience was more important than data in relation to the identification of planning problems, although the absence of a more positive response was due to staff regarding information and experience as complementary. Practitioners argued that personal acquaintance with a subject suggests the existence of a problem worthy of attention while information provides evidence as to the dimensions of the issue. These comments are supported by the findings in relation to problem definition. The programmers credited data with greater value than the rest of the staff indicating a difference in underlying approach.

These results were supported by the further comments of staff. Officers were in mild agreement that data provides surprising results. Staff who confirmed this view were asked to cite an example. Evidence was produced on each occasion but none of the cases was drawn from highly significant or sensitive policy areas. There was a tendency for the rare and unusual instance to stand out, rather than for data unexpectedly to suggest the need for a major policy adjustment. Officers felt they should be sufficiently well versed in their subject to avoid data raising major surprises. Given that unforeseen results were regarded as rare all sections of the Department were in very strong agreement that data stimulates discussion. A role that was not limited to the pre-decision stage but appeared to be a theme throughout the policy making process.

Problem definition

Officers were in general agreement that planning problems are seldom clearly defined, although there was a large degree of variation in the individual views of forward planners (see Table 4.13). Given this situation information was perceived to enhance understanding of the complex problems dealt with by planning authorities. Virtually all staff were agreed that data provides clearer perceptions of planning problems, an increased understanding of the characteristics of the local environment and also a reasonably realistic representation of trends in the environment. In these circumstances data performs a passive role, informing officers as to the nature and extent of a planning issue previously highlighted through an individual's observation and experience of the locality.

Table 4.13: Perceptions of the role of information in the policy process: the pre-decision stage - problem definition

Statement	Staff grouping	Mean	Standard deviation
Planning problems are seldom clearly defined	SP [7]	3.29	1.28
	D [2]	4.00	0.00
	I [4]	4.50	0.50
	P [1]	4.00	0.00
	Total [14]	3.79	1.08
Data leads to clearer perceptions of planning problems	SP [7]	4.00	0.00
	D [2]	3.50	0.50
	I [4]	3.50	0.50
	P [2]	4.00	0.00
	Total [15]	3.80	0.40
Data leads to clearer understanding of the characteristics of the local environment	SP [7]	4.14	0.35
	D [2]	3.50	0.50
	I [4]	4.00	0.00
	P [2]	3.50	0.50
	Total [15]	3.93	0.44
Most people accept data produced by the Department as a realistic representation of trends in the environment	SP [7]	3.57	0.73
	D [2]	4.00	0.00
	I [4]	3.75	0.83
	P [2]	4.00	0.00
	Total [15]	3.73	0.68

N.B. Abbreviations and scores see Table 4.9

4.73 The decision stage

Designing alternatives

The officers interviewed were in general agreement that data influences the development of policy with users more convinced than the programmers and members of the Information Group (see Table 4.14). In an attempt to examine the substance of the 'influence' staff were asked whether personal observation and experience were more important than data in determining solutions to planning problems. Officers tended to confirm this view and on the whole felt experience was of more value in attempting to find solutions to planning problems than to identify them in the first place. Perhaps surprisingly users attached slightly greater importance to data than the other staff. This reflected a feeling that both elements were valuable.

There are often several possible policy responses to a single planning problem. However, the findings of the interviews demonstrated that political circumstances and perceptions of the course of action favoured by senior management constrain the alternatives considered by professional staff. Officers were asked to express the extent to which elected members give a clear lead on planning policies. There was overall disagreement with this statement although senior decision makers who have most contact with politicians were less certain. The idea that data substantiates the claims of elected members was also rejected while there was a strong positive response to the notion that the producers of computer based data have little contact with elected members. Discussions with respondents implied that while the lead of elected members on day to day matters was not particularly great their influence can be seen in the overall agenda of the authority. For instance in Hertfordshire in common with much of the South East a shortage of small low cost dwellings

Table 4.14: Perceptions of the role of information in the policy process: the decision stage - designing alternatives

Statement	Staff grouping	Mean	Standard deviation
Data strongly influences the development of policy	SP [7]	3.86	0.83
	D [2]	4.50	0.00
	I [4]	3.25	0.83
	P [2]	3.00	1.00
	Total [15]	3.67	0.94
Personal observation and experience is more important than data in determining solutions to planning problems	SP [7]	3.43	0.73
	D [2]	3.00	1.00
	I [4]	3.50	0.50
	P [2]	3.50	0.50
	Total [15]	3.40	0.71
In general elected members give a clear lead on planning policies	SP [7]	3.00	0.76
	D [2]	4.00	0.00
	I [3]	2.00	0.00
	P [2]	2.00	0.00
	Total [14]	2.79	0.86
Generally data substantiates the claims of elected members	SP [7]	2.86	0.64
	D [2]	1.50	0.50
	I [3]	2.67	0.47
	P [1]	4.00	0.00
	Total [13]	2.70	0.82
There is little contact between the producers of computer based data and elected members	SP [6]	4.00	0.00
	D [2]	4.00	0.00
	I [4]	3.50	0.87
	P [2]	4.00	0.00
	Total [14]	3.86	0.52
Generally data substantiates the claims of senior planning staff	SP [7]	3.29	0.70
	D [2]	3.00	1.00
	I [4]	4.00	0.71
	P [1]	4.00	0.00
	Total [14]	3.50	0.82

N.B. Abbreviations and scores see Table 4.9

has been identified. Simplifying the issues considerably one response could be to release sites currently protected from development by green belt status. However, the political context prevents such a proposal being put forward even as one alternative let alone reaching the decision making stage. As a result elected members were regarded as setting the political parameters within which professional staff must operate.

The views of politicians were not the only group the findings suggested officers considered when designing policies. It was generally agreed that data substantiates the claims of senior planning staff and more particularly the opinions of the Chief Officer. This is in many respects unsurprising as these individuals are responsible for the activities undertaken by the Department while officers may feel their future career prospects are best served by avoiding controversy or confrontation. One planner expressed the view that in order to change the policies of the Department it would be necessary to replace the Chief Officer, with another suggesting that there was an active effort to ensure that the information produced confirmed the views of senior staff. These findings indicate planning officers are influenced in the production of alternative policies by the perceptions of the views of elected members and senior management.

Providing information on alternative policies

Gathering data on alternative policy responses is a relatively focused process. The Planning Department in Hertfordshire maintains substantial data sets and if this source fails to be adequate and time permits an ad hoc survey can be undertaken. Officers and in particular users were agreed that data influences the process of decision making (see Table

Table 4.15: Perceptions of the role of information in the policy process: the decision stage - providing information on alternative policies

Statement	Staff grouping	Mean	Standard deviation
Data influences the process of decision making on planning matters	SP [7]	4.14	0.64
	D [2]	4.50	0.50
	I [4]	3.25	0.83
	P [2]	4.00	0.00
	Total [15]	3.93	0.77
Overall data helps to clarify differences of opinion over planning issues	SP [7]	3.43	0.73
	D [2]	4.00	0.00
	I [4]	3.25	1.30
	P [1]	4.00	0.00
	Total [14]	3.50	0.91
Generally data answers important questions	SP [7]	3.00	0.93
	D [2]	4.00	0.00
	I [4]	3.50	0.50
	P [2]	3.00	1.00
	Total [15]	3.27	0.85

N.B. Abbreviations and scores see Table 4.9

4.15). However, it is important to examine what is inferred by 'influence'. The statement that overall data clarifies differences of opinion on planning matters provoked a wide range of responses, although in general officers agreed. Members of the Information Group were least convinced by this suggestion, claiming that information can support a range of policy stances and may even lead to differences of opinion. Generally agreement was more muted to the more concrete suggestion that data answers important questions. Officers justified this response on the grounds that factors other than information have to be considered.

Overall there was consensus that data provides information on alternative policies but it was stressed that other factors such as personal knowledge were important.

Deciding on the appropriate policy

The core of the decision making process is the selection of the favoured policy. Overall officers confirmed the statement that data leads to agreement on the most appropriate course of action and in a similar vein mild disagreement with the sentiment that data increases uncertainty over the appropriate policies to follow (see Table 4.16). However, further discussions implied that information performs a complex role in this process. Central government's statistics particularly on unemployment were cited as an example of a data set which engendered dispute rather than consensus. Senior decision makers were even in agreement with the notion that data increases uncertainty as it was suggested that a single data set can be used to support a wide range of policy positions. In contrast the programmers had greater confidence in the ability of data to diminish the range of options.

Given the ambiguous nature of many data sets, the suggestion that professional planners ignore data was strongly denied, although this was qualified by comments which suggested staff may not necessarily choose to take any action. The programmers tended to feel there was a degree of truth in the statement perhaps due to their perceptions of a lack of action rather than the fact that data was being ignored. Additionally they suggested that greater precision on the part of users would reduce the production of irrelevant material. Staff also disagreed although less strongly with the idea that members ignore data. It was acknowledged that the value individual members attach to information varies with some keen

Table 4.16: Perceptions of the role of information in the policy process: the decision stage - deciding on the appropriate policy

Statement	Staff grouping	Mean	Standard deviation
Generally data leads to agreement about the most appropriate course of action	SP [6]	3.17	0.69
	D [2]	4.00	0.00
	I [4]	3.00	0.71
	P [1]	4.00	0.00
	Total [13]	3.31	0.72
Data increases uncertainty over the appropriate policies to follow	SP [7]	2.57	0.73
	D [2]	3.50	0.50
	I [4]	2.75	0.43
	P [1]	2.00	0.00
	Total [14]	2.71	0.70
Generally data is ignored by professional planners	SP [7]	2.00	0.93
	D [2]	2.50	0.50
	I [4]	2.00	0.00
	P [2]	3.00	1.00
	Total [15]	2.20	0.83
Generally data is ignored by elected members	SP [7]	2.14	0.83
	D [2]	2.00	0.00
	I [3]	2.67	0.47
	P [2]	3.50	0.50
	Total [14]	2.43	0.82
Data challenges preconceived notions	SP [7]	4.00	0.53
	D [2]	4.50	0.50
	I [4]	4.00	0.00
	P [2]	4.00	0.00
	Total [15]	4.07	0.44
Generally data persuades people to change their position on important issues	SP [7]	2.71	0.70
	D [2]	3.00	1.00
	I [4]	2.50	0.87
	P [2]	2.50	0.50
	Total [15]	2.67	0.79

N.B. Abbreviations and scores see Table 4.9

to discover more while a number prefer to rely on their own local knowledge.

These findings which suggest that while officers examine the available information it is not necesarily a determining factor were further supported by the comments of officers with respect to the extent data challenges preconceived notions. Most agreed with this statement but emphasised it was rare for data to change these preconceptions. One officer argued that in the case of a policy such as the green belt, information was not allowed to challenge the underlying validity of the policy. Staff also rejected the idea that data persuades people to change their position on an important issue. These findings are critical for if information was to have a substantive role in the decision making process it must persuade people to alter their views. As a result it appears that decisions are taken inspite rather than determined by the available information, with practical considerations such as the wide range of options supported by a particular data set an important additional factor.

4.74 The rationalisation stage

Officers were asked during the interviews to comment on whether data is used by decision makers either to rationalise a personal preference for a policy or as ammunition in arguments to gain support for a favoured stance (see Table 4.17). All staff endorsed the idea that data performs a legitimising function and as such supports decisions which officers have originally taken on the basis of intuition. Given these findings staff argued that in Hertfordshire familiarity with the available data provided a reassuring background against which officers took decisions. An individual suggested that most staff were aware of the intended direction of the County's planning policies and as a result it was the function of data to

support this position in formal public arenas such as the examination in public of the Structure Plan. This sentiment was endorsed by the very strong agreement with the notion that data is used to support the arguments of the Department in authority wide discussions. It was argued that in these circumstances the substance of the information was in many respects less important than the tactical advantage of its presence.

Table 4.17: Perceptions of the role of information in the policy process: the rationalisation stage

Statement	Staff grouping	Mean	Standard deviation
Data is used to legitimate existing decisions	SP [7]	3.71	0.45
	D [2]	3.00	0.00
	I [4]	4.50	0.50
	P [2]	4.00	0.00
	Total [15]	3.93	0.57
Data supports planning decisions that have already been taken	SP [7]	3.71	0.45
	D [2]	3.50	0.50
	I [4]	4.25	0.43
	P [2]	4.00	0.00
	Total [15]	3.93	0.44
Data is used to support the arguments of the Department in authority wide discussions	SP [7]	4.29	0.45
	D [2]	4.50	0.50
	I [4]	4.25	0.43
	P [2]	4.00	0.00
	Total [15]	4.27	0.44

N.B. Abbreviations and scores see Table 4.9

The Chief Officer emphasised the need for senior management to identify what constitutes proof in their particular environment. As a result once information resources have been established of a quality which provides credibility, they can be employed to prove the appropriateness of the policies proposed by the Department. The Department of the Environment's reticence to challenge Hertfordshire's policies was perceived as providing

evidence as to the Department's ability to support its decisions. Overall these findings indicate that information is employed to legitimate intuitive decisions and also following the Department's selection of a policy option to gain the support of elected members and provide the necessary ammunition to counter the challenges of external organisations.

4.75 The post-decision stage

Monitoring and evaluation constitute the two main elements of the post-decision stage (see Table 4.18). The annual monitoring year in Hertfordshire provides the framework for much of the activities of the Forward Planning Group. Senior planners attach a great deal of importance to this work routine, arguing that the regular production of reports enhances the credibility of the Department in the eyes of elected members. It is therefore unsurprising that there was very strong agreement with the suggestion that data is used to monitor policy. It should be stressed that monitoring in Hertfordshire takes place at two levels with the role of data greatest for reviews of the numerical rather than the more general policies. There was only slightly less strong confirmation that data is used to evaluate the success or otherwise of planning policies although these comments were qualified. Many officers had little experience of undertaking evaluations and those that did suggested it was likely the published findings would show the policy in a favourable light. Understandably individuals are unlikely to undermine their own position and professionalism by highlighting a policy failure. As a result the relationship between information and the process of monitoring and evaluation is complex and involves issues of personal and departmental credibility.

Table 4.18: Perceptions of the role of information in the policy process: the post-decision stage

Statement	Staff grouping	Mean	Standard deviation
Data is used to monitor policy	SP [7]	4.43	0.49
	D [2]	4.00	0.00
	I [4]	4.50	0.50
	P [2]	4.00	0.00
	Total [15]	4.33	0.47
Data is used to evaluate the success or otherwise of planning policies	SP [7]	4.14	0.64
	D [2]	4.00	0.00
	I [4]	3.75	0.43
	P [2]	4.00	0.00
	Total [15]	4.00	0.52

N.B. Abbreviations and scores see Table 4.9

4.76 Computer based data and the policy making process

This section focuses on issues associated with the role of automated data in the policy making process and more particularly whether practitioners regard computerisation as enhancing data availability or accuracy.

Computers and the availability of information

The aggregate responses of officers endorsed the assumption that the development of computer based systems had increased the general use of data within the Department although such material was not necesarily directly accessed by uses (see Table 4.19). A wide range of responses were provoked by this statement with staff commenting that the utilisation of information stored in such systems was dependent upon possession of the necessary skills and confidence, while a number of individuals suggested they had more than sufficient work to be interested in making use of new

Table 4.19: Perceptions of the availability of computer based data

Statement	Staff grouping	Mean	Standard deviation
The development of computerised systems has increased the use of data by staff within the Department	SP [6]	3.83	1.07
	D [2]	3.50	1.50
	I [4]	4.25	0.43
	P [2]	4.50	0.50
	Total [14]	4.00	1.00
In general planners receive too much data	SP [7]	2.71	1.28
	D [2]	2.00	0.00
	I [4]	3.00	1.00
	P [1]	4.00	0.00
	Total [14]	2.79	1.15

N.B. Abbreviations and scores see Table 4.9

data sources. It is noticeable that users were slightly less positive about the contribution of automation to increasing data availability than the other staff groupings. The interviews also explored whether in circumstances of an increasing range of data sources officers felt they were in receipt of too much data. The overall results neither confirmed nor denied this notion but within a considerable range of responses individual staff groupings tended towards more distinct views. Users and in particular senior management disagreed with the sentiment that planners receive too much data while in contrast members of the Information Group endorsed this view. All groupings were concerned about the relevance of the data they received with the staff involved with the provision of information suggesting that if users were more specific about their needs they would be given less data. The two users who felt data overload was

a particular problem had worked in the Department for less than eighteen months. This suggests problems of data surplus may be related to the level of familiarity with a particular subject or context.

Automation and the quality of the data generated

Officers were asked to comment during the interviews on the quality of computer based information with respect to whether they regarded it as accurate, believable, reliable, realistic, clear, unbiased, complete or useful. The only characteristic which drew a positive response from all the staff interviewed was the notion that computer based data is useful. Staff were least convinced that the data was complete or unbiased and suggested that the presence of the other qualities varied in time and according to the issue under consideration. The comments of officers indicated that their perceptions of data quality were strongly linked to the person or people responsible for its collection, storage and manipulation. Staff also emphasised that in terms of accuracy they made little distinction between information processed using compuproduced by other methods. It was stated that issues of quality are strongly related to whether the data was input accurately in the first place and therefore dependent on the level of human error. Users and in particular senior staff were most sceptical about data quality but given these general perceptions accepted the problems associated with processing information arguing that it was good enough to meet their needs and although not perfect was no worse than that possessed by their 'opponents'. Data quality was in many respects not a critical issue for policy makers, rather the availability of data when it was most needed was regarded as more important.

The role of computer based data in the policy making process

Given the findings with respect to availability and accuracy, there is little evidence from the interviews to suggest that the influence of automated data is any greater than that of information from other sources (see Table 4.20). Officers marginally disagreeing that the provision of automated data means people are less likely to accept the findings of manual techniques. The programmers viewed such data most favourably while users and in particular senior decision makers regarded automation as not particularly significant. A number of officers suggested an articulate individual could rally support for a policy regardless of the computer based data available. The extent to which the use of automated data makes it difficult for those outside the Department to dispute the findings of analyses was questioned by senior management, although overall staff mildly agreed with the statement particularly those most directly involved with processing information. These findings indicate that officers in general make no real distinction between the role of computer based information and that derived from other sources.

Table 4.20: Perceptions of the role of computer based data in the policy process

Statement	Staff grouping	Mean	Standard deviation
The provision of computer based data means people are less likely to accept the findings of manual techniques	SP [7]	2.71	0.88
	D [1]	2.00	0.00
	I [4]	3.50	0.87
	P [2]	3.00	0.00
	Total [14]	2.86	0.83
The use of computer based data makes it difficult for those outside the Department to dispute the findings of analyses	SP [7]	3.29	0.88
	D [2]	2.00	0.00
	I [4]	3.50	0.87
	P [2]	3.50	0.50
	Total [15]	3.20	0.91

N.B. Abbreviations and scores see Table 4.9

4.77 Discussion

The findings of the case study question the applicability of the assumptions underlying the systems rationalist perspective with respect to the role performed by information in the strategic decision making process in Hertfordshire. Information was employed to assist the process of problem definition, providing evidence on alternative policy responses and under the control of the policy maker monitoring and evaluating existing policies. The most profound impact of information was during the rationalisation stage. As a result information was employed to legitimate favoured policy options and as ammunition against agencies who doubt the appropriateness of the decision taken. The role of information in the process of identifying problems, designing alternative policy responses and the key area of policy selection was found to be limited. The evidence suggests staff made little distinction between the function computer based data performs and information from other sources, particularly as most policy makers receive automated data in the form of hard copy. The Hertfordshire findings provide some support for the idea that computerisation increases the quantity of information available, although evidence suggests it is inappropriate to assume that all practitioners are able or willing to access directly material from such systems. Suggestions that computerisation increases the quality of information were not supported by the Hertfordshire investigations, with users emphasising that timeliness was a more important issue than data quality beyond a reasonable standard.

These findings question linear conceptions of the decision making process whereby the discovery of readily definable problems is followed by data collection which determines the 'best' policy. The analyses indicate that while information is being employed by practitioners it is not performing

a substantive role in policy making as the systems rationalist perspective assumes. The results suggest information is performing a tactical function in the sense of giving decisions an air of rationality and supporting the policy positions adopted by the Department. In such circumstances it is only necessary for data to be sufficiently accurate to gain credibility while timely production of such material is vital. The generation of information also appears to perform an important background function indicating the dimensions of a problem, reassuring officers that preferred policies are meeting with a measure of success and that the status quo is not being challenged. In contrast with respect to the sensitive areas of problem finding, the selection of alternative policies and the choice of the appropriate decision, officers prefer to rely on personal experience and knowledge of the political and organisational context rather than the uncertain outcome of analyses.

4.8 CONCLUSION

The findings of the Hertfordshire case study raise important issues concerning the appropriateness of the systems rationalist perspective with regard to the development of the computer package, the utilisation of information by individual practitioners and the role performed by information in the policy making process. Organisational factors were shown to have a significant influence on the nature of the information systems developed, while individual personalities and the relationship between the technical specialists and users were found to be more important than the formal characteristics in the utilisation of information by individual practitioners. The findings also question whether information performs a substantive function in the strategic decision making process. It is therefore important these issues are

explored in the seemingly very different context of Glasgow. This investigation will also enable any difference in the overall utilisation of geographical information between the two authorities to be examined.

CHAPTER 5

THE USE OF GEOGRAPHICAL INFORMATION IN GLASGOW DISTRICT PLANNING DEPARTMENT

5.1 INTRODUCTION

This chapter describes and analyses the findings of the empirical investigations based in Glasgow District Planning Department. In common with the structure adopted for the preceding discussion concerning Hertfordshire, the first part of the chapter presents a profile of the authority in terms of the components of the computer package, the characteristics of the social world into which it is embedded and the overall approach adopted to information management. This is followed by consideration of the factors influencing the development of the computer package and utilisation of geographical information as well as the role of information in the policy making process. The findings of the two case studies are also compared. Particular concern focuses on the extent to which the utilisation of information varies between the two authorities and whether the observed differences can be accounted for by the disparity in statutory planning responsibilities. The detailed characteristics of the investigations undertaken in Glasgow will be examined prior to consideration of the main features of the computer package.

Exploratory interviews were conducted with thirty-five members of the Planning Department including senior management, users and those involved with the provision of information. Discussions were conducted with staff

involved with operational activities such as processing planning applications as well as local planners and officers concerned with policy making of a more strategic nature. The two members of the authority's Computer Services Department (CSD) most closely linked to Planning were interviewed while informal discussions were held with officers in other District Council departments and Strathclyde Regional Council.

Twenty-eight staff were selected for the second phase of semi-structured interviews which concentrated on issues associated with the use and role of geographical information in the strategic decision making process. Policy making in Glasgow takes place at two levels. These are in the form of firstly, local plans which relate to small neighbourhoods and secondly, city wide policy statements on particular topics. The sample included individuals involved with both these activities. The staff interviewed were grouped under the four headings listed below with the abbreviations adopted:

(i) local planners (LP) - 8 professional planners responsible for the preparation and implementation of local plans. These individuals constitute the members of two local plan teams.

(ii) senior decision makers (D) - 2 senior decision makers represented by the Senior Depute Director and the Chief Planning Officer responsible for the Planning Services Unit.

(iii) information and policy officers (IP) - 13 individuals including members of Information and Policy Groups 1, 2 and 3 who prepare policy statements on city wide planning matters and also the cartographer due to her position as a recipient of the Department's technical expertise rather than a computer specialist.

(iv) computer programmers (P) - 5 members of the Information and Computing Projects Group including four planning analysts with computer programming and statistical skills and the officer in overall charge of the Group.

The unavailability of a member of one of the Information and Policy Groups resulted in a total of twenty-seven interviews being undertaken. It was also impossible to conduct a planned interview with the Convenor of the Planning Committee due to illness.

As a result of the differing responsibilities of the Planning Departments in Glasgow and Hertfordshire the staff groupings are not exactly comparable. There are strong similarities between the type of work undertaken by the senior decision makers and the technical specialists in the two authorities. The activities of Glasgow's Information and Policy Groups in many ways combine the type of tasks undertaken by the Information Group and the forward planners in the Hertfordshire context. For instance their involvement in the collection of data has some similarities to the work of Hertfordshire's Information Group while the analysis of this information and preparation of city wide policies for a metropolitan area of the scale of Glasgow bears a strong resemblance to the type of work undertaken by the forward planners. However, Hertfordshire's Planning Department is not responsible for activities comparable to the work of the local plan teams in Glasgow. The same method of analysis has been adopted for both case studies but as a consequence of the differing responsibilities the aggregated results are presented at the level of individual staff groupings, the whole authority and also all respondents with the exception of local planners.

The division of responsibilities within Glasgow results in the knowledge of some officers being more narrowly focused on the tasks for which they are directly accountable than was the case in Hertfordshire. Two officers felt unable to respond to many of the statements concerning the role of information in the production of planning policies. The specialist authority wide map generating activities of the cartographer resulted in much of the policy making process being outside her range of experience. Additionally one of the planning analysts declined to answer over a third of the statements concerning the use of information for policy making. This is perhaps more surprising given the responses of the other four technical specialists and the apparent need for those involved with information systems to be aware of user requirements.

5.2 COMPUTER PACKAGE

5.21 Introduction

This section describes the main components of the computer package developed by Glasgow District Planning Department. The hardware, techniques, data sets and individuals directly involved with information provision will be considered and contrasted with the computer package introduced in Hertfordshire.

5.22 Equipment

The computing equipment available to the Planning Department including mainframe facilities which can be accessed throughout the authority are listed in Table 5.1. A striking feature is the much stronger emphasis Glasgow places on the utilisation of the authority's mainframe computer than planners in Hertfordshire.

Table 5.1: The equipment element of the computer package available within Glasgow District Planning Department

Equipment	Comment
Computers:	
- Mainframe	Access to the authority's Honeywell DPS 88/92 via 4 terminals located in the Information and Computing Projects Group and 6 terminals located throughout the rest of the Department
	2 tektronix 4111 work stations for automated mapping
- Mini	1 stand alone Prime computer dedicated to processing planning applications accessed via 15 terminals
- Micro	7 micro computers including 1 dedicated to desk top publishing
Accessories:	
- Printer	5 mainframe printers and 4 printers linked to micros including 1 laser printer
- Digitiser	1 tablet digitiser and control monitor purchased by Cleansing but used virtually exclusively by Planning and therefore is located in the latter
- Plotter	2 plotters for automated mapping
- Scanner	1 scanner for desk top publishing

5.23 Techniques

The computer specialists in Glasgow have investigated and acquired a much broader range of software than their colleagues in Hertfordshire (see Table 5.2). Information systems have generally been developed on

Table 5.2: The software element of the computer package in Glasgow District Planning Department

Hardware	Software	Comment
Mainframe	SPSSX	statistics package
	GIMMS	mapping package
	SASPAC	statistics package
	SASPAC U	statistics package
	Easiwork	standard business package
	Easigraph	graphics package
	DM4	data base package
	PDQ	data base package
	Status	text retrieval system
	Coordinate	automated mapping system and associated software for plotting
Mini	Planet	development control system and associated software
Micro	Delta	data base package
	Dbase III+	data base package
	Microchart	spreadsheet package
	Multiplan	graphics package
	Excel	business package including spreadsheet and graphics facilities
	Ventura	desk top publishing system and associated software

mainframe computers with the software available for such systems more specialist in nature and complex to use than the standard business packages utilised in Hertfordshire.

5.24 Information systems/data sets

Glasgow has tended to devote resources to the development and maintenance of a few large interrelated data bases in contrast to Hertfordshire's approach based on numerous single topic systems. Table 5.3 demonstrates the emphasis placed on utilising mainframe technology. Responsibility for the formal property enquiry system and the Planet development control system is shared, with Planning ensuring data accuracy while CSD provide twenty-four hour maintenance cover for these heavily used systems. Joint working arrangements also have been devised between Planning, CSD and Honeywell for the development of an automated mapping system.

5.25 People

The Planning Services Unit (PSU) is responsible for the provision and handling of information in the Department. The Unit is divided into four groups consisting of a total of 37 staff with 34 posts filled in 1988. These are known as Information and Policy Groups 1, 2 and 3 and the Information and Computing Projects Group. Each group is headed by an assistant chief planning officer (ACPO) and comprises three or four professional staff and a varying number of technicians according to the nature of the tasks undertaken. For instance due to the labour intensive survey work associated with documenting vacant land seven technical staff were attached to Information and Policy Group 2 in 1988. All staff in the Department have gained professional or technical planning qualifications or are undergoing training. The majority of individuals also possess a substantial amount of experience of the Glasgow context.

Table 5.3: Information systems for which Glasgow District Planning Department takes responsibility

Content of data set	Mainframe	Mini	Micro
Land statistics:			
- Formal property enquiry system (P)	+		
- Planet development control system (P)		+	
- Vacant land	+		
- Vacant industrial premises	+		
- Leisure and recreation	+		
- Health and welfare	+		
- Retail facilities file			+
Demographic statistics:			
- 1971 Census of Population	+		
- 1981 Census of Population	+		
- Population statistics (city wide and small area)	+		
- Population estimates			+
- Housing stock statistics	+		
Employment/unemployment statistics:			
- Census of Employment	+		
- JUVOS unemployment data	+		
- GO training project			+
Environmental statistics:			
- Listed buildings register			+
Policy related statistics			
- Policy cards system			+
- Capital bids system	+		
- Capital investment monitoring	+		
Mapping			
- Coordinate automated mapping system plus 900 OS maps (P)	+		
- Map index			+

(P) - Planning Department partially responsible for the system

The Information and Policy Groups collate and analyse data and subsequently prepare policy on district wide planning issues. The Information and Computing Projects Group is responsible for providing technical and statistical support and is the only group of its type in the authority. It consists of an ACPO, four officers with computer programming skills referred to as planning analysts, a cartographer and three planning technicians. The head of the Group is a qualified planner with a scientific background and experience of working in the authority since the early 1970s. The activities of the computer specialists are supported by the planning technicians who tidy up their work using micro computer facilities such as spreadsheet and graphics packages. The cartographer has specialist mapping skills and has acquired knowledge of automated techniques. These staff possess a relatively high level of computing expertise but such skills are not shared by other members of the Unit or the Department. Support for the development of major systems and maintenance of equipment is provided by CSD in the form of three person years of support per annum.

5.26 Summary

The computer package in Glasgow is characterised by large mainframe based systems utilising specialist software handling data generally from secondary sources. As a result the development and utilisation of such systems requires relatively sophisticated computing skills with this expertise concentrated within a specialist group. A measure of independence and stability is provided in both Hertfordshire and Glasgow by the presence of programming skills within the Department and a reasonably stable work force. However, there is a substantial contrast between the equipment and basic computing techniques adopted by the two authorities.

5.3 THE SOCIAL WORLD

5.31 Introduction

This section explores the social world in which the computer package is located, reviews the arrangements for data processing and assesses the extent groups within and outside the Department use the available information.

5.32 The external environment and the local government context of Glasgow District Planning Department

The external organisational context

Glasgow District Council is one of the largest urban authorities in Britain and the biggest in Scotland serving a declining population which totalled around 700,000 in 1989. The restructuring of the local economy has led to a significant contraction in the number of jobs available within the City. As a result between 1978 and 1988 employment is estimated to have declined by 78,000 with the traditional manufacturing industries mainly accounting for this loss. Circumstances have begun to improve with the service sector particularly in areas such as banking/finance and retailing now forming the core of the City's economy. However, developments in service industries have not been sufficient to off set the loss of jobs from traditional sectors of employment and therefore in July 1989 the average level of unemployment in the City was seventeen per cent with localities where the figure was nearer a third of the economically active residents. A distinctive socio-economic characteristic of Glasgow is the bias in housing tenure towards the public rented sector. In 1986 fifty-six per cent of dwellings were owned by the local authority while twenty-nine per cent were owner occupied. The activities of the District Council particularly their attempt to change the image of the City are encapsulated in the 'Glasgow's miles better'

campaign. This initiative has met with a considerable degree of success although many of the underlying socio-economic problems remain. The issues referred to above are reflected in the objectives of the Planning Department. These are to increase employment in the City, tackle social deprivation, seek an improvement in the quality of the environment and halt the loss of population particularly from the inner city. This brief overview demonstrates that the socio-economic conditions facing planners in Glasgow are in marked contrast to those encountered in Hertfordshire.

The level of exposure and technological awareness amongst the population and more particularly elected members is not as great as Hertfordshire. However in a peculiar twist linked to the District's policy of wherever possible purchasing goods produced locally, the opening of a number of branch plants by computer manufacturers in the region surrounding Glasgow has increased the number of products available to officers. The enhanced confidence in the economy of this part of Scotland has therefore influenced to some extent the range and direction in which the authority's computer package can develop.

The most significant external influence on the District Council are the activities of central government but this is less profound than was the case in Hertfordshire. Considerable uncertainty is created by fluctuating funding which makes long term financial planning difficult and legislative changes. The introduction of competitive tendering has influenced the approach adopted by a number of departments although not directly affecting planning. The emphasis of CSD has been modified towards a consultancy service in a similar manner to the central computing section in Hertfordshire and was renamed the Information Technology Department in 1989. A number of service orientated departments such as Parks have been

prompted to invest in information technology in an effort to improve financial efficiency. The impact of other public sector agencies such as Strathclyde Regional Council and the surrounding districts is much less marked than central government. As a major city district Glasgow perceives itself to be relatively self-sufficient and therefore maintains a large measure of independence from other authorities.

The local government context

The organisation of service provision by Glasgow District Council has traditionally been based on individual departments with a prominent role performed by chief officers and senior politicians. Generally, individual political aspirations amongst the leading elected members in Glasgow are greater than was the case in Hertfordshire with some committee Convenors taking a considerable interest in the activities of the department to which they are most closely involved. There is also more interaction between staff and councillors, although there is a tendency for the first contact to be made through the appropriate chief officer.

A department's position within the hierarchy of the authority has an important influence on the availability of resources and scope for action. The activities of Glasgow District Council are dominated by the Housing Department due to the massive stock of council houses. As a result about two-thirds of the Council's total budget is allocated annually to this activity. Planning in comparison receives about three per cent. This domination is also reflected in the fact that the work of over half the systems analysts in CSD is devoted to housing related systems. Planning is regarded within the authority as a middle ranking department. However, its overall status has tended to decline in the last ten years linked to the absence of significant political interest and the activities of the

Town Clerk's Department. The most obvious expression of this trend was the transfer of the Economic Development and Corporate Plans Groups from the Planning Services Unit to the Town Clerk's Department at the start of 1987. These groups served an authority wide rather than exclusively planning related function and in conjunction with the political interest in their work were responsible for some of the Department's most high profile activities. Senior planning staff responded to this challenge by curtailing the development of corporate services of this type in an attempt to remove the justification for transferring such activities to a more central location within the authority.

The motives of the Town Clerk's Department in the mid 1980's were regarded by many staff with a considerable measure of suspicion. The District Council traditionally had been dominated by individual departments but some perceived the Town Clerk and a number of senior politicians to be striving for a more corporate approach. The work of some of the planning groups made them obvious candidates for relocation to a Department aiming to perform a central coordinating function. It was suggested that the next group to have been transferred would have been Information and Computing Projects. However, circumstances changed with the leading actors either leaving the authority or retiring, while the activities of groups such as Information and Computing Projects were more closely integrated into the work programme of the Planning Department. Additionally the groups which had been transferred encountered staffing problems as officers particularly in Corporate Plans became dissatisfied with the changing nature of their work.

The declining pressure from the Town Clerk was replaced by a proposal to amalgamate Planning with Building Control and Architecture to form an Environmental Services Department at the start of 1989. Some staff felt that one result of a reorganisation of this type would be the assimilation of the Information and Computing Projects Group into CSD. However, following the selection of a new Planning Convenor after the May 1988 local government elections the Department was in a stronger position to resist challenges to its integrity. The new Convenor was anxious to become more directly involved in the activities of the Department than those previously holding that office and in addition was anxious to emphasise Planning's contribution to resolving the problems facing the City. A permanent exhibition of the Department's work and the organisation of seminars on policy issues are two examples of the immediate effort to raise the profile of Planning. However, the association of greater security with a new and enthusiastic Convenor is a fragile foundation for the Department, as political favour can change particularly as the successful candidate was not the choice of the Labour Group's ruling Executive. As a result some politicians are likely to be looking for signs of weakness which may have unfortunate repercussions for the Planning Department as its status is to some extent linked to the political success of this individual.

The external setting and the District Council context provide the background against which the activities of the Planning Department and more particularly information provision takes place. The issue of whether proposals or rumours about reorganisation prove to be founded or come to fruition is in many ways rather less significant than the uncertainty engendered and efforts expended in attempting to maintain the status quo.

The influence of this and the other features discussed will be considered in Section five with respect to their impact on the development of the computer package.

5.33 The historical context and organisational structure of Glasgow District Planning Department

A historical overview of the development of information provision

The present statutory functions of the Planning Department were established following the reorganisation of Scottish local government in 1975. This in turn prompted a review of the Department's structure and organisation. The Development Control and Local Plan Sections were formed to undertake the main statutory duties of the authority with these activities supported by the Policy and Intelligence Section. The latter was given responsibility for developing the Department's information resources, coordinating city wide planning policies, preparing the response to the Region's Structure Plan and providing a city wide framework for planning through a District Plan. In addition Policy and Intelligence became the focus for the authority's research projects. The Section produced the first two Housing Plans for the Scottish Office but following the transfer of this work to the newly established research group in the Housing Department, Policy and Intelligence became increasingly involved with matters concerning the local economy. A review of the Council's management structure was instigated in 1979 and as a result the Policy and Intelligence Section was divided into the four current groups plus Economic Development and a group initially known as Planning Policy renamed Corporate Plans in 1984. The last two groups were transferred to the Town Clerk's Department in 1986 as discussed earlier with the remainder being termed the Planning Services Unit.

Responsibility for the authority's computing interests changed during this period. At the time of local government reorganisation in 1975 the former Glasgow Corporation's mainframe computer was transferred from the renamed Glasgow District Council to the newly established Strathclyde Regional Council. It was proposed that the District's main computer users which were the Departments of Finance, Housing and Planning would be given the status of 'privileged clients' giving them access to the relocated facility. Difficulties over the allocation of resources and development priorities led the District Council to invest in its own computing facilities in 1979. An independent Computer Services Department was established while specialist computing and research functions were consolidated within the Planning Department. This team known as the Computing Projects Group consisted of personnel who possessed programming, systems research and statistical skills. The Group has been renamed Information and Computing Projects and while the essence of their work remains the same they now focus on planning related activities. The overall result has been to place the Planning Department in a unique position within the authority having access to in-house programming skills.

The involvement of the Planning Department in the development of computer based information systems appears until the mid 1980s to have been mainly linked to authority wide projects such as the property data base. This contrasts with Hertfordshire where the historical justification for devoting resources to information processing facilities was to support the Department's strategic planning activities. Glasgow's Information and Policy Groups analyse and assess the policy implications of the data which they collect but the link between these tasks and automation has until the

late 1980s been very tenuous. This theme will be developed during the course of the chapter as the Department's approach to information management is explored in more detail.

The organisation and nature of the activities undertaken by Glasgow District Planning Department

This section provides an overview of the activities undertaken by the Department and a detailed examination of the responsibilities of the groups comprising the Planning Services Unit. Figure 5.1 illustrates the structure and hierarchy of the Department, indicating the groups into which activities are divided and the organisation of personnel in the sections where staff were interviewed. The Directorate consisting of a Director and two Deputes have overall responsibility for the work of the Department with tasks divided between four sections each headed by a Chief Planning Officer. These sections are further sub-divided into either area based teams or groups providing specialist knowledge depending on the nature of the work.

(a) Development Control

Development Control is divided into four area based teams whose task it is to respond to the daily pressures of processing 4,000 planning applications per annum. A fifth group has also been established to deal with applications for more minor developments for which responsibility has been delegated to officers.

(b) Local Plans

The statutory function of local plan preparation and the associated policy making is divided between eight area based teams covering 41 local plan areas. Most officers regard the production of plans as secondary to the

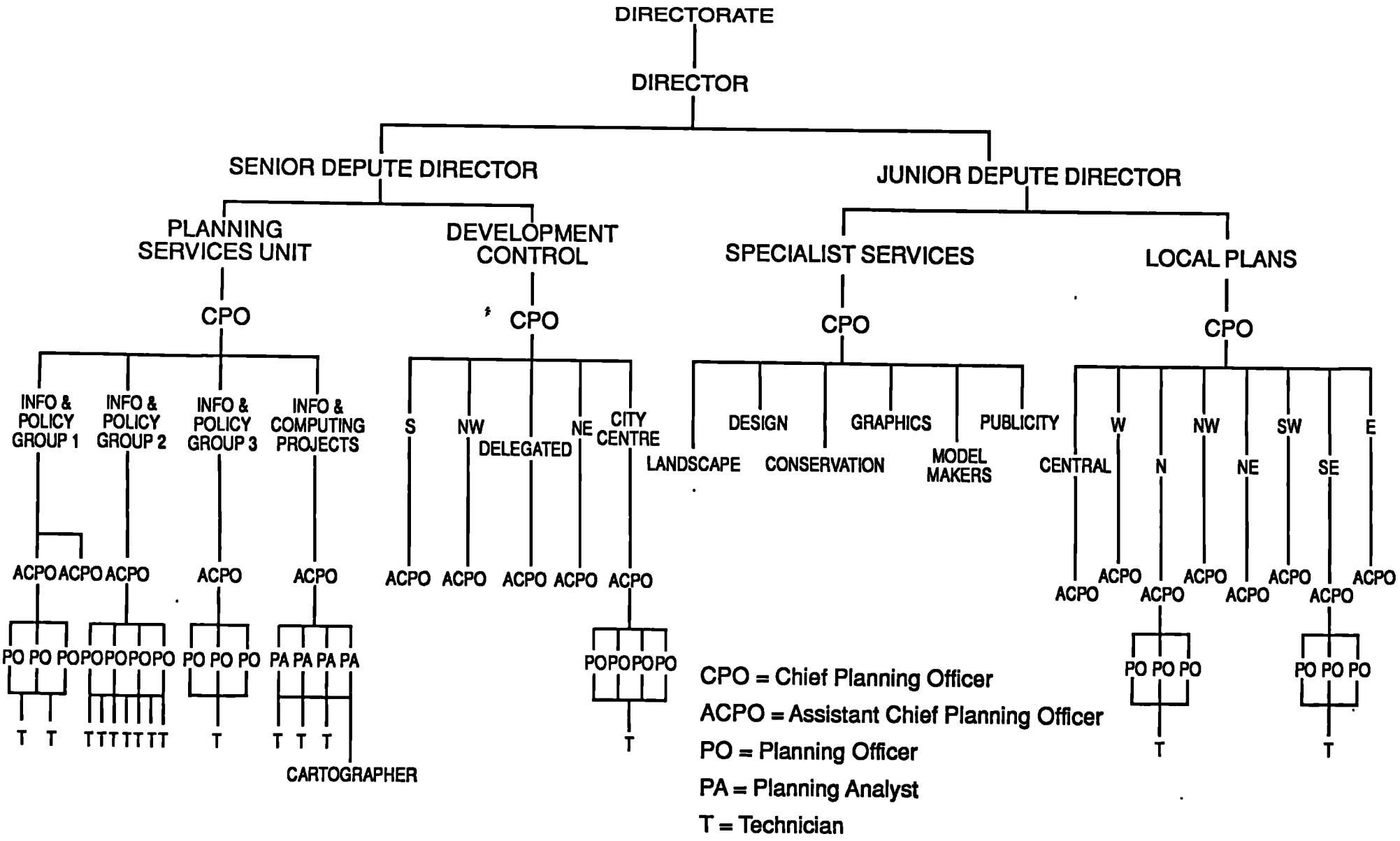

Figure 5.1: Structure of Glasgow District Planning Department (February 1989)

process of implementation. The task of monitoring is generally not perceived to be a high priority although some officers have produced reviews for their own purposes.

(c) Specialist Services

The Specialist Services section comprise six disparate groupings of expertise including landscape architects, architects, graphic designers and model makers. The staff in these groups perform a consultancy role providing specialist knowledge and skills.

(d) The Planning Services Unit

A wide range of information and research related activities are undertaken by the Planning Services Unit. Much of the content of the Section's work alters from year to year in line with the ever changing pressures on the planning system. The underlying theme of the varied work load of the Unit is the aggregation of information across the whole City. These activities complement the detailed local knowledge of the development control officers and local planners and aim to ensure there is a consistent approach to planning throughout Glasgow. Professional staff are given responsibility for particular topics and undertake the research necessary to generate recommendations and policy guidance. This may involve the maintenance and/or development of manual or computer based information systems. The Unit is also responsible for a large number of ad hoc projects which reflect the political priorities of the moment. These tasks are divided between four groups with the emphasis of Information and Computing Projects directed towards a specialist set of computing and statistical skills. The main activities of the individual groups are outlined below.

Information and Policy Group 1 - The primary functions of the Group are to produce a plan for the complete District Council area noting the priorities and resources required to implement the authority's development strategy and to coordinate the preparation of local plans ensuring that they do not contradict the policies of other departments or Strathclyde Regional Council. The Group also has responsibility for commenting on the local plans of adjoining authorities, transport matters, the preparation of an environment plan and the analysis of development control decisions.

Information and Policy Group 2 - The Group provides the Department with detailed land supply figures through the maintenance of a data base on the amount and location of vacant industrial land and premises and also residential sites in the City. This entails a substantial amount of labour intensive survey work. The Group also coordinates the authority's policies on travelling and show people.

Information and Policy Group 3 - The Group's main area of responsibility is monitoring and formulating policies on land use issues associated with retailing, offices and hotels. The Group is also involved in promotional activities in these areas and maintenance of the leisure and recreation and health and welfare information systems as well as producing general information documents such as the ward and District profiles.

Information and Computing Projects Group - The primary function of the Group is to develop, implement and maintain computer based information systems for the Planning Department. Given this objective the Group liaises with CSD on behalf of the Department and researches into methods for the storage and retrieval of data. The Group monitors population trends and produces projections as well as providing up to date Ordnance Survey maps for the authority and developing automated mapping techniques. Analysis of national data sets such as the Census of Population and

employment statistics is undertaken on behalf of the authority. The Group also provides technical and statistical advice on the conduct and preparation of surveys.

The work of the Information and Computing Projects Group in relation to automated mapping provides a good illustration of the specialist computing activities undertaken and their capacity to handle complex mainframe technology. Much of the Group's work serves not only the interests of Planning but also has a wider function. Automated mapping for instance benefits the Planning Department as one of the main users of Ordnance Survey data but is also of value to other parts of the authority in a similar manner to the property date base and work on population trends. The tasks undertaken by the Information and Policy Groups are more closely linked to planning related activities in terms of the collection, analysis and generation of policy on city wide issues. Given the substantial computing capabilities of the Department it is noticeable that the work of these Groups largely relies on manual information systems. It is also important to note that the computing group is located with the Specialist Services Section on a separate floor from the rest of the Planning Services Unit and other potential clients such as the Local Plan and Development Control teams.

5.34 The provision and utilisation of information in Glasgow District Planning Department

The collection, analysis and provision of information

The Planning Services Unit has formal responsibility for handling the data sets required by the Department. However, the local planners and to some extent the development control officers assemble considerable amounts of less structured information about the localities with which they are most

involved. The majority of the information produced by the Unit is based on the analysis of secondary data sources such as the Census of Population or JUVOS unemployment figures. The main exception to this is the collection of data concerning vacant land. Other survey work is the responsibility of the officer concerned with a particular topic and therefore studies of this type tend to be of a small scale nature. Occasionally the Unit cooperates with other departments, the Region or makes use of commercial market research organisations. For instance, concern over trends in retailing and the absence of adequate data resulted in collaboration with Strathclyde Regional Council.

Analysis of information held in automated systems is the responsibility of the Information and Computing Projects Group and as a consequence members of other groups tend to have very little direct contact with computers. Officers in the Information and Policy Groups have devised a variety of manual methods for holding a large proportion of the information they utilise. Very few systems have been developed to handle small data sets linked to the work of individual members of staff and in the case of the few exceptions such as the health and welfare data base the information is accessed by the technical specialists. As a result either manual methods are adopted for data processing or the computing staff are requested to supply hard copy. The emphasis placed on mainframe based systems may contribute to the low level of direct computer use by non-technical staff due to their relative complexity for infrequent users. However, work is commencing on the development of two micro computer based applications which will handle data on residential sites and retail developments. This will enable the officers responsible for these topics to take advantage of the facilities offered by technology. It is hoped the development of

these systems will allow more time to be devoted to analysis rather than the current situation which is dominated by the process of updating the data base and associated documents.

The provision of information to users inside and outside the Department takes the form of the circulation of reports or answers to special requests. It is difficult to quantify the frequency with which information is supplied as there are no regular patterns. Table 5.4 indicates the number and source of requests but no account is taken of the variation in the time involved in producing the information required. The Planning Services Unit usually takes responsibility for questions concerning city wide issues while more specific enquiries are handled by the relevant local planner. The utilisation of information by elected members was especially difficult to quantify and has been omitted from the table. Overall reports produced by officers satisfy the information requirements of councillors. Table 5.5 shows the number of reports produced by the Planning Services Unit in 1986 and 1987. Many of these reports are the result of ad hoc projects instigated due to political concern such as the committee reports on Clutter in Pedestrian Precincts and Light Rapid Transit. Documents such as registers of vacant land and population statistics are produced on a more regular basis. The majority of these documents take the form of committee reports and are regarded as a means of circulating information within the authority on issues such as demography. Presentation beyond the basic level of communicating information is not perceived to be an important issue.

Table 5.4: The frequency with which user groups request information

User Group	Information providers					
	IP1	IP2			IP3	ICP
		Vacant land	Residential land	Industrial land		
Planning						
- Development control	4	1	1	1	6	1
- Local plans	6	5	1	5	6	5
- Other PSU groups	-	-	-	-	-	6
Other GDC departments	4	5	1	2	5	4
Other local authorities	3	2	1	2	6	2
General public/ private sector	1	2	3	4	6	5

Scores: 1 - About once a year or less
2 - Several times a year
3 - Monthly
4 - Less than once a week/more than monthly
5 - less than daily/more than weekly
6 - Daily or more frequently

IP1 - Information and Policy Group 1
IP2 - Information and Policy Group 2
IP3 - Information and Policy Group 3
ICP - Information and Computing Projects Group

Table 5.5: The number of reports published by the Planning Services Unit in 1986 and 1987

Group	1986	1987
Information and Policy Group 1	17	22
Information and Policy Group 2	16	21
Information and Policy Group 3	8	12
Information and Computing Projects	4	3
Total	45	58

The utilisation of information by groups within the Department

This discussion explores the basic patterns of information and computer utilisation by groups in Glasgow and examines more closely the tasks for which data is required. The Information and Policy Groups have been included in this category due to their position as clients of the Information and Computing Projects Group. The formal mechanism for consultations on issues concerning the introduction of computer based systems and any changes in work practices is the Department's New Technology Working Group. Subsequent comments will examine the information needs of each Unit.

(a) Development Control

Development Control use a computer based system to assist the day to day administration involved in processing planning applications. The decision to automate followed a review of the problems and procedures associated with the existing manual system while the precise timing was influenced by the availability of finance. The Information and Computing Projects Group prepared the detailed specification and CSD evaluated the technical potential of various tenders. The Planet system was selected which allowed CSD to customise the software to meet the Department's requirements rather than incurring the additional expense and possible inconvenience associated with the manufacturer undertaking this work. CSD also took responsibility for the daily maintenance of the system following implementation as such activities would have absorbed a substantial proportion of the resources of Planning's computing group and therefore prevented them from developing other systems. The system became operational in 1985 with a number of officers suggesting that the desire to see a return on the considerable investment particularly by members of the Directorate resulted in the system being introduced too quickly. There

have been misunderstandings between the planners and computer analysts with the resolution of these difficulties inhibited by the absence of a planning officer with responsibility for liaison between Development Control and CSD during the period of system specification and the early stages of implementation. It is likely that the pressure of work resulted in insufficient time being devoted to these important periods of system development and consequently the analysts designed what they thought the planners wanted finding once completed that substantial modifications had to be made. A liaison officer was eventually appointed which eased problems in the short term but as the number of planning applications received by the department increased the emphasis of the officer's work returned to this activity. Formal mechanisms for coordination have been established in the form of the Development Control Appraisal Group and the Planet Working Group.

The system is the only source of information on planning applications received since 1985. It also provides search facilities and the routine documentation which is required to process a planning application. The main objective of introducing technology was to save time as Glasgow is near the lower end of the league table of Scottish authorities successfully processing applications within the statutory eight week period. This issue causes a great deal of sensitivity within the Section as well as resentment from officers outside Development Control as resources are increasingly directed towards this task. Given the sensitivity with which this issue is perceived it is understandable that the Section is very keen to avoid information being made available which would allow an assessment to be made of the time taken to process individual applications. Direct access to the computer system is limited to development control staff partly for this reason and also in an effort to

prevent additional pressures increasing response times. A number of routine printouts are produced with the aim of satisfying the needs of those outside the Development Control Section but the use of this important data set for more strategic decision making has not been well developed.

Officer perceptions concerning the value of the system vary. Management perceive the introduction of the computer based system to have facilitated the identification of problems such as an individual officer or group becoming overloaded with cases while the overall time savings have not been particularly significant. Staff who worked with the manual system consider there to be few benefits and resent the discipline imposed as computerisation removes the flexibility which allowed each officer to develop their own working practices. Instead officers are required to complete work cards which are perceived to provide the individual concerned with little direct benefit and as a result in some instances these forms are partially or inaccurately completed. Staff also regard fragmented arrangements for the storage of historic records as unsatisfactory with data held in a manual file cards system, the computer and microfiche. The response time of the automated system also provokes negative comparisons with the previous system which probably reflects a raised awareness of the lag time as the individual waits at the computer rather than the more active task of looking up an index card. In contrast, individuals who have joined the Unit since 1985 tend to have fewer complaints and perceive the search facilities to have positive benefits. The result of these circumstances is that the system's use varies from officer to officer. Some are keen to investigate the system's potential using the search facilities on average six times a day while others only use the system when absolutely necessary.

The Planet system is not the only source of information used by development control officers. The Information and Policy Groups are increasingly working with the Unit to provide supporting evidence for planning appeals. However in general the majority of staff consider themselves to be reasonably familiar with the issues indicated by the formal information sources available within the Department. It is also important to note that the figures presented in Table 5.4 represent the information requests of a section totalling around thirty-two planning officers.

(b) Local Plans

The local planners are largely self-sufficient with regard to information. Each officer has accrued a detailed knowledge of two or three localities with staff emphasising the greater value of personal experience and knowledge of the most appropriate people to contact over the data sets available within the Department. Currently over half the local plans have been approved while monitoring is not regarded as a priority by officers.

The Planning Services Unit largely supplies the information on population, housing stock and economic activity required for local plan preparation. The time taken to produce these figures was either regarded as totally unacceptable or very prompt depending on the local planner questioned. The spatial unit selected for each local plan area leads to considerable difficulties compiling statistics. The boundaries chosen were designed to encompass communities and bear no relation to spatial areas such as administrative units or enumeration districts. The statistical skills available within the computing group prove very valuable in these circumstances enabling population estimates and socio-economic characteristics to be derived from standard data sets. Local planners have access to mainframe terminals and through these to data sets such as

the formal property enquiry system. However, there was very little evidence that these facilities were used. Some officers prefer to collect their own data. These individuals argue that the relevant departments provide more up to date and accurate information on matters such as school and health and welfare facilities than can be supplied from the systems within the Department. It is therefore difficult to generalise about the pattern of information use for local plans work as utilisation appears to depend on an individual's network of contacts.

The local planners regard the reports produced by the Planning Services Unit as interesting but of little relevance to their day to day work. The quantity of ad hoc requests for information made by a local planner reflects the relationship between individual members of staff in the two Units but in general amounts to no more than six per year. The nature of the requests vary from data on the level of car ownership in a small locality to more complicated work on the future housing stock for a local plan area. Those asking for such information seem satisfied with the results but the local planners expressed interest in greater access to the Planet system and more frequent lists of development control decisions. Members of the Information and Policy Groups are increasingly becoming involved with local plan inquiries in instances where their specialist knowledge on a particular topic is regarded as valuable.

Most local planners have little direct computing experience therefore one adverse experience is generalised across all computer systems. Overall local planners were more interested in the potential of tools such as desk top publishing than the computer based data sets available within the Department.

(c) Information and Policy Groups

The Information and Policy Groups are reliant on the computing section for access to data stored in computer based systems. The level of use of such systems is often dependent on the relationship between staff as computing experience amongst non-technical officers is low. There is access to mainframe terminals but these are very seldom utilised. A number of officers expressed considerable uncertainty about exactly what data or computing facilities were available. Staff who were unfamiliar with computers felt they would benefit from an indication of what facilities were available and as a result of such guidance be in a better position to assess their needs. Given the development of a number of micro computer systems it is likely mutual understanding between members of the Planning Services Unit will increase.

General observations

The majority of planning officers involved with policy making in Glasgow are relatively self-sufficient with regard to information. Those requesting data were relatively satisfied with the quality. Computer based systems are largely developed in response to essential routine pressures rather than conceptualised by senior management as part of a broader strategy. This contrasts with the situation in Hertfordshire where the collection of data and development of information systems was part of an overall information management strategy for the whole Department. There is little utilisation of computers by non-technical staff, with local planners and members of the Information and Policy Groups mainly using manual techniques to store and analyse information. There was very little use of the mainframe terminals available within groups to access the property data base or material held in smaller systems such as information on health and welfare facilities. Officers

requiring such information largely utilised other methods particularly direct contact with the appropriate officer. Members of the Development Control Unit had mixed feelings about technology with the emphasis placed on the impact of computerisation on the conduct of their work rather than the substance.

The discussion has so far concentrated on the utilisation of information systems by different groups within the Department but as with Hertfordshire the Glasgow findings indicate that officers with virtually the same work load differ in the extent they use information. The critical role performed by an individual's network of friends in communicating the nature of the data available and therefore the likelihood a request would be made appeared to be more pronounced in the Glasgow context due to the less integrated information management strategy. These issues will be explored in more detail in Section six.

5.35 The relationship between the Planning Services Unit and other public agencies

Information generation and the Computer Services Department

The presence of technical specialists places the Planning Department in a unique position in the authority. The four planning analysts have programming skills and can manipulate mainframe software. The presence of the computing specialists provide the Planning Department with a measure of independence, although for many projects they must work in conjunction with the authority's computing department. CSD performs a consultancy function providing technical support and evaluating the tenders for pre-specified systems. It was suggested that following their formation CSD were initially wary about the activities and motivations of the existing computer group located in Planning. For instance, it was

suggested that shortly after their formation they were reluctant to allow the planning analysts to attend the Cobol programming courses organised for members of CSD. Staff in the two Departments have developed a reasonable working relationship in the last two years although senior management in CSD would prefer all the authority's computing expertise to be located in the same Department. The impact of the change of status of CSD to the Information Technology Department is not as yet clear but it is likely that the consultancy function will be expanded.

The division of activities between the two Departments enables the planning analysts to pursue their preferred area of work which is the development of new systems, leaving the more tedious tasks associated with maintaining equipment and the large data sets to members of CSD. Most of the initial difficulties have been overcome although there are times when the priorities of the Departments differ. For instance, perspectives often vary on the most important features of a new system. CSD tend to emphasise the importance of hardware and software compatibility throughout the authority while Planning is more anxious the system fulfils the perceived needs of the Department. Projects such as the development of an automated mapping system demonstrate instances where computing staff in the Planning Department have to work with CSD as well as the computer manufacturer. These arrangements for information processing and system development contrast with the independence from external agencies which typified the situation in Hertfordshire.

Planning information as a corporate resource

The role of Planning as a supplier of information to departments throughout the authority diminished with the relocation of the Economic Development and Corporate Plans Groups to the Town Clerk's Department. However,

the Planning Services Unit and more particularly the Information and Computing Projects Group maintains a number of important corporate functions.

The Planning Department takes responsibility for processing national data sets such as the Census of Population and employment statistics as well as producing population projections and housing stock estimates for the authority. Data held by the Information and Policy Groups is supplied on request but there is a much less regular flow. Planning also makes a significant contribution to the corporate property data base and the provision of Ordnance Survey maps.

The property data base was developed from a gazetteer established prior to local government reorganisation in 1975. Information is held on each property in the city including details of ownership extracted from the Valuation Roll. The system is used by many departments including Housing which keeps records on the vast stock of council houses, Estates for property management and the Legal and Conveyancing Section for property charge searches. The Information and Computing Projects Group have responsibility for locating new properties and allocating a twelve figure grid reference, amending the digitised boundary polygons when necessary and inputting the relevant statutory planning data.

The provision of Ordnance Survey maps and the development of automated mapping techniques is the Department's other main area of corporate responsibility. The authority wide demand for Ordnance Survey maps is considerable averaging weekly written requests of several hundred in addition to three or four daily requests for one or two standard maps. The majority of maps are supplied to departments other than Planning as

the planning technicians are responsible for meeting internal needs. During the early 1980s it became increasingly difficult for the Group to fulfil its corporate responsibility of providing up to date maps at a variety of scales in circumstances of an ever changing environment. As a consequence the Information and Computing Projects Group started to investigate the potential of automated techniques as a means of alleviating the operational difficulties being experienced and in 1984 a single digital map was purchased. A pledge was made to the Ordnance Survey that if the data was produced for Glasgow the maps totalling 900 would be purchased by the authority. This undertaking was made prior to the officer being certain that finance would be available. In subsequent years the necessary funding was secured through the allocation of a fixed sum for the purchase of digital maps by Planning and contributions from other departments in response to their own requirements for a particular set of maps. As a result by 1988 complete digital map coverage for the City was achieved.

The computer based mapping system has been developed by members of the Information and Computing Projects Group in association with CSD and Honeywell. The first work station was established in CSD in 1986 and a second twelve months later in Planning. Value for money was the critical issue in the eventual choice of software with the manufacturer of the authority's mainframe offering a substantial discount in exchange for the Planning Department acting as a pilot for the system. It was agreed that Honeywell would take responsibility for software modifications thereby enabling them to develop a more commercially attractive product. Glasgow on the other hand acquired a system at relatively little cost but faced the problems and inconvenience associated with being a test site for a largely untried system. The original objective was to develop a system

which could generate Ordnance Survey maps on a screen and plot selected topographic features at any scale. This was largely achieved by the end of 1988 with the technology utilised to produce on average one plot a day.

The emphasis of system development has now been redirected towards an evaluation of software capable of integrating and manipulating map and attributable data. The Planning Department is in a relatively advantageous position as a large proportion of their data sets are already spatially referenced. A number of pilot projects for clients within Planning as well as other departments such as Architecture and Related Services, Building Control and Estates have been undertaken. The aim of the main planning related project has been to digitise the boundaries of all the vacant land in the City and associate individual sites with information held in a data base. Once the time consuming task of inputting the information has been completed it is hoped that the process of calculating site areas and conducting analyses will be made easier and more accurate. The annual review documents should also be produced more quickly as the computer file will only need to be amended rather than the laborious process of completely redrafting paper maps and lists.

Projects of this type help to develop experience and knowledge about the technology as well as providing products with which to demonstrate the potential of the system. It is perceived to be in the interests of Planning that those departments considering the possibilities of GIS opt for the approach adopted by the Information and Computing Projects Group as this increases the pool of potential funding and places pressure on CSD to accommodate their needs into future computing plans. The formal

mechanism for raising such concerns and ensuring coordinated development in this field is through the Automated Mapping Group chaired by a member of the Planning Department's computing group.

Generally the quantity of information requested by other council departments depends largely on personal contacts. There are, however, a number of interdepartmental groups which meet regularly and act as a formal mechanism for the exchange of views on issues concerned with the property data base and map related matters. These groups are chaired by a member of the Information and Computing Projects Group and include:

- Glasgow District Council Property Database Users Group;
- Glasgow District Council Formal Property Enquiries Working Group;
- Glasgow District Council Automated Mapping Group;
- Coordinate Software Working Group.

Authority wide investment and coordination of information technology is provided by the Glasgow District Council Computer Users Group and the Glasgow District Council Strategy Group with the Glasgow District Council Micro Users Group concentrating on issues associated with this technology. It is noticeable that these groups tend to focus on technology rather than the management of information.

The provision of data to other public agencies

Glasgow District Planning Department unlike Hertfordshire has few links with the adjoining authorities or the private sector with respect to the exchange of information. The Planning Services Unit has closest contact with Strathclyde Regional Council, the Scottish Office and the Scottish Development Agency in this regard. Discussions mainly focus on examining the reasons underlying the production of different estimates rather than joint working arrangements. Glasgow largely regards itself as self-sufficient and capable of providing the required data, while

extracting the commercial value of information from the private sector is not perceived to be a priority. Representatives of Glasgow, usually in the form of a member of the Information and Computing Projects Group, attend technical forums concerning national data sets and pressure groups promoting the interests of Scottish authorities. These bodies include the Scottish Statistical Liaison Committee and its sub groups, working groups of the Conference of Scottish Local Authorities (COSLA) which sends representatives to the national Ordnance Survey Mapping Groups and Planning Exchange's User Group on Information Systems in Planning.

The role of the Planning Department and in particular the computing group is rather greater in the sphere of sharing expertise than exchanging data. Glasgow's experience with automated mapping technology has led to demands from a substantial number of agencies for demonstrations of the system and advice on the most appropriate approach. The Department has not actively sought this role and as interest increases activities of this type are tending to disrupt the routine production of maps. The function of the demonstrations is largely educational in terms of informing those new to the field as to the results possible rather than actually becoming involved in the process of system development.

5.36 Summary

This section provides a profile of the social world into which the computer package and the use of information is embedded. The discussion questions the assumptions underlying the systems rationalist approach, suggesting the impact of organisational factors on the development of information systems as well as the differential utilisation of information and technology by individual officers. These issues will be explored in more detail in Sections five and six respectively. Important points of

divergence between the situation found in Glasgow and that in Hertfordshire have been indicated. These issues will be addressed more fully in the subsequent analyses.

5.4 THE OVERALL APPROACH TO INFORMATION MANAGEMENT ADOPTED BY GLASGOW DISTRICT PLANNING DEPARTMENT

5.41 Introduction

The profiles of Glasgow and Hertfordshire indicate that these two authorities have adopted very different approaches to the management of information. This section will attempt to clarify these variations through a structured examination of the strategies favoured. The approach adopted by Glasgow is less integrated into the work of the Department than was the case in Hertfordshire. Overall information is generated in response to essential routine requirements, serving internal and where appropriate corporate needs and is based on mainframe technology. Each of these elements of Glasgow's strategy will be examined in more detail.

5.42 Information priority areas

Priority in Glasgow is given to the provision of data and the development of information systems to satisfy essential routine tasks. A large proportion of the Department's computing resources are devoted to the maintenance and development of operational systems such as automated mapping, the property data base and the Planet development control system. These store information of potential value to the strategic decision making process but this possibility has not been integrated into the work of the Department. Additionally a number of largely mainframe based systems have been devised to process data on topics such as health and welfare facilities, the population, unemployment, employment and vacant

land. These data sets are analysed intensively for short periods by members of the computing group. Individual members of the Information and Policy Groups and local planners are largely responsible for collecting and processing the information they require for policy making rather than the provision of such material being part of a broader departmental strategy.

Hertfordshire have developed a more integrated approach to information management than Glasgow with the emphasis placed on fulfilling traditional strategic planning needs in combination with the increasing demands of the more service oriented activities. Glasgow's approach is based on a need to respond to essential routine requirements with responsibility for the information utilised in connection with more strategic decision making largely resting with the individual concerned.

5.43 The needs served by the provision of information

The emphasis of information provision is placed on satisfying departmental needs. In a number of instances the interests of Planning overlap with the authority and in these cases information provision and system development performs more of a corporate role. Such circumstances also enable funding to be tapped from a wider number of sources. The Planning Department supplies the authority with demographic, socio-economic and land use related data as well as making a substantial contribution to the property data base and development of automated mapping. The provision of information to agencies outside the Department is not regarded as a priority. Elected members have been reluctant to sanction the aggressive sale of data on ideological grounds as well as concern that recipients of mail shots derived from lists of for instance planning applications will assume that the authority has endorsed the products being promoted.

Officers responsible for particular data sets were anxious about the accuracy of material supplied to individuals outside the Department while senior staff in the Planning Services Unit perceived some opportunities to exist for marketing information particularly in connection with data on vacant land. It is possible the new Convenor may encourage a more outward looking approach to information as a means of raising the profile of the Department. However, the exploitation of existing information systems to meet the needs of groups outside the Department is not as well developed as in Hertfordshire.

5.44 The information technology strategy

The majority of the Department's systems are based on mainframe technology. This includes small data bases for the Information and Policy Groups as well as larger projects. Technical expertise is concentrated in the Information and Computing Projects Group with virtually all direct contact with technology undertaken by its members. However, evidence indicates interest in the capabilities of micro computers is growing amongst individuals throughout the Unit with the provision of a micro by the Scottish Office in connection with a pilot project on vacant land encouraging this trend. A number of staff in the Information and Policy Groups perceive micros to be more responsive to their needs than mainframe technology. Given that they are often required to undertake ad hoc projects it is felt micros would provide greater flexibility by giving the user scope to utilise the facilities offered by standard business packages rather than relying on members of another group to develop a mainframe system. Past experience suggests it is likely that in the time between commissioning the system and its completion political priorities will have changed.

The approach adopted towards information technology in Glasgow contrasts with Hertfordshire's decentralised micro based philosophy. Glasgow has concentrated technical expertise in a small highly skilled group on a separate floor from the mainstream planners. The computer specialists have until very recently largely utilised mainframe technology but there are some indications that this approach is beginning to change.

5.45 Summary

Glasgow's approach to information management in many ways reflects a number of separate responses to operational pressures. The cohesion provided by linking information technology to a departmental information management strategy appears to be lacking. This contrasts significantly with Hertfordshire, where senior staff possess a vision as to the manner in which Planning activities should be undertaken and the contribution of information to these tasks. Overall Glasgow's approach can be characterised by an emphasis on the development of operational systems designed to produce data for essential routine activities serving mainly internal users although where interests overlap the systems perform more of a corporate function. The systems are largely based on the authority's mainframe computer with technical resources and skills centralised in a single group within the Department. This discussion raises questions concerning the underlying reasons for the adoption of this approach as well as the extent to which the differing strategies of the two authorities influence the overall and personal utilisation of information. These issues will be explored in Sections five, six and seven.

5.5 FACTORS INFLUENCING THE DEVELOPMENT OF THE COMPUTER PACKAGE IN GLASGOW DISTRICT PLANNING DEPARTMENT

5.51 Introduction

This section examines the factors influencing the development of the computer package in Glasgow District Planning Department. Consideration will be given to the factors which have had a favourable effect on system development followed by an examination of a significantly longer list of more negative influences. Given the Hertfordshire findings it is also important to assess the impact of organisational factors on the ability of planners in Glasgow to secure resources and the subsequent scope of action.

5.52 Factors facilitating the development of the computer package

People

The Hertfordshire case study demonstrates the key role performed by individual members of staff in the process of developing information systems. In that instance the leadership and vision of senior management supported by able middle ranking officers was of particular significance. In Glasgow the development of information processing resources is largely a reflection of the activities of a member of middle management. This individual has considerable experience of the Glasgow context as well as possessing a willingness to fight the battles necessary to secure funding and maintain staffing levels. Given the limited resources available to local government the contribution of an officer who has an in depth knowledge of the context and the motivation to compete against other departments in the authority can prove vital. It is likely that the new Convenor's aim of establishing a firmer base for the Department will also facilitate the development of the computer package.

The Glasgow case study emphasises that an enthusiastic member of middle management can have a marked impact on the nature of the computer package. However, a comparison of the two case studies suggests that reliance on middle management is likely to result in a fragmented approach. Senior officers are the only individuals in a position to provide a framework for the development of a departmental approach to information management. In contrast the concerns of middle management are likely to be more narrowly focused given their responsibility for a specific area of the Department's work. Senior staff are also in a much better position to influence the nature of the factors which inhibit the development of the computer package. Officers lower down the hierarchy may choose as in Glasgow to attempt to overcome existing constraints but they are not in a position to remove them.

Future stability and the internal organisational context

The Planning Department in Glasgow has faced a relatively turbulent period culminating in the relocation of the Economic Development and Corporate Plans Groups to the Town Clerk's Department in 1986. Organisational uncertainty absorbs attention and resources into attempts to maintain the status quo. However, in contrast to Hertfordshire indications suggest there may be greater stability in the future due to the departure of the leading actors in the Town Clerk's Department and greater political interest following the selection of the new Convenor. An important area of continuity throughout this period has been the work force and in particular a key member of middle management although dependence on a single individual carries dangers.

Working with other local authorities

Glasgow encounters none of the limitations imposed as a result of joint working arrangements with other local authorities while equally receiving none of the potential benefits from the exchange of information. This situation contrasts considerably with circumstances in Hertfordshire where there is currently reasonably close cooperation between the County and Districts over information related issues.

5.53 Constraints on the development of the computer package

The status of the Planning Department in relation to the priorities of Glasgow District Council

A department's standing in an authority influences the scope of action and the resources which can be secured, with uncertainty over the future complicating the development of the computer package. The status of the Planning Department appeared to diminish for a period following local government reorganisation in 1975. This trend was emphasised in the minds of many staff by the transfer of two groups from the Planning Services Unit to the Town Clerk's Department. However, in contrast to the situation in Hertfordshire the direct challenge to the Department's status appears to have declined.

The role of the Directorate

The Directorate tend to stand back from the activities of the Planning Services Unit, involving themselves more fully with the statutory functions of local plan preparation and the pressures on the development control process. The provision of information is not regarded as an important priority while a lack of computer awareness and confidence about such matters would seem to have encouraged senior management to leave the handling of these activities to those possessing technical expertise. The

Directorate appears reluctant to become directly involved with interdepartmental battles over resources but provides largely passive support for certain experienced and respected officers. Staff comments suggest that while in the case of major projects it is an advantage to have the support of senior management it is possible to make progress without their commitment. This contrasts with Hertfordshire where senior management perform a central role, assisting the acquisition of resources and encouraging the formulation of a departmental information management strategy.

Political parameters

Glasgow District Council has been dominated by what was described by a number of practitioners as a traditional right wing labour majority. This has provided officers with a relatively stable political context. The influence of elected members on the day to day provision of information has not been great but they are partially responsible for the overall approach. The lack of commercialism reflects the Labour Group's view that information produced by the Council from public funds should be made available free of charge. Issues concerning copyright and data protection have encouraged this stance. Elected members have also had some influence over the purchase of equipment stemming from a buy local policy, although in general most councillors have little interest or direct experience of technology. Past Convenors have reflected this general attitude as well as being unable to protect the Department from outside pressures. However, as has been emphasised circumstances have changed, with more active political support for the interests of Planning likely to have a beneficial impact on the development of the computer package. Officers perceived the commitment of elected members to be of some importance in

relation to the expansion of computer based systems but of less value than even the passive support of the Directorate.

New technology and the Unions

An authority wide agreement has been sought with the trade unions in Glasgow on the sensitive issue of new technology. This agreement states that in return for certain modifications to work practices such as flexible working hours, union members will cooperate with the introduction of new technology subject to detailed discussions at a departmental level. It has therefore become accepted practice in Planning for the Unions to be consulted before the introduction of new systems which affect staff outside the Information and Computing Projects Group. However, there has been some organised action with the Union placing bans on the use of technology as a lever in pay negotiations or linked to a dispute in some other part of the authority. As a result there are a nunber of instances where the implementation of a system has been disrupted.

New technology is seen by some individuals as a potential threat to familiar work practices and the traditional roles of various groups within the Department. The different interested parties include technical staff, professional officers, typists and graphic designers. The view of the Directorate is that planning officers have the capability to undertake all of these tasks but that it is appropriate for their skills to be devoted to professional activities. However, facilities such as desk top publishing, are perceived by some staff to challenge the traditional division of responsibilities with the central concern the potential loss of jobs. There is therefore some wariness, with the Unions understandably anxious to obtain assurances about future working arrangements before agreeing to the introduction of automated systems. These procedures and

the possibility that the Unions may react negatively to technology if only as a means of exerting pressure on management about another matter contrasts with Hertfordshire where the trade unions were not regarded as a significant issue with respect to the introduction of computer based systems.

Working with other District Council departments

Glasgow's level of flexibility in system development is restricted by the need to cooperate with other departments particularly CSD. The priorities of Planning in these circumstances may have to take second place to more powerful interests or issues which are regarded of more immediate city wide concern. Staff outside the Information and Computing Projects Groups suggested interdepartmental working often emphasises differences and raises sensitive issues concerning the ownership and control of data. However, given the competition for limited resources, association with departments possessing greater financial resources may enable projects to be undertaken which would not otherwise be possible. The general pattern in Hertfordshire has been to maintain a substantial degree of independence although these circumstances may be changing.

Reliance on computer manufacturers and suppliers

Glasgow's approach to computer and software manufacturers has been mixed. The Planet system exemplifies a decision to select technology which allowed the development work to be undertaken within the authority by CSD rather than relying on the supplier. The agreement with Honeywell on the automated mapping system in contrast gives the manufacturer responsibility for software modifications. The delays and inconvenience which were being experienced prompted the authority in the middle of 1988 to seek an agreement with the Company to have monthly meetings to discuss progress.

Honeywell's apparent slowness also had a negative effect on the attitude of other departments which Planning had hoped would adopt the system and therefore provide additional financial support. Some of the difficulties have been overcome but in the interim the Parks Department chose another although not completely successful alternative. Hertfordshire in contrast have largely avoided reliance on external agencies.

Central government policies

The policies of central government impact on the activities of Planning by creating an additional layer of uncertainty. Glasgow has not faced proposals with the same profound impact on local government and Planning as Hertfordshire but legislative changes have undermined the routines on which systems were based, even in seemingly unconnected areas. This is exemplified by the introduction of the community charge into Scotland in 1989. The previous system of rating was used in Scotland as the basis for the production of a valuation roll which amongst other details listed the owner and occupier of existing and new properties. Such data was of great value to the Planning Department as a source of update for the property data base. The introduction of the community charge changed the key unit of taxation from properties to the individual and therefore removed the need to produce such a document. It is likely in the short term the Strathclyde Assessor will continue to produce a valuation roll and given Glasgow's cooperation with respect to compiling the community charge register will make it available to the District Council. However, the provision of this information in the longer term is less clear. Difficulties are also caused by central government's current procedures for Scottish local authority financial management which require all expenditure above £6,000 to be defined as capital and therefore subject to stringent justifications. Such spending limits in the context of major

schemes such as the automated mapping project add a further hurdle to an already difficult situation. It would be easier to cope with such circumstances if they were constant but as a result of the activities of central government and the modifications made by the District Council the source and quantity of funding for new technology tend to vary from year to year.

6.54 Summary

The Glasgow findings indicate the important contribution of organisational factors to the development of the computer package. The acquisition of resources for information processing is a striking result of the activities of a member of middle management. The less favourable attributes of the environment are reflected in the difficulties securing resources and the constraints on the manner they can be deployed. Glasgow has experienced a period of considerable instability in addition to a largely unfavourable internal organisational environment. More particularly senior management have not provided clear guidance on the Department's overall information priorities and have taken an ambivalent attitude to technology. However, it is likely that with greater political support for the interests of Planning the Department may encounter a period of greater stability. Given the detailed differences in the nature of the conditions which face staff in Glasgow and Hertfordshire both case studies suggest the significant impact of organisational factors on the development of the respective computer packages. The implications of these findings will be evaluated in Chapter 6.

5.6 THE UTILISATION OF GEOGRAPHICAL INFORMATION BY INDIVIDUAL PLANNING OFFICERS

5.61 Introduction

The findings discussed in Section three suggest that the utilisation of geographical information in Glasgow varies according to the individuals involved. This section focuses on this issue examining the level of computer awareness and skills amongst practitioners, the relationship between the technical specialists and users and the general willingness and capacity of officers to use information. Consideration will be given to variations in skill levels and attitudes between practitioners in Glasgow as well as comparing the general trends with the results of the Hertfordshire case study. The quantitative findings which support this discussion are drawn from the semi-structured interviews. The focus is therefore placed on the utilisation of information by staff involved with strategic decision making and as a result the activities of development control officers are excluded from these discussions.

5.62 Computer awareness and technical skills amongst practitioners

Practitioners in Glasgow have access to the Department's data sets through a number of mainframe terminals. However, direct use of computer based systems presumes officers possess the skills and inclination to unlock the information. These issues will be explored with consideration also given to whether the level of technical knowledge possessed by an individual is linked to formal characteristics.

Table 5.6 indicates that with the exception of two members of staff all those interviewed had attended at least one course on information management or computer related issues, with over two-thirds receiving skills training in the last two years. Similar figures were recorded in

Table 5.6: Indicators of computer awareness amongst officers in Glasgow District Planning Department

Question	Staff grouping	Response	
		Yes	No
Have you ever attended a course on information management or computer related issues?	All [27]	25	2
Have you attended a course on information management or computer related issues in the last 2 years?	All [27]	19	8
Do you read computing magazines?	LP [8]	1	7
	D [2]	1	1
	IP [12]	2	10
	P [5]	5	-
	Total [27]	9	18
Have you bought a magazine about computing in the last year?	All [27]	1	26
Have you any keyboard skills?	All [27]	19	8
Do you have your own home computer?	LP [8]	1	7
	D [2]	-	2
	IP [12]	3	9
	P [5]	1	4
	Total [27]	5	12

LP - local planners
D - senior decision makers
IP - information and policy officers
P - computer programmers
[ ] - total number of staff interviewed in the grouping

Hertfordshire where only 67 per cent of staff had participated in a course in the preceding two years, while the figure for Glasgow was 70 per cent. However, with the exception of members of the Information and Computing Projects Group the other indicators of computer awareness suggest the knowledge of most officers to be relatively superficial. Several non-technical staff stated that they were not sure how to switch on a mainframe terminal let alone access material.

Given the free availability of computing magazines in the Department it is not surprising that only one officer purchases these publications. All the computing specialists stated they read such material which compared with a fifth of non-technical staff. Practical experience gained from experimenting with home computers was limited to 18 per cent of staff in Glasgow compared to 53 per cent in Hertfordshire. It is noticeable that of the five officers possessing their own home computer only one was a computer specialist, and that just two officers made regular use of the facility (see Table 5.7). There is no evidence to suggest that any reticence to use computers on the part of the majority of officers was a result of a lack of keyboard skills. Seventy per cent of staff in Glasgow stated they had at least limited keyboard skills while four indicated they could type proficiently. It should not be assumed that those possessing typing skills were also regular computer users as two of the four were highly critical of the systems developed by the Department.

The findings indicate that computing skills were largely limited to those staff whose day to day work depends on the possession of such expertise. Four out of five of the Information and Computing Projects Group regularly attend courses although with the exception of one officer there was no evidence to suggest sufficient enthusiasm that computing had become a

Table 5.7: Detailed indicators of computer awareness amongst officers in Glasgow District Planning Department - use of home computers

Question	Use	No. of staff	Staff grouping
What is your home computer used for?	- Word processing - Spreadsheet - Data base - Design work	1	P
	- Word processing - Games	1	IP
	- Small programs	1	IP
	- Games	1	LP
	- Not used	1	IP

N.B. Abbreviations see Table 5.6

hobby as well as a skill used at work (see Table 5.8). Computing knowledge amongst non-technical staff was largely limited to isolated encounters at one or half day demonstrations organised either internally by the Information and Computing Projects Group, centrally by the authority or at longer courses associated with continuing professional development (CPD). Staff attending departmental demonstrations had little opportunity to gain practical experience while those participating in courses organised by other agencies expressed frustration as they either possessed insufficient basic knowledge to be able to benefit or were unable to use the skills acquired in their work and therefore rapidly forgot what they had learnt. For instance, a number of staff had attended courses on spreadsheet and data base facilities, yet the only officer outside the computing group to have access to a micro computer was the librarian.

Table 5.8: Detailed indicators of computer awareness amongst officers in Glasgow District Planning Department - course attendance

Question	Staff grouping	Organising body	Subject of course
What courses have you attended on information management or computer related issues in the last two years?	LP	Planning Dept - GDC	Automated mapping
		Planning Dept - GDC	Desk top publishing
		Planning Dept - GDC	Property data base
		Planning Dept - GDC	D.C. system
	LP	School of Art [CPD]	Intro. to computers
	LP	Planning Dept - GDC	Desk top publishing
	LP	School of Art [CPD]	Intro. to computers
	LP	Planning Dept - GDC	Automated mapping
	D	Planning Dept - GDC	Desk top publishing
		Planning Dept - GDC	Automated mapping
		Planning Dept - GDC	Property data base
	IP	CSD - GDC	Delta
		CSD - GDC	Basic computing
		CSD - GDC	New technology
		CSD - GDC	Computing for managers
		Planning Dept - GDC	Desk top publishing
	IP	School of Art [CPD]	Computers in Planning
		Planning Dept - GDC	Desk top publishing
	IP	CSD - GDC	Spreadsheets
		Planning Dept - GDC	Automated mapping
	IP	School of Art [CPD]	Micros
	IP	CSD - GDC	Spreadsheets
	IP	Planning Dept - GDC	Desk top publishing
	IP	School of Art [CPD]	Spreadsheets
	IP	Uni. of Strathclyde	SPSSX
	IP	Comp. manufacturers	Automated mapping
		Mapping Awareness (x2)	Automated mapping
		AM/FM	Automated mapping
		OS	Digital update
	P	CSD - GDC	Delta
	P	Manufacturer	GIMMS
		Manufacturer	Desk top publishing
	P	Glasgow Col. Printing	Desk top publishing
		AM/FM	Automated mapping
		Manufacturers (x10)	Demonstrations
	P	Mapping Awareness	Automated mapping
		Statistical Society	Centenary Conf.
		Royal Stat. Soc.	Soc. meetings
		Brit.Soc.Pop.Stud/IBG	Demography
		Survey Methodology Soc.	Soc. meetings

N.B. Abbreviations see Table 5.6

The findings from the case study suggest four bands of computer awareness amongst non-technical staff in Glasgow . These are listed below.

(i) Optimists: a small minority of officers who are relatively optimistic about technology due to the imminent completion of the development stage of a computer based system which will have a direct input into their work.

(ii) Frustrated pragmatists: a significant proportion of officers including individuals from all the user groupings who feel frustrated by their limited computing knowledge and the lack of support and encouragement from within the Department. They are not naturally enthusiastic about technology but perceive that user friendly micro based systems could facilitate and improve the conduct of their work.

(iii) Followers: a small group of users who have no strong opinions about computers and would utilise whatever resources were indicated by more senior staff.

(iv) Unwilling learners: a substantial number of individuals from all user groupings who are either sceptical or positively antagonistic to the introduction of computers. Such views are generally based on observation of the systems developed in the Department or one or two unsatisfactory encounters with technology rather than lengthy direct experience.

These stereotypes indicate the relatively low level of computing experience amongst non-technical staff and that in contrast to Hertfordshire most users could only suspect how computers would affect their work. There was a proportion of officers in both authorities who had a very negative view of technology and demonstrated an unwillingness to learn. However, in the absence of experience to contradict this impression the group was substantially larger in Glasgow than Hertfordshire.

The Glasgow results in common with Hertfordshire demonstrate no clear link between the age, length of service, sex or subject of further education qualifications and an individual's level of computer awareness. Only three of the staff interviewed were under 30 amongst which the planning analyst possessed the most positive attitude to micro based systems of all the technical staff while the two users exhibited no more confidence or greater computing experience than the rest of the staff. There was a full range of technical knowledge amongst the five female officers interviewed, from highly skilled computer specialists to users with very little expertise. Overall computing skills amongst non-technical staff in Glasgow were very limited regardless of formal characteristics, while an individual's personality appeared to have a significant influence on the officer's interest in technology.

These results support the findings of the Hertfordshire case study suggesting it is inappropriate to assume that all users are both willing and have the knowledge necessary to access material from automated systems. Given the largely centralised approach to information management in Glasgow it could be argued that this is not particularly significant as non-technical staff can always request the information they require from the officers with specialist skills. In these circumstances the utilisation of computer based information by practitioners is dependent upon good working relations between the technical specialists and users.

5.63 The relationship between the technical specialists and users

The Glasgow results like Hertfordshire demonstrate that the perspectives of the technical experts and users differ with respect to technology. Table 5.9 demonstrates that the non-technical staff and most particularly senior management regarded the computer specialists as using a lot of

Table 5.9: Perspectives on the relationship between users and the technical specialists

Statement	Staff grouping	Mean	Standard Deviation
Computing staff tend to use a lot of technical language	LP [8]	3.50	1.00
	D [2]	4.00	0.00
	IP [12]	3.75	1.01
	Total [22]	3.68	0.97
	Total-LP [14]	3.78	0.94
	Total HCC [13]	3.69	0.72
Computing staff tend to be more interested in what the computer can do than providing data	LP [8]	3.50	0.87
	D [2]	3.50	0.50
	IP [12]	3.08	0.64
	Total [22]	3.27	0.75
	Total-LP [14]	3.14	0.64
	Total HCC [13]	3.69	1.07
Frequent meetings should be held between producers of computer based data and data users	LP [8]	4.13	0.60
	D [2]	4.00	0.00
	IP [12]	3.92	0.76
	P [5]	4.20	0.40
	Total [27]	4.04	0.64
	Total-LP [19]	4.00	0.65
	Total HCC [15]	3.87	1.02

LP - local planners
D - senior decision makers
IP - information and policy officers
P - computer programmers
Total-LP - total excluding the local planners
Total HCC - total for Hertfordshire County Planning Department
[ ] - total number of staff interviewed in the grouping

Scores: strongly disagree = 1; disagree = 2;
neither agree nor disagree = 3;
agree - 4; strongly agree - 5

technical language. It was also suggested although less strongly that the computing staff were more interested in the capabilities of the equipment than generating information for the planning process. The overall response to the latter was less positive than in Hertfordshire reflecting a feeling amongst a large number of individuals that it was impossible to generalise with some of the technical specialists regarded as friendly and helpful while others were felt to have no interest in Planning and to be very unapproachable. The computing staff in contrast criticised planning practitioners for their imprecision and inability to specify their needs. This perception is very important as the Information and Computing Projects Group tend to presume a lack of clarity about information and computing requirements to reflect a lack of real need. For instance, a number of users perceived micro computers to have potential but due to a lack of knowledge were unable to specify their needs precisely and as a result were largely dismissed.

The investigations also indicated some differences in the priorities of staff with respect to the development of automated systems (see Table 5.10). Officers in Glasgow like Hertfordshire stressed the importance of the timely production of accurate data from information systems which were reliable and designed with the involvement of users. The degree of emphasis placed on the timely production of information was less strong than Hertfordshire while local planners stressed the need to increase staff access to data and the training of non-technical officers in computing skills. This suggests individuals were experiencing a degree of frustration over their inability to access material from computer based systems and also a lack of technical expertise.

Table 5.10: Priorities of staff groupings with respect to the development of information systems

Priorities	LP [8]	D [2]	IP [12]	P [4]	Total [26]
Accuracy of data	87.5%	100.0%	91.5%	75.0%	88.5%
Timely production of data	87.5%	100.0%	66.7%	75.0%	76.9%
User involvement in system development	75.0%	100.0%	66.7%	100.0%	76.9%
System reliability	87.5%	100.0%	91.7%	76.0%	88.5%
Extension of available applications	-	-	33.3%	50.0%	23.1%
Organisation of the Information Group	12.5%	-	8.3%	25.0%	11.5%
Training of non-technical staff in computers	37.5%	-	8.3%	-	15.4%
Reduction of date acquisition costs	-	-	-	-	-
Financing development of computer based systems	12.5%	-	8.3%	-	7.7%
Data acquisition	-	100.0%	75.0%	50.0%	50.0%
Increasing staff access to data	87.5%	-	33.3%	50.0%	50.0%
Ensuring confidentiality	12.5%	-	8.3%	-	7.7%

N.B. - Staff were asked to select their top five priorities
- Abbreviations see Table 5.9

These general differences in priorities and perspectives between staff were reinforced by the comments of practitioners. Several users suspected that micro computers could assist their work to a greater extent than the existing mainframe systems but felt frustrated by a lack of support and encouragement. A substantial number of officers had developed derogatory images of either the 'computer boffins upstairs playing with their expensive toys' or in contrast 'woolly headed planners'. These stereotypes were influenced by the lack of contact between staff due in part to the frequent unavailability of the key member of the Information and Computing Projects Group, the physical location of the computing group and the absence of a non-technical enthusiast in the form of Hertfordshire's intermediaries who could break down many of the images discussed above. There was some evidence to suggest that the low level of contact between staff led to a lack of knowledge about the available information or facilities. Given this situation all staff agreed that there should be frequent meetings of both a formal and informal nature between the producers and consumers of information. Some individuals also suggested there was a need for greater communication between the technical specialists to avoid resentment between planning analysts over the individual asked to develop a relatively new technology.

The Glasgow findings suggest a lack of mutual understanding between the technical specialists and users which as a consequence must influence the propensity to request information and therefore utilisation. There were variations in emphasis with respect to the development of computer based systems and distinct differences in perspective over information related issues. Given the concentration of computing skills in Glasgow these issues were particularly important as users must rely largely on the computing staff to access information as well as to develop automated

systems. The preceding discussion questioned whether the low level of computer awareness amongst non-technical staff was particularly significant given the presence of individuals with these specialist skills in the Department. These findings suggest this is important as users need to have sufficient technical knowledge to be able to specify their needs clearly and therefore gain the recognition of the computing group. These results have been generalised across staff groupings but as was the case in Hertfordshire the experiences of individual users depended to a large extent on the interaction between personalities.

5.64 General information awareness amongst planning practitioners

This discussion explores the extent to which practitioners in Glasgow possess the necessary skills to absorb and interpret data and also the value staff attach to information in undertaking their work. The comments of officers refer to both computer based data and information in general as few made a clear distinction according to the source.

Table 5.11 presents the responses of practitioners with regard to the extent professional staff, elected members and the general public understand information. These findings suggest comprehension to decline from professional planners, through the general public to elected members. The striking feature of these results is the general rejection of the statement that planners understand the data generated by the Department. Members of the Information and Policy Groups who are most closely involved with large scale data manipulation for the policy making process were most strongly of this view citing map handling skills to be a particular weakness while the local planners were more confident about their own capabilities. Officers throughout the Department expressed particular difficulties handling statistics derived from the Census of Population due

Table 5.11: The perceived level of understanding of computer based information

Statement	Staff grouping	Mean	Standard Deviation
Generally those with experience of local government planning matters understand the computer based data generated by the Department	LP [8]	3.63	0.70
	D [2]	3.00	1.00
	IP [12]	2.42	0.76
	P [5]	2.80	0.40
	Total [27]	2.89	0.87
	Total-LP [19]	2.58	0.75
	Total HCC [15]	3.20	0.91
Generally elected members understand the computer based data generated by the Department	LP [8]	2.25	0.66
	D [2]	1.50	0.50
	IP [10]	2.00	0.77
	P [3]	2.67	1.25
	Total [23]	2.13	0.85
	Total-LP [15]	2.07	0.93
	Total HCC [15]	2.40	0.88
Generally those with no experience of local government planning matters understand the computer based data produced	LP [8]	2.75	0.66
	D [2]	2.00	0.00
	IP [10]	2.10	0.83
	P [4]	3.50	0.50
	Total [24]	2.54	0.87
	Total-LP [16]	2.44	0.93
	Total HCC [15]	2.07	0.77
Many people find computer based data incomprehensible	LP [8]	3.63	0.48
	D [2]	4.00	0.00
	IP [12]	3.50	0.76
	P [5]	3.20	0.75
	Total [27]	3.52	0.69
	Total-LP [19]	3.47	0.75
	Total HCC [15]	3.87	0.88

N.B. Abbreviations and scores see Table 5.9

to the nature of the definitions adopted. Given these generalisations a small number of staff were regarded as highly adept at manipulating information. A number of officers suggested a relationship between comprehension and good presentation, although this was not reflected in the use of for instance graphical techniques. It was noticeable in Hertfordshire that senior officers perceived a need to educate staff on how to utilise information effectively. This may have contributed to the apparently higher level of comprehension amongst officers in that context.

There was a strong perception amongst respondents that elected members have a poor understanding of automated data although the present Convenor was frequently mentioned as an important exception. Unlike the Hertfordshire case study officers perceived the general public's comprehension of information, while being patchy, to be greater than that of elected members. It was suggested by a senior member of staff that this reflected the largely manual work experience and the aging membership of the Council. Additionally, it was stressed that political considerations based on personal experience dominated the reasoning of councillors rather than formal information sources.

It might be questioned to what extent it matters whether officers understand the information generated by the Department. Evidence from discussions suggests that such issues depend on the data set and the circumstances. It is probably not particularly important that officers are fully aware of the assumptions underlying the population projections and estimates generated by the Department but an understanding of the Census of Population definitions would help to avoid the misrepresentation

of statistics. In the context of a local plan appeal there is little doubt it is crucial that officers have a complete grasp of all aspects of the information they are presenting.

These findings question the extent to which those involved with the policy making process possess the skills needed to absorb and manipulate the information produced by the Department. It is possible that personal data handling skills affect an individual's degree of confidence with respect to information and therefore their propensity to employ such material. The discussions with practitioners also suggest that the utilisation of information depends on the extent to which individuals perceive the effort of accessing and manipulating data to be outweighed by the value of such material to their work. The comments of staff in this respect largely reflect officers' perceptions of the decision making process. Section seven will examine this process in more detail but it is appropriate at this point to highlight three stereotypes. The central characteristics of these views of the policy making process are similar to those found in Hertfordshire.

(i) Rationalists: individuals who view decision making as a rational process in which information can have a significant and perhaps even decisive role.

(ii) Determinists: individuals who perceive the decision making process to be dominated by 'politics' in which information is of less value than personal experience and the manoeuvrings of the leading actors.

(iii) Frustrated pragmatists: individuals who acknowledge that the policy making process has a political element and perceive that if they had access or knowledge of the available information it could make a valuable contribution to their work.

This analysis suggests officers holding the first or third conception of the policy making process are more likely to employ information in their work. However, the departmental view characterised by the perception of senior staff tends towards the second conceptualisation.

5.65 Summary

The findings of the Glasgow case study reinforce the Hertfordshire results casting doubt on the appropriateness of the assumption underlying the systems rationalist perspective that policy makers are willing and possess the expertise to utilise technology or information. Many officers have insufficient knowledge to unlock the information held in computers or to specify the type of automated system which could be of value. The findings indicate that computer awareness amongst non-technical staff is important even in a situation where there are specialist computing personnel within the Department as users need to have an appreciation of such issues to be able to specify their needs. The relationship between the technical experts and users suggested some difficulties in communications which are likely to have a significant impact on the design and utilisation of information systems. The low level of information awareness amongst professional staff is a striking feature of these findings and must be addressed before staff can be expected to utilise information effectively. It is noticeable that in the less supportive computing environment of Glasgow and a departmental culture which attaches less value to information there were rather more of the negative stereotypes than was the case in Hertfordshire.

5.7 THE ROLE OF GEOGRAPHICAL INFORMATION IN THE POLICY MAKING PROCESS OF GLASGOW DISTRICT PLANNING DEPARTMENT

5.71 Introduction

This section explores the applicability of the various conceptualisations of the role performed by information in the policy making process to the circumstances found in Glasgow. Consideration will also be given to the extent computerisation increases the availability and accuracy of information and as a consequence influences the decision making process. Given the Hertfordshire findings which question the value of the systems rationalist perspective it is important to examine these issues in the very different context of Glasgow. The results presented in this section will be compared with those derived from Hertfordshire as a means of assessing both the functions for which practitioners employ information and the extent to which there is any difference in the overall level of utilisation between the two authorities. Particular attention will focus on whether the statutory planning responsibilities of the authorities affect utilisation.

5.72 The pre-decision stage

Problem finding

The work of some of the Information and Policy Groups involved reviewing trends in the environment such as the collection of information on vacant land but more generally planners in Glasgow respond to political pressures rather than undertaking routine data analysis aimed at highlighting problem areas. Officers from all groups were firmly of the view that personal observation and experience were more important than data in identifying planning problems (see Table 5.12). Staff stated that unless an individual was new to their job, information should support an officer's intuitive knowledge of a locality or topic. One officer

Table 5.12: Perceptions of the role of information in the policy process: the pre-decision stage - problem finding

Statement	Staff grouping	Mean	Standard Deviation
Personal observation and experience is more important than data in identifying planning problems	LP [8]	3.50	0.71
	D [2]	3.50	0.50
	IP [11]	3.45	0.50
	P [5]	3.60	0.50
	Total [26]	3.50	0.57
	Total-LP [18]	3.56	0.50
	Total HCC [15]	3.27	0.77
Data provides surprising results	LP [8]	2.63	0.86
	D [2]	3.00	1.00
	IP [11]	3.09	1.08
	P [5]	3.80	0.40
	Total [26]	3.04	0.98
	Total-LP [18]	3.28	0.93
	Total HCC [15]	3.40	0.71
Data stimulates discussion	LP [8]	3.75	0.66
	D [2]	3.00	1.00
	IP [11]	3.73	0.62
	P [5]	3.80	0.40
	Total [26]	3.69	0.67
	Total-LP [18]	3.67	0.67
	Total HCC [15]	4.20	0.40

N.B. Abbreviations and scores see Table 5.9

commented that it was both easier and less time consuming to rely on personal suspicions than to search out the relevant information. The value attached to the personal expertise of officers was further illustrated by responses to the statement that data provides surprising results. Overall there was no clear preference but the responses of the various staff groupings were far more definite, with the local planners rejecting the idea while the programmers perceived information to indicate unexpected results. Twelve members of staff agreed with the statement of

which nine were able to cite an example. The instances produced were largely trivial in nature rather than drawn from highly significant or sensitive policy areas. A senior member of staff commented that data only produces surprises if the officer is ignorant. Although unforeseen results were regarded as rare all the groupings agreed except senior management that data stimulates discussion. These findings suggest even more strongly than the Hertfordshire results that the contribution of information to the process of finding planning problems is relatively limited. Officers in Glasgow placed a strong emphasis on the importance of personal expertise in this regard.

Problem definition

Overall officers agreed that planning problems were seldom clearly defined but there was a wide range of responses (see Table 5.13). The perceptions of individuals appeared to be more significant than the daily work experience of any one group of officers. A number of the technical specialists suggested that the training of planners failed to provide them with the skills necessary to define planning problems which they perceived to be reflected in the imprecision of users with respect to their data needs. Other members of staff criticised fellow officers for a tendency to oversimplify complex planning issues. Given the nature of planning problems, the staff interviewed suggested information has a role in providing evidence as to the extent and dimensions of the issues to be dealt with by the authority. Most officers confirmed that data leads to clearer perceptions of planning problems, an increased understanding of the characteristics of the local environment and also a reasonably realistic representation of trends in the environment. A number of individuals qualified their general agreement commenting that data was only one component which needed to be added to knowledge of the local

Table 5.13: Perceptions of the role of information in the policy process: the pre-decision stage - problem definition

Statement	Staff grouping	Mean	Standard Deviation
Planning problems are seldom clearly defined	LP [8]	3.25	1.56
	D [2]	3.00	1.00
	IP [11]	3.45	0.89
	P [5]	3.60	1.02
	Total [26]	3.38	1.18
	Total-LP [18]	3.44	0.96
	Total HCC [14]	3.79	1.08
Data leads to clearer perceptions of planning problems	LP [8]	3.75	0.66
	D [2]	3.00	0.00
	IP [11]	3.64	0.48
	P [5]	3.40	0.80
	Total [26]	3.58	0.63
	Total-LP [18]	3.50	0.60
	Total HCC [15]	3.80	0.40
Data leads to a clearer understanding of the characteristics of the local environment	LP [8]	3.50	0.71
	D [2]	4.00	0.00
	IP [11]	3.45	0.66
	P [5]	3.80	0.40
	Total [26]	3.58	0.63
	Total-LP [18]	3.61	0.59
	Total HCC [15]	3.93	0.44
Most people accept the data produced by the Department as a realistic representation of trends in the environment	LP [8]	3.88	0.33
	D [2]	4.00	0.00
	IP [10]	4.00	0.00
	P [4]	4.00	0.00
	Total [24]	3.96	0.20
	Total-LP [16]	4.00	0.00
	Total HCC [15]	3.73	0.68

N.B. Abbreviations and scores see Table 5.9

community and that in certain circumstances information complicates issues. A local planner noted problems of ecological fallacy in relation to aggregated data while a senior member of staff suggested that the value of information with regard to defining planning problems declined in line with the controversy provoked by an issue.

These findings, while suggesting a less marked use of data, nonetheless reinforce the results of the Hertfordshire case study. The investigations indicate data is used to inform officers as to the nature and extent of a planning issue previously highlighted through the individual's knowledge of the locality and general experience.

5.73 The decision stage

Designing alternatives

Officers were in general agreement that data influences the development of policy although the more positive responses of the local planners and senior management were qualified by the suggestion that it was inappropriate to describe this as a strong influence (see Table 5.14). It was generally emphasised that personal observation and experience were of greater value than data in determining solutions to planning problems. Several staff perceived information and experience to be complementary while only one individual attached more importance to data. It was stated that information seldom indicates a single course of action, rather it may suggest the parameters within which appropriate policies should be selected.

There are usually a range of possible policy responses to any given planning problem. The Hertfordshire findings suggest that the options examined by officers were restricted by their real or imagined

Table 5.14: Perceptions of the role of information in the policy process: the decision stage - designing alternatives

Statement	Staff grouping	Mean	Standard Deviation
Data strongly influences the development of policy	LP [8]	3.50	0.71
	D [2]	4.00	0.00
	IP [11]	3.27	0.75
	P [5]	2.80	0.98
	Total [26]	3.31	0.82
	Total-LP [18]	3.22	0.85
	Total HCC [15]	3.67	0.94
Personal observation and experience is more important than data in determining solutions to planning problems	LP [8]	3.38	0.86
	D [2]	3.50	0.50
	IP [11]	3.55	0.66
	P [5]	3.80	0.40
	Total [26]	3.54	0.69
	Total-LP [18]	3.61	0.59
	Total HCC [15]	3.40	0.71
In general elected members give a clear lead on planning policies	LP [8]	2.00	0.71
	D [2]	3.00	1.00
	IP [11]	2.45	0.78
	P [1]	3.00	0.00
	Total [22]	2.36	0.83
	Total-LP [14]	2.57	0.82
	Total HCC [14]	2.79	0.86
Generally data substantiates the claims of elected members	LP [8]	2.13	0.33
	D [2]	2.00	0.00
	IP [9]	2.67	0.47
	P [3]	2.33	0.47
	Total [22]	2.36	0.48
	Total-LP [14]	2.50	0.50
	Total HCC [13]	2.70	0.82
There is little contact between the producers of computer based data and elected members	LP [4]	4.00	0.71
	D [2]	4.00	0.00
	IP [9]	4.00	0.00
	P [5]	4.00	0.00
	Total [20]	4.00	0.32
	Total-LP [16]	4.00	0.00
	Total HCC [14]	3.86	0.52
Generally data substantiates the claims of senior planning staff	LP [8]	2.25	0.83
	D [2]	3.00	1.00
	IP [10]	3.00	0.63
	P [4]	2.50	0.87
	Total [24]	2.67	0.85
	Total-LP [16]	2.88	0.78
	Total HCC [14]	3.50	0.82

N.B. Abbreviations and scores see Table 5.9

perceptions of the political pressures and expectations of senior staff.

Officers were asked to express the extent to which they felt elected members gave a clear lead on planning policies. Overall staff disagreed with this statement in common with a second suggestion that generally data substantiates the claims of elected members. However, the comments of officers indicated that while political influence on day to day activities was limited, the views of councillors could not be ignored on important or controversial issues. Most officers also noted that since the selection of the new Convenor the political climate had started to change with professional staff being asked to justify their actions more fully. With respect to the more focused activity of information provision, it was strongly confirmed that there was little contact between the producers of computer based data and elected members suggesting that the programmers are not directly responsive to the politicians, although like other staff they may be influenced by their perceived needs.

The comments of practitioners suggest the influence of senior management to be less significant than in Hertfordshire. The idea that information generally substantiates the claims of senior staff was rejected with the vast majority of officers stating they were unclear as to exactly what policies the Directorate favoured and that senior staff took little interest or active involvement in the collection or analysis of data.

These findings indicate that information makes some limited contribution to the process of designing alternative policies but that this is of secondary importance to the knowledge and experience of individual officers. The political context was also shown to have a general effect on the policy options considered while the influence of senior staff was

much less significant than in Hertfordshire. Senior officers in Glasgow appear not to have expressed their views and objectives with the same vigour as colleagues in Hertfordshire.

Providing information on alternative policies

Officers agreed that data influences the process of decision making with the exception of senior staff who suggested that in certain circumstances political forces were more significant (see Table 5.15). Those

Table 5.15: Perceptions of the role of information in the policy process: the decision stage - providing information on alternative policies

Statement	Staff grouping	Mean	Standard Deviation
Data influences the process of decision making on planning matters	LP [8]	3.63	0.70
	D [2]	3.00	1.00
	IP [11]	4.00	0.00
	P [5]	3.80	0.40
	Total [26]	3.77	0.58
	Total [18]	3.83	0.50
	Total HCC [15]	3.93	0.77
Overall data helps to clarify differences of opinion over planning issues	LP [8]	3.25	0.66
	D [2]	3.00	1.00
	IP [11]	3.27	0.75
	P [5]	3.60	0.49
	Total [26]	3.31	0.72
	Total-LP [18]	3.28	0.80
	Total HCC [14]	3.50	0.91
Generally data answers important questions	LP [8]	3.00	1.12
	D [2]	3.00	1.00
	IP [11]	2.73	0.75
	P [5]	3.80	0.40
	Total [26]	3.04	0.94
	Total-LP [18]	2.89	0.94
	Total HCC [15]	3.27	0.85

N.B. Abbreviations and scores see Table 5.9

interviewed were asked to comment on two further statements in an effort to gauge the extent information 'influences' the decision making process. There was mild agreement with the notion that data helps to clarify differences of opinion over planning issues. However, several officers commented that it was only one factor amongst many with a great deal depending on the issue and personalities of the individuals involved. In some instances it was suggested that information leads to greater confusion as the same data set can be interpreted in several often contradictory ways. Similar reasoning lead the professional planners to question whether data answers important questions in contrast to the programmers who endorsed this view. The Glasgow findings imply that information in certain circumstances can be employed to provide information on alternative policies. However, due to the qualifications discussed above there was a less strong endorsement of the role of information for this purpose than in Hertfordshire.

Deciding on the appropriate policy

The selection of the favoured policy is the key stage of the decision making process. There was a distinct division of opinion over the extent to which data leads to agreement on the most appropriate course of action (see Table 5.16). Senior decision makers and the technical specialists endorsed the idea while the other groupings were less convinced, arguing that financial and political issues have to be taken into consideration along with the personalities of those involved. The findings indicate that while the power of information to lead to agreement is questionable, it was not felt data increases uncertainty over the appropriate policies to follow. This contradicts to some extent the results of the preceding discussion which suggest data rarely points to a single policy option. Officers indicated that the reason for this apparent paradox was that

Table 5.16: Perceptions of the role of information in the policy process: the decision stage - deciding on the appropriate policy

Statement	Staff Grouping	Mean	Standard Deviation
Generally data leads to agreement about the most appropriate course of action	LP [8]	2.88	0.78
	D [2]	4.00	0.00
	IP [11]	2.81	0.57
	P [4]	3.50	0.50
	Total [25]	3.04	0.72
	Total-LP [17]	3.11	0.68
	Total HCC [13]	3.31	0.72
Data increases uncertainty over the appropriate policies to follow	LP [8]	2.75	0.83
	D [2]	2.50	0.50
	IP [11]	2.72	0.86
	P [5]	2.80	0.75
	Total [26]	2.73	0.81
	Total-LP [18]	2.72	0.80
	Total HCC [14]	2.71	0.70
Generally data is ignored by professional planners	LP [8]	2.50	0.71
	D [2]	3.00	1.00
	IP [11]	2.00	0.43
	P [4]	2.75	0.83
	Total [25]	2.36	0.74
	Total-LP [17]	2.29	0.75
	Total HCC [15]	2.20	0.83
Generally data is ignored by elected members	LP [8]	3.25	0.83
	D [2]	4.00	0.00
	IP [9]	2.89	0.74
	P [3]	3.33	0.94
	Total [22]	3.18	0.83
	Total-LP [14]	3.14	0.83
	Total HCC [14]	2.43	0.82
Data challenges preconceived notions	LP [8]	3.63	0.70
	D [2]	4.00	0.00
	IP [11]	3.45	0.78
	P [4]	4.25	0.43
	Total [25]	3.68	0.73
	Total-LP [17]	3.71	0.75
	Total HCC [15]	4.07	0.44
Generally data persuades people to change their position on important issues	LP [8]	2.63	0.70
	D [2]	3.50	0.50
	IP [11]	2.55	0.66
	P [4]	3.00	0.71
	Total [25]	2.72	0.72
	Total-LP [17]	2.82	0.78
	Total HCC [15]	2.67	0.79

N.B. Abbreviations and scores see Table 5.9

generally data is not allowed to create uncertainty rather than the fact that it actually points to a single course of action. It was stated that information is overlooked or rubbished where there is any doubt as to whether the data supports the favoured policy.

With these considerations in mind officers rejected the idea that professional staff ignore data but acknowledged that they may not necessarily utilise or act upon such material. Senior management seemed less certain about the extent to which staff took note of information. One officer described an instance where it was politically unacceptable to admit the extent of resources being spent on a particular project and therefore the information could not be employed. A member of the Information and Computing Projects Group stated that the local planners had ignored the data generated from the 1981 Census of Population until directed by a senior officer to obtain the material relevant to the localities for which they were responsible. In contrast several local planners argued that they would make greater use of the Department's data resources if they were better informed. It was felt in the case of elected members that with one or two exceptions they were more likely to ignore data than professional staff. Senior management were most strongly of this opinion, suggesting in common with a number of staff that on very few occasions was data regarded as being critical to politicians as their views were shaped by other factors.

The findings provided further support for the suggestion that while officers consider the available information it is not the determining factor. For instance, it was agreed data challenges preconceived notions, although acknowledged these views were unlikely to be altered. The idea that data persuades people to change their position on important issues

was also rejected. These overall trends largely mirror the Hertfordshire findings which suggest decisions are taken inspite of rather than determined by the available information. It was noticeable that elected members in Glasgow were regarded as far more likely to ignore data than their counterparts in Hertfordshire, perhaps due to the differing backgrounds of the individuals involved.

5.74 The rationalisation stage

Officers were asked during the interviews whether information was employed to rationalise an intuitive preference for a policy or as ammunition to support a favoured stance (see Table 5.17). There was a large measure of consensus amongst officers that data was both used to legitimate existing decisions and also to support planning decisions which had originally been taken on the basis of an intuitive judgement. A number of individuals commented that policy makers generally look for evidence to confirm the case they wish to put forward. It was suggested that both local planners and development control officers largely base their decisions on personal experience, only utilising the more formal data sources of the Information and Policy Groups when they are likely to be challenged at an examination in public or planning appeal. This sentiment was endorsed by the unanimous agreement that information is used to support the arguments of the Department in authority wide discussions.

The Glasgow findings in essence support the trend highlighted in Hertfordshire for information to be employed to legitimate an intuitive decision, to obtain the support of elected members and as ammunition against challenges from external organisations. Although the role of data is similar in the two environments the underlying rationale would appear to be different. Briefly returning to the final decision stage, the

Table 5.17: Perceptions of the role of information in the policy process: the rationalisation stage

Statement	Staff grouping	Mean	Standard Deviation
Data is used to legitimate existing decisions	LP [8]	3.50	1.00
	D [2]	3.50	0.50
	IP [11]	4.00	0.00
	P [5]	3.80	0.40
	Total [26]	3.77	0.64
	Total-LP [18]	3.89	0.31
	Total HCC [15]	3.93	0.57
Data supports planning decisions that have already been taken	LP [8]	3.38	0.86
	D [2]	3.00	1.00
	IP [11]	3.91	0.29
	P [5]	3.60	0.49
	Total [26]	3.62	0.68
	Total-LP [18]	3.72	0.56
	Total HCC [15]	3.93	0.44
Data is used to support the arguments of the Department in authority wide discussions	LP [8]	4.00	0.00
	D [2]	4.00	0.00
	IP [11]	4.00	0.00
	P [4]	4.00	0.00
	Total [25]	4.00	0.00
	Total-LP [17]	4.00	0.00
	Total HCC [15]	4.27	0.44

N.B. Abbreviations and scores see Table 5.9

Glasgow planners questioned the extent information is indicative of a single course of action. This reasoning in association with individual personalities and political factors appears to lead officers in Glasgow to be less firmly of the view that data leads to agreement on the most appropriate policy, or the degree to which data challenges preconceived notions, than their counterparts in Hertfordshire. This is not to say that planners in Hertfordshire were not aware of the limitations of information but felt that the tactical benefits to be gained from possessing a credible data source outweighed these arguments. Similarly the findings of

the Hertfordshire case study point more strongly to the value of information as an aid in justifying the Department's policies than the Glasgow results. Evidence from the case studies suggests that while both authorities employ information during the rationalisation stage planners in Hertfordshire attempt to anticipate the likely demands while data in Glasgow is sought in response to external pressures.

5.75 The post-decision stage

Officers in Glasgow agreed in theory that data is employed to monitor and evaluate the success of planning policies (see Table 5.18). However, in practice staff suggested it was rare for either activity to be undertaken with the exception of monitoring vacant land. It was generally felt to be more important to devote the limited resources available to implementing existing policies and resolving new problems than to examining past issues. The value of regularly reviewing key policy areas was therefore not as strong as in Hertfordshire.

Table 5.18: Perceptions of the role of information in the policy process: the post-decision stage

Statement	Staff grouping	Mean	Standard Deviation
Data is used to monitor policy	LP [8]	4.00	0.00
	D [2]	4.00	0.00
	IP [11]	3.91	0.29
	P [5]	4.00	0.00
	Total [26]	3.96	0.19
	Total-LP [18]	3.94	0.23
	Total HCC [15]	4.33	0.47
Data is used to evaluate the success or otherwise of planning policies	LP [8]	3.75	0.43
	D [2]	4.00	0.00
	IP [11]	3.55	0.66
	P [4]	3.75	0.43
	Total [25]	3.68	0.55
	Total-LP [17]	3.65	0.59
	Total HCC [15]	4.00	0.52

N.B. Abbreviations and scores see Table 5.9

5.76 Computer based data and the policy making process

Computers and the availability of information

The overall responses of the staff interviewed suggest computerisation has a positive influence on the availability of information, although there are distinct differences of opinion between staff groupings (see Table 5.19). The technical specialists firmly endorsed this view stating that automation enables a greater variety of output to be generated and also avoids data being tapped within a single group. However, this presumes that users possess the skills to access the information they require and more fundamentally are aware of the data which is available. This was denied by a number of officers with the local planners rejecting the idea that computer based systems increase the utilisation of information. The storage of the most recent development control records solely in a computer to which access was limited was frequently cited as an example of automation decreasing data availability. Senior management's lack of support for skills training was blamed by one officers for automated data not being fully utilised. It was suggested that such actions were a result of the technological ignorance of senior staff and fear that the dispersal of such knowledge would erode their control over the Department. It is possible that the lack of computer and perhaps also information awareness throughout all levels of the Department accounts for the significantly less positive overall endorsement of the notion that the development of computer based systems increases the use of data than was the case in Hertfordshire.

The interviews also examined whether practitioners felt they were in receipt of too much information given the growing range of data sources. Overall officers rejected this idea emphasising in particular the shortage of good quality relevant material. The only group to suggest that the

Table 5.19: Perceptions of the availability of computer based data in Glasgow District Planning Department

Statement	Staff grouping	Mean	Standard Deviation
The development of computerised systems has increased the use of data by staff within the Department	LP [8]	2.63	0.86
	D [2]	4.00	0.00
	IP [10]	3.60	0.66
	P [4]	3.50	0.87
	Total [24]	3.29	0.89
	Total-LP [16]	3.63	0.70
	Total HCC [14]	4.00	1.00
In general planners receive too much data	LP [8]	2.75	0.83
	D [2]	2.00	0.00
	IP [12]	2.83	0.80
	P [3]	3.67	0.47
	Total [25]	2.84	0.83
	Total-LP [17]	3.00	0.91
	Total HCC [14]	2.79	1.15

N.B. Abbreviations and scores see Table 5.9

planners might be overloaded with data were the technical specialists, commenting in addition that if users were more precise about their needs they would receive less material. These findings like Hertfordshire's provide little evidence to suggest that practitioners are experiencing problems of data overload.

Automation and the quality of data generated

Staff were asked during the interviews to comment on the quality of computer based data available within the Department in terms of a variety of features. The only characteristic to gain a positive response from all groups of staff was the notion that automated data is generally 'useful'. With respect to the other qualities officers tended to perceive automated data to be realistic, reliable and believable but found it more difficult

to generalise over its clarity, accuracy and lack of bias while such resources were generally not regarded as complete. The technical specialists who have the responsibility for generating this data were the most positive about its quality while senior decision makers were the most sceptical. A large proportion of officers emphasised the generalised nature of their response commenting that data quality varied in time and according to the issue. In line with the majority of local planners one senior member of staff stated that information from whatever source could never offer the same insight as observing activities on the ground. As a result local planners were perceived to have a more complete knowledge than data could ever provide, although admittedly of a small locality.

The vast majority of staff interviewed emphasised that their comments about the quality of computer based data were equally applicable to information derived from other sources, although a few suggested that the latter might appear more authoritative. The assumption that by storing data in a machine the impact of human error would be removed was firmly rejected. It was frequently stated that inaccuracies in data collection are reflected in the output while a programmer commented that in terms of analysis a computer can add a column of figures accurately but cannot make judgements as to whether such an action was appropriate. A middle ranking officer suggested in addition that data quality was largely dependent on the stability of the team of planners charged with responsibility for checking for inaccuracies. This sentiment is reflected in the general feeling that the production of good quality data was dependent on the person or people responsible for its collection, storage and manipulation. It was suggested by a number of the technical specialists that the decision to develop a computer based system demonstrates that some priority is given to the data and as a consequence leads resources to be

devoted to ensuring it is up to date and accurate. These findings in common with Hertfordshire suggest that generally computerisation was not considered to increase data quality. Most staff seemed reasonably satisfied with the accuracy of the information they received with an improvement in standards not regarded as a particularly significant issue.

The role of computer based data in the policy making process

The officers interviewed in Glasgow questioned whether the source of information was particularly significant and as a result they disagreed with the suggestion that the provision of computer based data means people are less likely to accept the findings of manual techniques (see Table 5.20). Senior management particularly felt the source to be irrelevant to

Table 5.20: Perceptions of the role of computer based data in the policy process

Statement	Staff grouping	Mean	Standard Deviation
The provision of computer based data means people are less likely to accept the findings of manual techniques	LP [8]	2.88	0.93
	D [2]	2.00	0.00
	IP [11]	2.91	0.90
	P [5]	2.80	0.98
	Total [26]	2.81	0.92
	Total-LP [18]	2.78	0.92
	Total HCC [14]	2.86	0.83
The use of computer based data makes it difficult for those outside the Department to dispute the findings of analyses	LP [8]	3.75	0.66
	D [2]	3.00	1.00
	IP [10]	3.20	0.87
	P [5]	2.80	0.98
	Total [25]	3.28	0.92
	Total-LP [17]	3.06	0.94
	Total HCC [15]	3.20	0.91

N.B. Abbreviations and scores see Table 5.9

the contribution of information. There was mild agreement with the statement that the use of automated data makes it difficult for those outside the Department to dispute the findings of analyses. An officer suggested this was due to the data not being freely available while personal frustration encountered accessing computer based data might explain the high response of the local planners. Discussions with staff in both Glasgow and Hertfordshire implied that in general they perceived there to be little difference between the role performed by automated data and material derived from other sources. Officers in Glasgow suggested that computer based data could give an air of authority although that alone was unlikely to be a determining factor. There was also a minority who appeared to be extremely sceptical about computerisation and as a result tended to reject such data without consideration.

5.77 Discussion

The findings of the Glasgow case study question the value of the systems rationalist perspective in relation to the role performed by information in the strategic decision making process. Information was employed in conjunction with the personal knowledge and experience of practitioners to assist the process of problem definition, the provision of evidence on alternative policy responses and on the rare occasions that monitoring and evaluation were undertaken. However, the most significant impact of information was during the rationalisation stage as an aid to legitimating the preferred policy and as ammunition against agencies which might doubt the appropriateness of the decision taken. The role of data in the process of identifying problems, designing alternative policy responses and the key area of policy selection seemed to be limited. The findings also indicate that practitioners regard computer based data as performing a similar function to information derived from other sources. The

relationship between computerisation and increased data availability was not as strong as Hertfordshire while the results of both case studies question the link between automation and improved information quality.

The findings of the Glasgow case study are very similar to those derived from Hertfordshire, questioning the extent to which information performs a substantive function in the policy making process. The strong emphasis on the role of information during the rationalisation stage suggests data is employed to perform a tactical function, although as a response to external pressures rather than the more proactive approach adopted in Hertfordshire. There is also evidence to indicate that information in conjunction with professional experience is also employed to perform a background role in the form of detailing the nature of a planning problem and providing evidence on alternative policy options.

There is a large measure of similarity between the results of the two case studies with respect to the role of information for policy making, however, there were differences in the extent to which data was employed. Processes for which the Hertfordshire planners perceived information to be most valuable, officers in Glasgow agreed but not to such a great extent. Similarly activities for which the Hertfordshire case study suggested data was little utilised planners in Glasgow tended to reject its use even more strongly. There would seem to be two possible explanations why in general officers made less use of data in Glasgow:

(i) the planning responsibilities of district councils result in information performing a less important role in the policy making process;

(ii) aspects of the organisational environment discourage the utilisation of data.

The local planners are the one grouping of officers whose work differs substantially from that of staff in Hertfordshire. As a result, in an attempt to examine whether this accounted for the difference in results between the two authorities the averages were recalculated omitting the responses of the local planners (see preceding tables for figures). Twenty-seven statements about the role of information were put to officers and of these only in five cases was the difference between the overall average and the average without the responses of local planners greater than 0.15. These statements being: the development of computerised systems has increased the use of data by staff within the Department; data provides surprising results; in general elected members give a clear lead on planning policies; generally data substantiates the claims of senior planning staff; and the use of computer based data makes it difficult for those outside the Department to dispute the findings of analyses. The reasons accounting for the responses of local planners have been discussed in the preceding analysis. Overall these findings suggest that the lower level of data usage in Glasgow is not a direct result of different planning responsibilities.

Evidence from the case studies tends to support the view that the propensity to use data is related to the organisational environment. Analysis of computer and data awareness amongst planners suggested the presence of a significant number of the more negative stereotypes while there was also a substantial group of officers who felt frustrated by their lack of knowledge. It is this middle group which is most significant as they are neither great enthusiasts or positively antagonistic to information or technology and are therefore likely to be influenced by the circumstances in which they are located. Glasgow's centralised approach to information provision and the current emphasis on mainframe

systems may be partially responsible for this situation. However, in many ways this would seem to be a symptom of the value senior officers attach to information. The initial sections of the chapter demonstrated that a committed and enthusiastic member of middle management could acquire considerable computing resources for the Department. It would appear that the coordinated use of the data held in such systems depends on the establishment of a departmental information management strategy which identifies the role of information in the work of staff and provides the framework in which the conditions can be created which will realise these objectives. The lack of a culture which stresses the value of data at least for some aspects of the policy making process, results in a tendency to emphasise more strongly than in Hertfordshire the contribution of other factors and means of acquiring knowledge such as personal observation and experience.

5.8 CONCLUSION

The findings of the Glasgow case study support the Hertfordshire results, questioning the applicability of the systems rationalist perspective with respect to the development of the computer package, the role of information in the policy making process and the utilisation of geographical information in relation to individual officers and more generally throughout the authority. Organisational factors have been found to have a significant influence on the development of the computer package and utilisation of information while the substantive role of information has been questioned. The important theoretical and practical implications of these findings will be evaluated in Chapter 6.

CHAPTER 6

CONCLUSION

6.1 INTRODUCTION

The findings of the empirical investigations suggest organisational factors have a significant impact on the utilisation of geographical information in local authority planning departments. This chapter examines the theoretical and practical issues raised by this analysis. It was argued in Chapter 3 that three areas required detailed investigation with respect to the utilisation of information (see Section 3.2). These are:

- factors influencing the development of the computer package;
- the role performed by information including automated data in the policy making process; and
- factors directly affecting the utilisation of geographical information including the impact of computer based systems.

The research hypotheses linked to each of these fields of study reflect the conceptual framework's adoption of a segmented institutionalist perspective and consequently concern about the impact of organisational factors. This chapter will explore each of these areas through a comparison of the experiences of the planning authorities in Glasgow and Hertfordshire and an evaluation of these results in relation to the research hypotheses. Consideration will be given in each case to the theoretical implications of the evaluation, in particular the differences between the findings derived from the British context and the work of the Irvine Group based in local government in the United States. It is not

considered necessary to reiterate the weaknesses of the systems rationalist approach favoured by the existing empirical studies based in British planning authorities given the detailed discussion in Chapter 2 (see Section 2.32).

The results of the evaluation also have implications for planning practice with respect to the design and organisation of information systems. These issues are explored in Section five with the proposed guidelines suggesting that a user centred strategy is closely linked to the effective utilisation of information. The final section of the chapter examines the importance of the research and outlines areas requiring further investigation.

6.2 EVALUATION OF THE FACTORS INFLUENCING THE DEVELOPMENT OF THE COMPUTER PACKAGE

6.21 Introduction

This section explores the processes underlying the development of a computer package. This is important as factors which inhibit the ability of a planning authority to satisfy the needs of practitioners must have a negative effect on the utilisation of information. The systems rationalist perspective assumes automated systems to be largely isolated from the social and political processes present in a given organisation. This conceptualisation has been rejected by the research and therefore hypothesis 1 states:

> The development of the computer package in a local authority planning department is dependent upon three sets of organisational factors: (a) the organisational context; (b) people; (c) change and instability (see p.81).

The analyses of the very different contexts of Glasgow and Hertfordshire support the argument that organisational factors have a significant impact on the characteristics and development of computer packages. This evaluation will examine these findings more closely. The approach to information management and the resulting computer packages in the case study authorities will be summarised as background for an assessment of the factors responsible for the characteristics of the information systems noted. Particular attention will focus on the appropriateness of the three-fold division of organisational factors outlined in hypothesis 1, with the resulting theoretical framework compared with the studies undertaken by the Irvine Group.

6.22 The computer packages and the overall approach to information management adopted by the case study authorities

The characteristics of the computer packages and the overall approach to information management adopted by the planning authorities of Hertfordshire and Glasgow differ substantially (see Sections 4.2, 4.4, 5.2 and 5.4). Given that both departments have made a considerable investment in equipment and personnel, including staff with specialist computing skills, the organisation of these resources has been very different. In Hertfordshire the computer package is currently dominated by micro computers and their associated user friendly software. The Department also has a staffing capacity able to undertake projects involving large scale data collection. Glasgow in contrast is characterised by highly sophisticated generally mainframe technology which mainly handles data from secondary sources.

These computer packages are in turn a reflection of different underlying approaches to the management of information. Hertfordshire has favoured the decentralisation of resources and expertise. Information systems have traditionally been designed to serve strategic functions but applications of an operational nature are increasingly being developed. Opportunities are also being taken to exploit the commercial potential of the information held by the Department, while internal users remain the major clients. It is important to recognise that the approach adopted by Hertfordshire is part of a broader strategy created by senior management which identifies the important role of information in the process of achieving the County's planning objectives. Computing skills in Glasgow have been largely concentrated within a specialist team. Emphasis is placed on satisfying internal data needs but in instances where cooperation with other departments in the authority was likely to increase the resources available, systems also perform a corporate function. In practice, existing systems mainly provide data for essential routine activities, although much of the information held could also be used by the planners responsible for activities of a more strategic nature. This reflects Glasgow's less clearly defined overall strategy with respect to the Department's information priorities, the role of information in the policy making process and the link between information management and technology, compared to Hertfordshire.

6.23 Factors influencing the development of the computer packages in the planning authorities of Glasgow District Council and Hertfordshire County Council

The summaries of the approaches adopted and the components of the computer packages indicate considerable differences between the two case studies. Systems rationalist perspectives assume that these characteristics are

largely the result of the unrestricted choices of the individuals responsible. However, the findings of the analyses demonstrate that the development of information systems is influenced by a range of human institutional and organisational factors (see Sections 4.4 and 5.4). The nature of these factors need to be examined in more detail as a means of assessing the appropriateness of the framework suggested by hypothesis 1. A distinction is made between the conditions which affect firstly, the critical process of securing commitment and therefore funding for a project and secondly, the overall approach to information management and the resulting components of the computer package. The important issue concerning the relationship between users and technical experts referred to in Chapters 4 and 5 has been omitted from this section of the discussion. This is due to the highly individual nature of these experiences and also that interpersonal contacts of this type have an impact on the detailed design and utilisation of information systems rather than the general features of the computer package. As a result this issue will be considered in Section 4 in relation to the factors directly influencing the utilisation of information.

A comparison of the factors affecting the development of the computer packages in the two case study authorities is shown in Table 6.1. It should be noted that the symbols utilised in the table are suggestive of general trends rather than precise measures. The evaluation has been structured in terms of the conceptual framework adopted by the research. These findings indicate that planners in Glasgow faced much less favourable circumstances in which to develop information systems than was the case in Hertfordshire. The first issue for more detailed consideration concerns the factors influencing the process of securing investment.

Table 6.1: The influence of organisational factors on the development of the computer packages in the case study authorities

Factor	Hertfordshire County Planning Department	Glasgow District Planning Department
EXTERNAL ORGANISATIONAL CONTEXT		
(i) Socio-economic environment	+	0
(ii) External organisations:		
- Central government	-	0
- other local authorities	0	+
- computer manufacturers	+	-
INTERNAL ORGANISATIONAL CONTEXT		
(i) Status of the Planning Department within the authority	+	-
(ii) Political parameters	0	-→0
(iii) New technology and the trade unions	+	-
(iv) Other Council departments	+	0
PEOPLE		
(i) Senior staff	+	-
(ii) Middle management	+	+
CHANGE AND INSTABILITY		
(i) Past	+	-
(ii) Future	0	0

Key

+ factor facilitating the development of the computer package

- factor constraining the development of the computer package

0 factor on balance neither facilitating nor constraining the development of the computer package

(i) Commitment and investment in the computer package

The process of securing commitment and therefore the funding necessary to develop and maintain the computer package was in both cases dependent on the activities of at least one enthusiastic and highly motivated individual. As in other fields local government is characterised by a large number of interests competing for a share of the limited resources available. In the absence of an individual willing to fight the inevitable political battles little if any investment will take place. The Glasgow case study demonstrates that this officer need not necessarily be a member of senior management. A lack of formal seniority acquired through position in this instance was supplemented by long experience and an intimate knowledge of the workings of the organisation. Nevertheless, success is perhaps more probable if the lead is taken by a member of senior management as they are likely to be members of the important financial committees and therefore in a better position to negotiate the necessary resources. This was the case in Hertfordshire where the lead was taken by the Chief Planning Officer with support provided by members of middle management.

(ii) The overall approach and components of the computer package

The findings of the case studies demonstrate the key role performed by an enthusiastic individual in the process of securing commitment to a particular project. The analyses of the Glasgow and Hertfordshire planning authorities indicate that the extent of the funding obtained, the overall approach to information management and the components of the computer package are influenced by the staff and politicians associated with the department, the organisational context and the level of instability (see Table 6.1). The results suggest that planners in Hertfordshire were faced by fewer constraints than their colleagues in

Glasgow. The reasonably favourable authority wide and also departmental conditions are largely due to the activities of the Chief Planning Officer. A department's status within an authority is a highly significant issue with respect to the range of possible approaches to information management and the level of financial support available. Hertfordshire's relatively strong position compared to most planning departments reflects the respect and confidence senior politicians have in the Chief Officer and the work undertaken by his staff. This has contributed to the development of information systems largely independent of other departments and enabled sufficient resources to be secured to fund the conduct of surveys, the continued presence of specialist computing staff and the necessary equipment. The emphasis the Chief Planning Officer places on the role of information in the strategic planning process is also significant. As a result an information management strategy has been developed which gives consideration to data accessibility and associated issues such as staff training. This in turn has encouraged the adoption of a decentralised approach and the introduction of micro computers. These findings suggest that the activities of the Chief Officer have been responsible for the creation of a favourable internal organisational context in which to develop the computer package. However, Hertfordshire's overall approach has also been shaped by less positive factors.

The external organisational context has had a significant influence on the information processing activities of the Department. Central government's proposals for the reform of local government and the statutory planning functions of county councils have been particularly important. Senior management responded to the challenge of these draft measures by attempting to raise the profile of the department's activities and

therefore ensuring politicians, senior staff in other departments and the local electorate were made aware of the valuable work being undertaken. This in turn has had an impact on the underlying approach to information management in two main respects. Firstly, service orientated activities requiring data of an operational nature have been added to the traditional strategic functions of the Department. Secondly, existing data reserves are being exploited to meet the needs of external organisations as a means of increasing awareness about the activities of the Department.

With the exception of the uncertainty created by the proposals of central government, conditions in Hertfordshire have been relatively stable. However, there are signs that the Department is about to encounter a period of greater instability. Challenges to the status quo include the physical reorganisation of the Department which has separated the Information Group from their major departmental client, staff changes, potential modifications to the relationship with the other planning authorities in Hertfordshire and declining independence within the County Council due to the development of a GIS.

Overall the findings suggest the approach underlying the development of the computer package in Hertfordshire has been influenced by the leadership of senior management, their response to pressures in the external organisational context and a period of relative stability. The results of the analysis shown in Table 6.1 demonstrate that by contrast practitioners in Glasgow have faced a less favourable environment. The level of resources devoted to information technology in Glasgow is largely attributable to the activities of a member of middle management. The attitude of senior staff is generally passive which leads to a lack of central leadership and ambiguity over the department's overall information

priorities. As a result systems are developed in response to essential operational requirements rather than as part of a broader departmental framework concerning the management of information.

The internal organisational context has had a significant impact on the nature of the computer package. The Department's declining status within the authority since 1975 has inhibited the range of possible approaches. As a consequence a number of systems with corporate potential have been developed as contributions from other departments increased the funding available. This situation has the disadvantage of subjecting the Planning Department to the priorities of other agencies but given the limited resources available the alternative was probably inaction. The activities of politicians have also been significant in the Glasgow context. The inability of successive Convenors to protect the department's position within the authority has had an important contextual impact. The Department has therefore faced a period of organisational instability as important groups within the Planning Services Unit were relocated to the Town Clerk's Department. However, it was suggested that the selection in 1988 of a new and ambitious Planning Convenor may ensure a period of greater stability. Political influence is reflected more particularly in the policy of wherever possible buying equipment manufactured locally and the lack of interest in the commercialisation of information.

Agencies in the external organisational context have not influenced the development of the computer package in Glasgow in as marked a manner as Hertfordshire. Agreement to act as a pilot site for the Coordinate automated mapping package led to the problems of delay and inconvenience which are often associated with dependence on an agency external to the Planning Department. Additionally, legislative changes by central

government disrupted existing routines in Glasgow as in other contexts. The introduction of the community charge for instance led to concern about the loss of vital information held on the Valuation Roll and the likely impact this would have on the ease of updating existing systems.

The results of the analysis of the Glasgow case study suggest the development of the computer package has been influenced by a highly constrained and relatively unstable internal organisational context with the activities of a key individual responsible for the resources acquired. These findings as with those derived from the Hertfordshire context demonstrate the important contribution of organisational factors. The process of securing commitment and therefore funding for the development of the computer package was linked in both case studies to the activities of at least one enthusiastic and skilled member of staff. However, the manner in which these resources could be deployed was affected by the internal and external organisational contexts, instability, the actions of staff in general and in particular the attitude of senior management. As a result these findings support the argument underlying hypothesis 1 (see p.81) that the components of the computer package in a given organisation are influenced by three groups of factors namely, (i) the organisational content, (ii) people and (iii) change and instability.

This evaluation suggests that the development of information systems is embedded within the social and political processes present within an organisation. Figure 6.1 illustrates this relationship and also indicates the existence of a feedback loop whereby an organisation's experience of computerisation affects their future development plans. The precise nature of the organisational factors found to be of significance under each of the three headings will vary between organisations. However, the

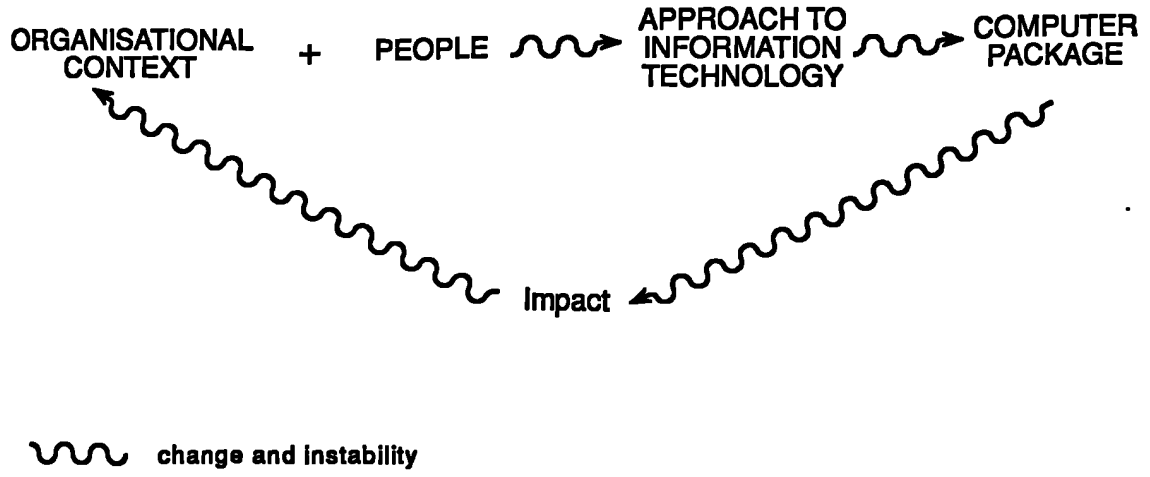

Figure 6.1: Factors influencing the development of a computer package

model provides an explanatory framework for the analysis of factors influencing the development of a computer package.

6.24 Theoretical implications

The evaluation of the case study findings have important theoretical implications as they support the research's rejection of a systems rationalist perspective. As a result it is argued that studies need to examine a wide range of human, institutional and organisational factors in order to understand the computing experiences of planning authorities. It is important that the resulting explanatory framework is compared to the findings of the studies undertaken in local government in the United States. This provides the basis for assessing whether it is necessary to modify the Irvine Group model to take account of the British planning context.

The findings of the analyses and the Irvine Group studies both suggest the significance of organisational factors to the development of the computer

package in a given organisation. However, there are two important differences between the resulting models. These concern the most appropriate unit of study and the general organisation of the model.

It was argued in Chapter 2 that while the URBIS studies adopted the whole local authority as the unit of study, the departmental nature of British local government made it more appropriate to focus in detail on the experiences of a specific department (see p. 53-54). Departments within an authority compete against one another for power and legitimacy which is in turn reflected in their scope and range of responsibilities as well as their capacity to command resources. The position of a department within the social and political hierarchy of an authority was highlighted in the preceding evaluation as a significant contextual influence on the development of a computer package. Given these findings the important issue in relation to the work of the Irvine Group is the existence of differences in status between departments within the same authority. For this reason comments which are applicable to a generally powerful department such as Finance are not equally relevant to Planning. The fact that the Finance Department and the planners serve the same geographical area is of little significance with regard to the development of their respective computer packages in circumstances where one possesses considerably more status within the authority than the other.

The model developed by the Irvine Group fails to take account of the important differences between departments within the same authority (see Figure 6.2). The findings of the analysis indicate that the internal organisational context should be conceptualised as two layers rather than just one as the Irvine Group work suggests. These layers consist of firstly the departmental context and secondly its relationship to the

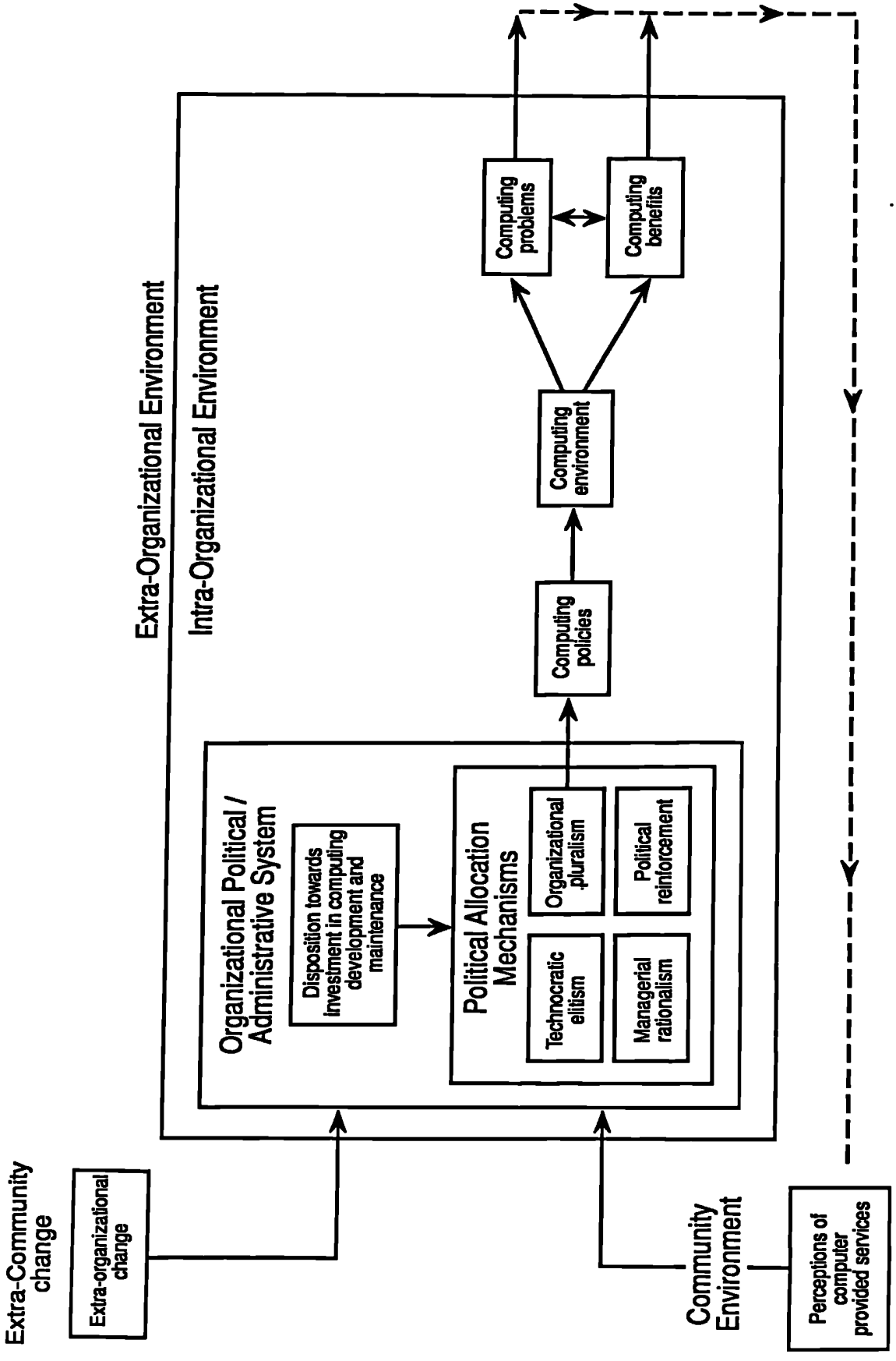

Figure 6.2: A model of the relationship between the computer package and the organisational context
Source: King and Kraemer (1985, p.22)

Figure 6.3: The organisational context of computing in a local authority planning department

local authority as a whole (see Figure 6.3). The conceptual framework developed as a result of the findings of the case studies also indicates the impact of people and organisational instability on the nature of the computer package (see Figure 6.1). The importance of these groups of factors are not explicitly included in the Irvine Group model, although these issues are examined in their work as demonstrated in Chapter 2.

6.25 Summary

The evaluation of the empirical investigations indicate the significant influence of organisational factors on the development of the computer packages in Hertfordshire and Glasgow. These results support the theoretical framework and more particularly hypothesis 1 suggesting the important contribution of (i) the organisational context, (ii) people and (iii) change and instability. Computer based systems are therefore regarded as embedded within the social and political processes of an organisation. The effect of interdepartmental competition for power and resources on the constraints imposed by the internal organisational context distinguishes this research from the studies based in the United States. The findings also have important implications for the utilisation of automated data as the development of the computer package has been found to be influenced by a range of organisational factors, many of which are outside the control of a single individual or agency. As a result, in certain circumstances it may be difficult to fully satisfy the requirements of users which is likely in turn to have a negative effect on utilisation.

6.3 EVALUATION OF THE ROLE OF INFORMATION IN THE POLICY MAKING PROCESS

6.31 Introduction

This section considers the role performed by information in the policy making process of local authority planning departments. The analysis in Chapter 2 suggests there to be several conceptualisations of the function performed by information in decision making (see Tables 2.1 and 2.3). These range from approaches which assume information to have a substantive influence on policy selection to those which perceive the role of such resources to be symbolic or even political in nature and as a consequence

employed selectivity by decision makers. In addition assumptions concerning the sub-set of information which is held in computer based systems vary from those which argue such data increases the rationality of the decision making process through its greater accuracy and accessibility, to those which regard the origin of information to have little bearing on its eventual role. The actual functions for which decision makers require information is an important issue as the misinterpretation of this role by system designers must influence user satisfaction and therefore utilisation. The research has rejected the rational conceptualisations and as a result hypothesis 2 states:

> Systems rationalist perspectives provide an incomplete understanding of the role of information in organisations such as local authority planning departments (see p. 81).

The preliminary analysis of the empirical investigations support this argument, however, it is necessary to examine the respective results more closely as well as compare the findings with the studies undertaken by the Irvine Group. Rational perspectives assume that decision makers firstly, employ information extensively throughout the decision making process and secondly, that it serves the interests of the organisation as a whole. As a result the evaluation will examine whether the findings of the case studies provide support for these assumptions. Consideration will also be given to the factors influencing the role performed by both information in general as well as computer based data.

6.32 The findings of the case study investigations: the role of information in the different stages of the policy making process

Despite the differences in the computer package described above, the findings of the Glasgow and Hertfordshire case studies are broadly similar (see Table 6.2). The analysis indicates that information is regarded as performing an important role in the rationalisation and legitimation of

Table 6.2: Findings on the role of information in the policy making process of local government in the United States and two British Planning Departments

Stage in the policy making process	HCC(x)	GDC(*)	URBIS(+)
PRE-DECISION STAGE			
(i) Finding the problem	No	No	Yes(2)
(ii) Defining the problem	Yes(2)	Yes(2)	Yes(2)
DECISION STAGE			
(i) Designing alternative policies	No	No	No
(ii) Gathering information about alternative policies	Yes(2)	Yes (2)	Yes(1)
(iii) Selection of preferred policy	No	No	No
RATIONALISATION STAGE			
(i) Rationalisation of the selected policy	Yes(1)	Yes(1)	Yes(1)
(ii) Legitimation of the selected policy	Yes(1)	Yes(1)	Yes(1)
POST-DECISION STAGE			
(i) Monitoring	Yes(1)	0	Yes(2)
(ii) Evaluation	0	0	No

Key

Yes(1) - Information performs an important role

Yes(2) - Information performs a less important role

No - Information of little significance

0 - Activities seldom undertaken although respondents assumed data to be of some value

x - Hertfordshire County Planning Department

* - Glasgow District Planning Department

+ - URBIS project, source: Danziger et al (1982)

policies. It also suggests such resources have a qualified function with respect to the definition of the problem area and provision of evidence about alternative courses of action. The greatest difference between the two sets of findings concerns the monitoring element of the post-decision stage. Planners in Hertfordshire regarded information as having an important role with respect to these activities. This was generally presumed to be the case by staff in Glasgow, although with the exception of the regular surveys of vacant land little formal monitoring actually took place. The analysis also indicates that respondents in both authorities question the value of information with respect to initially discovering the existence of a problem, designing possible policy responses and the critical activity of selecting the most appropriate course of action. Policy evaluation following implementation was seldom undertaken in either authority therefore the responses of professional planners have not been recorded in this analysis. The results of the case studies suggest the role performed by computer based data is not significantly different from information in general.

The format adopted for the interview schedule allows comparisons to be made with the findings of the URBIS project undertaken by the Irvine Group. It should be noted, however, that the work conducted in local government in the United States concentrates exclusively on automated data and examines its role with respect to both strategic and operational decision making. Given the above findings the method of storage is not regarded as a significant issue. With these considerations in mind it is striking that the results of the two sets of studies are broadly similar. The main difference concerns the role of information in the initial act of identifying an issue requiring action. The disparity is probably due to the inclusion in the URBIS studies of responses from practitioners

involved with both operational and strategic decision making. The identification of potential problems is likely to be more closely linked to routine activities where facilities for exception reporting have been developed. This is perhaps particularly true of the operational systems investigated by the Irvine Group, namely automated accounting applications. There is also a difference in the degree of importance attached to the role performed by information with respect to the provision of evidence concerning alternative policy options. These findings have also been confirmed by the preliminary analyses of the 1985 URBIS survey (International City Management Association 1989).

The results of the evaluation in common with the Irvine Group studies have important implications as they question the extent to which information has a substantive role in decision making. The findings provide little support for the assumptions underlying the systems rationalist perspective which suggest practitioners employ information throughout the policy making process and that it represents a decisive factor during the critical stage of selecting an appropriate course of action. However, while rejecting the substantive role of information the analysis does not indicate that decision makers totally disregard such resources. It is therefore necessary to examine the results more closely to identify the types of functions for which information is required by practitioners.

Examination of the analyses presented in Table 6.2 suggests policy makers employ information to fulfil two types of task. The first of these concerns the important role information performs during the rationalisation stage of the policy making process. Information in these circumstances is regarded by the research as fulfilling a tactical function. The findings also suggest information is employed by

practitioners to provide background to the policy making process in the sense of confirming the dimensions of a problem area, offering evidence on alternative courses of action and monitoring the progress of a decision.

The findings of both sets of studies indicate information makes a significant contribution to the rationalisation and legitimation of a decision. This suggests practitioners employ information as an aid to ensuring a proposed policy obtains approval in formal decision making arenas such as a local authority committee. The analyses indicate it is likely that the initial decision as to which course of action to promote will have been influenced by factors other than the available information (Argyris 1971). Such resources have a second tactical function, as ammunition against interests which wish to overturn established policy. This is backed up by evidence from the case studies which demonstrates that information is used to support existing decisions particularly where a planning authority is being challenged over a refusal to grant planning permission or the merits of statutory planning documents.

Overall information in these circumstances is likely to be employed selectively fulfilling a tactical and perhaps even symbolic function (Feldman and March 1981). The experiences of the planning authorities indicate that during decision making agreement must be sought on several occasions and from different groups of individuals such as professional staff, politicians and other interested parties inside and outside the authority. Policy making is therefore complex and interactive.

The second function of information identified by the analyses is as background to the policy making process. This is regarded as a relatively straightforward role whereby practitioners refer to the information

reserves of an authority to check that their existing knowledge coincides with this evidence. More particularly information may be sought, for instance, to indicate the precise magnitude of a problem. In these circumstances information performs a reassuring function providing the background against which the activities of an authority take place.

The evaluation of the findings of the case studies suggest information is employed by practitioners to perform largely tactical and background functions. However, the discussions in Chapter 2 indicate that information may also perform a political role in the sense that it is controlled by the most powerful grouping within an organisation and as a result serves their interests. The next section will consider this issue.

6.33 The findings of the case study investigations: the political role of information in the policy making process

The findings of the empirical investigations raise some important issues with regard to the political role of information. Political in this sense refers to the dominance of a coalition of individuals which may include a combination of professional staff, politicians and/or interests not directly connected with the administration of local government services, rather than the narrower concept of party political supremacy. The discussion is based on an evaluation of the applicability of the Irvine Group's four decision making styles, described in Chapter 2, to the experiences of the case study authorities. The main assumptions underlying these conceptualisations are summarised in Table 6.3. (For detailed assumptions see Table 2.3). The background function of information is not considered to be a distinguishing feature of these descriptions and has therefore been omitted. The preceding analysis of the role performed by information, including automated data, in the

Table 6.3: A summary of the assumptions underlying the four decision making styles identified by the Irvine Group

Assumption	Mangerial rationalism	Technocratic elitism	Organisational pluralism	Reinforcement politics
Role of information in the decision making process	Substantive	Substantive	Tactical/ Symbolic	Tactical/ Symbolic, Political
Contribution of automated data to the decision making process	Enhances the rationality of decision making	Enhances the rationality of decision making	No difference from information in general	No difference from information in general
Location of control over decision making and information	In line with the management hierarchy	Technical specialists	No dominant grouping	Most powerful coalition

different stages of the policy making process provides little support for the approaches referred to as managerial rationalism or technocratic elitism. Given these findings it is now important to examine the location of control over decision making and supporting resources such as information and technology. The evaluation will explore this aspect of all the conceptualisations to determine which in whole or part is most applicable to the circumstances found in Hertfordshire and Glasgow.

The assumptions of the managerial rationalist style of decision making were questioned in the general discussion of the characteristics of planning practice in Chapter 2. The findings of the case studies support this view suggesting the existence of uncertain and often competing objectives with the formal procedures of the authority not necessarily an accurate guide to the conduct of the decision making process.

The second approach put forward by the Irvine Group presumes that a growing dependence on computer based systems will enable the technical experts to control the flow of information and therefore ensure it serves their interests. The increasing dominance of the technical experts is not supported by the empirical investigations. There was no evidence to indicate policy issues were being reduced to technical problems which were resolved using some form of numerical modelling. The interest of the computer specialists appeared to be focused on technology rather than an attempt to become dominant within the broader policy making process. The more specific issue of control over computing skills and resources is more complex. It is inevitable and to some extent appropriate that as a result of their expertise the influence of the technical specialists will be greater in this respect than other groups. However, the case studies suggest that the extent of this control depends on the strategy of the authority given that Hertfordshire was encouraging the decentralisation of computing skills and resources.

The findings of the analyses provide little support for the assumptions underlying either managerial rationalism or technocratic elitism. In the case of the latter the influence of the technical experts with respect to computing resources is greater than other groups but this influence has not been translated into control of the policy making process. Evidence from the preceding analysis provide support for the arguments of the approaches termed organisational pluralism and reinforcement politics in relation to the role of information including automated data in the different stages of decision making. The critical difference between these conceptualisations concerns the extent to which the policy making process and resources such as information are controlled by a single coalition of interests.

The results of the empirical investigations suggest that at a departmental level organisational pluralism typified the conditions in Glasgow while reinforcement politics was more applicable to Hertfordshire. There appeared to be a fragmented pattern of influence and control over policy making in Glasgow, with no grouping exerting complete control over the formulation of policies and associated resources such as information. This contrasts with the Hertfordshire findings which suggest information was employed to support the objectives established by senior management. It is the lack of clear leadership which seems to result in the more ambiguous situation noted in Glasgow. However, it is important to broaden the discussion about Glasgow to the level of the authority. In this context the planning department had until recently become increasingly marginalised with information resources relocated from Planning to the Town Clerk's Department. It is possible to argue that this reflects the dominance of a coalition of professional and political interests within the authority. The findings also indicate that the balance of power is not static due to the ever changing mix of personalities.

There was no evidence in either of the case study authorities to suggest the existence of very strong party political involvement. The influence of politicians could be seen in the general direction of policies and to that end information was employed to sustain these basic arguments but within these parameters more detailed issues were generally the responsibility of professional staff.

The evaluation of the empirical investigations provide some support for the idea that information performs a partisan role. The Irvine Group suggests the decision making style termed reinforcement politics characterises the situation in local government in the United States. Both

sets of studies question whether the technical specialists have increased their influence over the policy making process. The findings indicate that staff possessing technical expertise are likely to become politicised over matters concerning computer equipment while their interest in broader policy issues is not as great as some have feared (Downs 1967). The implications of these findings on the content and form of planning policies is regarded as outside the scope of this research.

Overall the evaluation suggests information performs a tactical, background and to some extent political role in the policy making process. There is little support for the assumption underlying the systems rationalist perspective that such resources have a substantive function. The next section seeks to identify and explore the factors influencing the role performed by information in the case study authorities.

6.34 Factors influencing the role performed by information in the case study authorities.

The first part of this section examines the factors affecting the functions performed by information in general, while the second considers issues associated with automated data. Particular attention is focused on an assessment of the reasons underlying the failure of information to have a substantive influence on policy selection in practice.

(i) Factors influencing the role performed by information in general

The importance of factors other than information

The results of the empirical investigations in common with the Irvine Group studies demonstrate that considerations other than information, influence the policy options explored by practitioners and the eventual course of action chosen. Financial limitations, the scope of the author-

ity's statutory powers and the existence of an opportunity to develop a policy initiative provide the background against which decision making takes place. However, given these circumstances are favourable the case studies indicate that a number of other factors affect the choices made during the policy making process.

The democratic nature of local government makes it appropriate that the wishes of the controlling political party influence the recommendation put forward by officers. It will be necessary in some instances for elected members to be made aware that professional opinion differs from the position favoured by the ruling party. However, generally it is in the interests of both the department and the officers involved to avoid frequent conflicts with politicians. The results of the case studies suggest professional staff regard elected members as defining the parameters within which detailed policies have to be formulated.

The perceived expectations of senior management is a further consideration which is likely to influence the recommendations proposed by members of staff. It was suggested in one of the case studies that in order to alter the direction of planning policy it would be necessary to change the Chief Officer. Staff in these circumstances were disinclined to challenge the departmental orthodoxy established by senior management. Evidence also indicates that individuals were anxious not to antagonise senior staff unnecessarily due to concern about future career development or in certain cases fear of provoking an increased work load. It was also suggested that in many instances officers regard personal observation and experience to be at least as important and in a large proportion of instances more valuable than information in the process of formulating policies. Staff

indicated that in most circumstances information merely confirms existing knowledge rather than highlighting new trends (Lindblom and Cohen 1979).

The results of the case studies demonstrate that practitioners explore only a small range of alternative policies and are influenced in their selection by their perceptions of the expectations of senior management, party political considerations and personal experience. Given these circumstances Dutton et al. state "...information except in its very broadest sense, is rarely the decisive factor in the policy process..." (Dutton et al. 1980, p. 177).

The nature of information

The findings of the case studies indicate that on its own information and more specifically data is regarded as having very little meaning. The implications of this material only become evident through the interpretation of interested parties, with these analyses often open to debate. As a result, practitioners suggested information is rarely indicative of a single course of action and therefore they questioned whether such resources could exert a decisive influence on the policy making process

The time scale of the decision making process

The time available for the formulation of policy is often highly restricted. The findings of the empirical investigations suggest that practitioners perceive the time involved in collecting, processing and interpreting data often diminishes the value of the information produced. However, for those responsible for the provision of such material it is

often difficult to anticipate the needs of policy makers due to the unpredictable nature of the planning environment.

(ii) Factors influencing the role performed by automated data

The systems rationalist perspective and the decision making styles the Irvine Group term managerial rationalism and technocratic elitism argue that computerisation increases the accuracy and accessibility of information. These issues will be considered in the light of the evidence from the empirical investigations.

The accuracy of computer based data

It is suggested that by employing computers to handle data practitioners can overcome the distortions and errors which are associated with manual procedures and as a consequence improve the quality of the information available to policy makers. The use of automated techniques is also said to increase the speed, sophistication and quantity of data which can be processed (Simon, 1973; Whisler 1970). Evidence from the case studies supports the view that computerisation enables large volumes of material to be handled relatively quickly, however, the issue of information quality is more complex. Few planners in Glasgow or Hertfordshire regarded computer based data to be any more accurate than information from other sources. It was pointed out that data manipulation is dependent on the quality of the original input and the skills of the analyst regardless of the methods being utilised. Automated data is therefore perceived to be as susceptible to human error and fallibility as information derived from manual techniques.

With these considerations in mind it is important to broaden the discussion to examine the priority practitioners attach to data quality. The analysis of the case studies indicate that policy makers regard the timely generation of information to be more critical than accuracy within reasonable limits. Given that information performs a tactical and even political function rather than a substantive role within the policy making process the importance attached to speed is not perhaps surprising. Practitioners suggested that the rapid indication of general trends is of more value than rigorous and lengthy studies. However, the potential of computers to increase the speed with which data could be processed was generally not regarded as significant. As a result these findings question firstly, the assumption that policy makers regard high quality information as a priority and secondly, that computer based data is more accurate than material from other sources.

Accessibility and computer based data

Systems rationalist interpretations suggest that computerisation improves accessibility to information as such material is not restricted to a specific location or certain individuals. The findings of particularly the Hertfordshire case study provide some evidence to support the idea that the introduction of computers improves the availability of information but there were a number of important qualifications with respect to accessibility. The first issue concerns the assumption that policy makers possess the necessary skills and inclination to retrieve and manipulate information from computer based systems. In purely practical terms automation can only improve accessibility if practitioners have the knowledge to exploit these resources. The findings of the case studies demonstrate that policy makers in Hertfordshire and more particularly Glasgow rely heavily on the staff with technical expertise to produce the

information they require. As a result access to computer based data may be in practice as restricted as information stored by other means.

The second consideration relates to the more general assumption that policy makers wish to increase access to information resources. The studies undertaken by the Irvine Group indicate staff attach considerable importance to being able to control the availability of the material collected (Danziger et al. 1982; Dutton et al. 1980). This reaction is understandable given the tactical and even political role performed by information. In these circumstances an individual or an organisation is likely to attempt to ensure opponents of a particular decision are not provided with any unnecessary assistance while policy makers will also be anxious to avoid the disclosure of information which might cause embarrassment. This argument is exemplified by evidence from the empirical investigations. The Glasgow case study drew attention to the Development Control Section's sensitivity over access to its records of current planning applications (see p.215), while members of the Transport Coordination Unit in Hertfordshire appeared reluctant to share their information resources (see p.135). Interdepartmental initiatives such as the development of geographic information systems also raise issues of ownership and control. The analyses therefore question whether in practice computerisation increases accessibility to information and also the extent to which this is a priority for policy makers.

6.35 Summary

The findings of the case studies in common with the work of the Irvine Group suggest information performs a background, tactical and even political role in the policy making process. As a result the evaluation supports hypothesis 2 which questions the applicability of the assumptions

underlying the systems rationalist perspective to policy making in planning authorities. These findings have important implications for the utilisation of information as system designers generally assume information is employed to perform a substantive function. The frequent use of information as an aid to the rationalisation and legitimation of a particular policy suggests the need to develop systems which are flexible, simple to operate and can generate the information required by practitioners at great speed. Information must also be made available to policy makers in a succinct form such as summaries or graphical representations of key issues. It is likely given the nature of the policy making process that information systems which fail to meet these criteria will not be used as much as the designers anticipate.

6.4 EVALUATION OF THE FACTORS INFLUENCING THE UTILISATION OF GEOGRAPHICAL INFORMATION

6.41 Introduction

This section examines the detailed factors influencing the extent to which individual policy makers use geographical information. The evaluation particularly concentrates on the issues associated with the utilisation of the growing number of spatial data sets held in computer based systems. Computerisation entails substantial investment therefore factors which inhibit staff usage will in turn lead to a significant waste of resources.

The research focuses on the use of geographical information with respect to strategic decision making rather than activities of a more operational nature. This raises important issues as policy makers have considerable discretion as to whether they use the available data, with this lack of

compulsion highlighting the tensions which exist in relation to the utilisation of computerised information. The findings are based on the responses of professional and managerial staff involved in technical and non-technical activities rather than clerical and non-professional staff who generally utilise systems of a more operational nature.

The Chorley Report explored the general societal factors affecting the development of geographic information systems (Department of the Environment 1987). The Report suggests that organisational factors such as a lack of user awareness and problems associated with securing agreement on standard practices for the provision of information are the main constraints on the introduction of such systems. The Chorley Committee concluded that central government agencies could make an important contribution to the creation of a favourable external environment. Particular attention was drawn to the role of central government as a major data supplier as well as its responsibility for promoting information technology and raising general awareness through the provision of training courses and funding for research. However, conditions external to organisations can only have an indirect effect on use therefore the research focuses on internal organisational factors which are more closely associated with the everyday work experience of individuals.

The systems rationalist perspective assumes that the mere presence of a technically operational system is sufficient justification for its use. This conceptualisation has been rejected by the research with the formal features of a planning authority such as its statutory respnsibilities considered to be of less significance than the social and political processes present in the organisation. Given that the development and utilisation of computer based data takes place in the same environment, it

is envisaged that with the addition of the manner in which the computer package is organised both processes are affected by the same three groups of organisational factors. As a result hypothesis 3 states:

> The utilisation of geographical information is only partly related to the formal functions of the planning authority, more significant are the impacts of the three sets of organisational factors cited in hypothesis 1 and the organisation of the computer package (see p. 81).

With these considerations in mind this evaluation will explore the findings of the empirical investigations. The extent to which the use of information varies between contexts and individuals will be examined. Particular attention will focus on identifying the factors influencing the utilisation of geographical information and an assessment of the appropriateness of the four-fold division of organisational factors outlined in hypothesis 3. The resulting theoretical framework will be compared with the findings of the studies conducted by the Irvine Group in the United States.

6.42 The utilisation of geographical information in the case study authorities

The analysis of the empirical investigations in common with the results of Danziger and Kraemer's (1986) study of end user computing indicate that overall the majority of professional staff are indirect or passive users of automated data. The findings of the case studies demonstrate more specifically that there was a considerable variation in the utilisation of information by individuals even between members of staff undertaking similar tasks in the same authority. The results also suggest a disparity in the overall utilisation of information between the two authorities. Consideration was given to the extent to which the variation could be attributed to differences in the statutory responsibilities of county and

district planning departments. The analysis provides little support for this line of reasoning, suggesting in contrast that factors unique to each context influence the utilisation of information systems by policy makers.

The findings of the case studies indicate that the mere presence of a computer based system is insufficient to assure its use. It is therefore important to examine in more detail the personal and contextual factors which affect the utilisation of geographical information in planning authorities. Hypothesis 3 highlights the impact of four sets of organisational factors. These are the personalities and actions of individuals, the institutional and environmental setting, the degree of instability and the organisation of the computer package. The evaluation of the development process demonstrates that the characteristics of the computer package are largely dependent upon the first three. Subsequent comments will examine these groupings of factors separately, however, it is acknowledged that proposals to modify the computer package must take account of the organisational constraints.

6.43 Factors influencing the utilisation of geographical information in Hertfordshire County and Glasgow District Planning Departments

(i) People

(a) Individual characteristics

The findings of the research indicate a link between the characteristics of individual members of staff and their propensity to use information and/or computers. The analyses suggest utilisation is associated with individual personality traits rather than more easily definable features such as age, length of service, sex or qualifications. Some people appeared to be naturally inclined to undertake data analysis and also keen to explore the potential of computer based systems. There was also a

significant group in both authorities, although particularly in Glasgow, which questioned whether information could make a substantial contribution to their work. Such individuals were also highly sceptical as to the value of computers. Between these extremes the majority of staff were ready to make use of information where they perceived it to facilitate their work or career development. The findings indicate that in Hertfordshire planning officers were more likely to regard information and technology as a positive aid than in Glasgow. This disparity is not explained by significant variations in the numbers of staff attending training courses or the types of individuals present but was related to more subtle differences between the contexts which are discussed below.

(b) The relationship between users and technocrats

The passive and indirect use of automated data by policy makers makes their relationship with staff possessing technical expertise extremely important. The findings of the case studies demonstrate that the relationship has a significant influence on the design of information systems particularly the extent to which they match user requirements, the propensity of staff to request information and even basic knowledge of the type of facilities and data that are available. The differing underlying perspectives of the two groups lead to communications difficulties and as a result a frequent mismatch between the system or data the user thought they had requested and the product they receive. Such circumstances affect the chances of these resources being utilised as well as the longer term interest of users in this area.

The interaction between personalities is therefore important with users preferring to work with individuals they regard as friendly and supportive. Individual perceptions of colleagues will vary but overall

policy makers perceived the technical experts to be neither sympathetic nor appreciative of their needs, while the computer analysts point to the ambiguity of the specifications put forward by users. Hertfordshire have addressed this issue through the introduction of officers performing an intermediary role which has facilitated communication between staff and encouraged the use of information systems. The utilisation of the technical expertise available within the County by the Hertfordshire districts points to the value of computing specialists with at least some experience of the planning context.

(ii) The internal organisational context

(a) The existence of a departmental information management strategy

The Hertfordshire case study indicates the benefits associated with the formulation of an information management strategy which is well known and accepted by staff throughout the Department. The experience of Hertfordshire demonstrates the value of establishing broad principles such as the information priorities of the department and the role of these resources in the work of planning officers. Consideration must also be given to issues such as the acquisition by non-technical staff of the necessary expertise and confidence to analyse and interpret basic information or to retrieve and manipulate the data held in computers. The central concern is therefore the needs of users and equipping these individuals with the relevant skills. The findings suggest that for staff to utilise information systems it is necessary for a supportive data rich environment to be created in which individuals can develop confidence in their ability to handle technology and its products. The allocation of time for informal training conducted in the work place by sympathetic individuals is an important element in this process. Hertfordshire's formulation of a departmental strategy incorporating many of these aspects

contributed to the investigations finding fewer negative attitudes towards information and technology amongst staff in this environment than in Glasgow. However, the development and implementation of a framework for information management is largely dependent on the vision and leadership of senior staff.

(b) Organisational independence

The empirical investigations indicate that reliance on outside agencies can inhibit a planning authority's level of flexibility. The prospects of information systems fulfilling user needs can be affected by apparently minor variations in interpretation and relatively small differences in emphasis. As a result organisational independence reduces the chance of a planning department's priorities having to be substantially compromised. Reliance on outside agencies at a more detailed level tends to increase the timescale of projects and results in inconvenience. Both case study authorities benefited from the flexibility associated with the presence of in-house computing expertise. Hertfordshire has emphasised their independence from agencies both within and outside the County Council through a policy of favouring the development of micro computer based systems. Such an approach may not be appropriate or possible in all circumstances, but the case studies suggest serious consideration should be given to the organisations and individuals on which the information resources of a department are likely to become reliant.

(iii) Organisational stability

The findings of the case studies suggest stable conditions foster the utilisation of computer based information. Frequent modifications to existing system are likely to be necessary as a result of volatile internal and external circumstances. This is typified by the changes

associated with new legislation or amendments to existing procedures. Uncertainty concerning the role of a planning department within a local authority or alterations to the organisation's internal structure also have a negative impact as attention and resources are deflected away from the critical activity of maintaining and updating information systems. A high level of staff turnover or changes in key personnel are likely to have a particularly profound influence on the utilisation of automated data, as new working relationships have to be developed while at the same time considerable experience and knowledge may be lost. Instability can take many forms but the examples cited indicate the negative effects of such conditions.

(iv) The organisation of the computer package

(a) The decentralisation of computing resources and skills.

The case studies demonstrate the close link between the decentralisation of the computer package and the utilisation of automated data. The use of the term computer package is particularly appropriate as it is important skills and personnel are dispersed as well as equipment. Decentralisation in this context refers to the diffusion of skills and resources to users rather than the more frequent use of the term in connection with the presence of programmers from an authority's central computing section in client departments. The Hertfordshire case study shows that groups of users which possess and are given substantial responsibility for their own technology make considerable use of the facilities available. The capabilities of micro computers and associated software in conjunction with relatively easy access to expertise facilitated the subsequent development of these systems.

In the case of complex technology it may not be appropriate or possible to decentralise completely the computer package. However, the empirical investigations indicate that if information systems are to be utilised non-technical staff must be intimately involved with their development so that such systems reflect user needs. Decentralisation is closely linked to the second factor concerning the organisation of the computer package that of accessibility.

(b) Accessibility to the computer package

The evaluation of the role performed by information in the policy making process highlighted the importance of rapid and easy access to data sources. The time available for locating supporting evidence for a policy is often short as a result if the relevant information cannot be quickly accessed it is unlikely the data reserves of the authority will be fully utilised. It is therefore important consideration is given to the location of equipment and personnel possessing technical expertise. Easy access to information and technology is likely to increase user awareness of the resources available within the organisation. The findings of the case studies indicate that direct user access to computer equipment within a supportive environment increases the computing confidence of non-technical staff and consequently has a positive effect on the utilisation of information. It is often difficult for practitioners to predict the nature or format of the data they require due to the ever changing character of the planning environment. As a result it is most unlikely practitioners will utilise the information held within a department if the relevant data or the staff possessing technical skills are difficult to access.

The findings of the case studies demonstrate the impact of organisational factors on the utilisation of geographical information by practitioners. The results indicate there is no guarantee that staff will use a technically operational computer based system. The extent to which policy makers in Glasgow and Hertfordshire utilise information was found to be influenced by individual personality traits and the unique characteristics of the respective planning authorities. Given the discretion available to policy makers in the precise conduct of their work, there were examples in each department of individuals who at one extreme attached great importance to information and were keen to exploit the processing capabilities of the available technology as well as those who in contrast disregarded such resources. The majority of staff occupied a position between these extremes with their use of information influenced by the activities and personalities of colleagues, the organisational context, the level of environmental instability and the organisation of the computer package. It should be emphasised in relation to the computer package that it was the organisational arrangements of automated systems that were found to be important rather than the technical configuration of equipment. The analyses suggest that the characteristics of individual policy makers, the relationship particularly between technocrats and users but also staff in general and the existence of a departmental information management strategy were especially significant.

The findings of the evaluation support the argument underlying hypothesis 3 (see p. 81) that the utilisation of geographical information including spatial data held in computer based systems is influenced by four groups of organisational factors namely, (i) people, (ii) the organisational context, (iii) instability and (iv) the organisation of the computer package. The formal features of the respective planning authorities such

as their statutory responsibilities were not found to have a significant influence on the use of information by policy makers. The case studies suggest that utilisation in common with the development of automated systems discussed earlier in the chapter is embedded within the social and political processes of an organisation. Figure 6.4 illustrates the contrasting perspectives on the factors affecting the extent to which practitioners use information systems. Practice is shown to be far more complex than conceptualised by the systems rationalist approach with the utilisation of information in planning departments dependent upon the

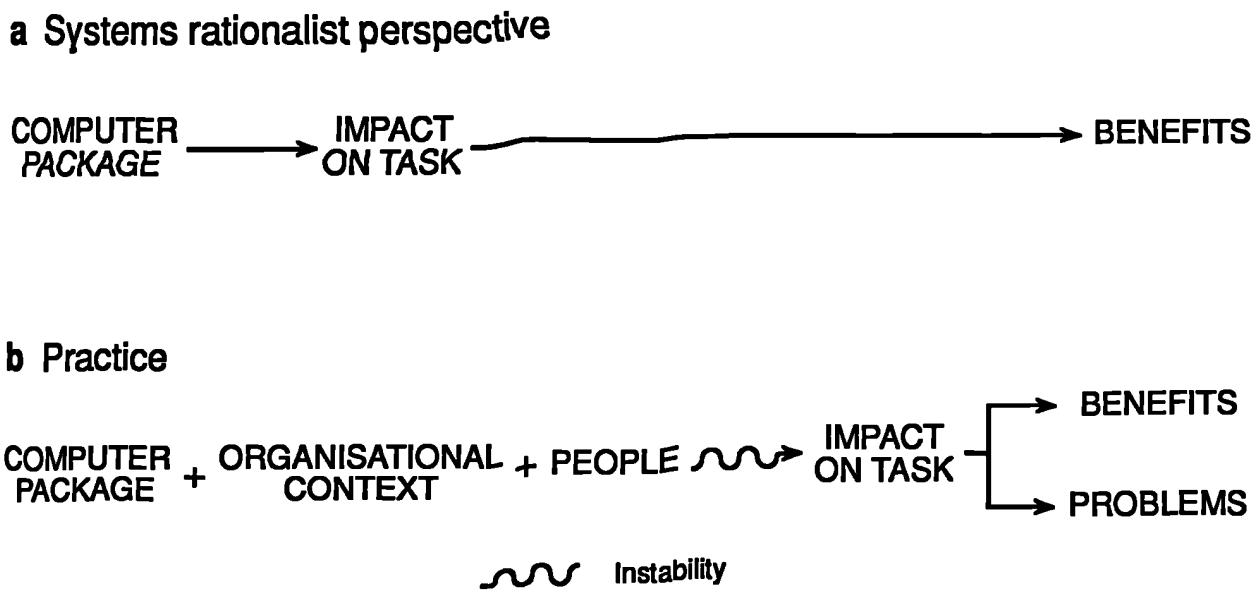

Figure 6.4: Factors influencing the utilisation of computer based information systems in organisations

interaction of individuals in a distinctive and ever changing environment. These factors influence in turn the development and organisation of the computer package which itself affects the use of information by policy makers. As a means of assessing the evaluation's wider applicability the next section will compare this explanatory framework with the results of

Danziger and Kraemer's (1986) study of end user computing in the United States.

6.44 Theoretical implications

Danziger and Kraemer (1986) explored the factors influencing the use of a range of computer applications by staff involved with a variety of local government services in the United States. These researchers investigated the extent to which successful end user computing was dependent upon the nature of the computer package, user characteristics and the organisational context. The findings suggest the characteristics of the computer package and individual personalities including the relationship between the technical experts and users are of most significance. Danziger and Kraemer defined the organisational context in terms of formal features such as the number of departments within an authority, the size of the population served and the professionalism of the staff employed. The emphasis on formal characteristics probably explains the apparent difference between the degree of importance the work based in the United States attaches to the impact of the organisational context compared to the findings of the Hertfordshire and Glasgow case studies.

Danziger and Kraemer's evaluation of the broad issues influencing the utilisation of information is complemented by a more detailed analysis. The general groupings of factors described above were sub-divided into their separate components, with an assessment made of the contribution of each of these individual factors. The findings suggest the use of information by practitioners is most significantly affected by the five factors listed below:

- the decentralisation of the computer package to users;
- well developed computing facilities which permit direct user access;

- user confidence in their own ability to handle computer based systems;
- the responsiveness of computer specialists to the needs of users;
- the routine use of computers and information systems by users.

There is a great deal of similarity between the first four of these factors and the issues highlighted by the Glasgow and Hertfordshire case studies under the headings of people and the organisation of the computer package. Danziger and Kraemer suggest the routine rather than selective use of information systems increases the prospects of successful end user computing. The inclusion of strategic and operational systems by the studies undertaken in the United States is probably responsible for the emphasis placed on this issue. Given the nature of strategic decision making in British planning authorities it would be difficult in many instances to establish standard work practices and therefore the routine use of automated systems by practitioners. The Glasgow and Hertfordshire case studies indicate the significance of three further factors. These are environmental stability, organisational independence and an information management strategy. However, given the detailed differences between the evaluations of the respective studies there is general agreement as to the profound impact of organisational factors on the use of information systems by practitioners in local government.

6.45 Summary

The evaluation of the Hertfordshire and Glasgow case studies suggests that the utilisation of geographical information including spatial data sets held in computer based systems is dependent upon the social and political processes present within a particular organisation. The analyses demonstrate the importance of, (i) people, (ii) the organisational context, (iii) environmental instability and (iv) the organisation of the computer

package to the use of information by practitioners. Evidence also indicates the significant influence of factors unique to a particular context rather than the formal features of an organisation. As a result these findings support the argument underlying hypothesis 3 (see p. 81). The Irvine Group studies conducted in the United States endorse the general principles highlighted by the case studies, although there are some detailed differences in emphasis. The results of this evaluation have important implications for planning practitioners attempting to maximise the use of information and avoid the under-utilisation of expensive resources. The case studies indicate that if automated data is to be utilised organisational factors must be taken into consideration during the implementation and subsequent modifications to computer based information systems.

6.5 IMPLICATIONS FOR PRACTICE

6.51 Introduction

The evaluation of the research findings has concentrated on the analytical and theoretical issues raised by the empirical investigations. This section explores the important implications the results of the work have for the design, implementation and organisation of information systems in planning practice. Studies based on a systems rationalist perspective focus on the technical aspects of developing computer based systems with the potential organisational benefits regarded as sufficient reason to expect practitioners to utilise such facilities. The process of implementation therefore focuses on fulfilling technical specifications, while little detailed consideration is given to the human and institutional issues associated with the introduction of technology. As a result studies of this type generally conceptualise implementation as a

relatively straightforward activity with the problems encountered resolved by enhanced funding, more sophisticated equipment, improved system design or better management. However, the findings of the case studies demonstrate that the development and utilisation of information systems has human, organisational and technical aspects. With these considerations in mind this section suggests information systems would be enhanced by the adoption of a user centred strategy. The first part of the discussion consolidates the practical issues raised by the preceding evaluations, while on the basis of these findings the second examines the characteristics and structure of a user centred strategy, including consideration of the roles of different staff groupings.

6.52 The implications of the case study findings for planning practice

The research has explored three areas which were considered to raise significant issues concerning the effective utilisation of geographical information in planning authorities. These are: factors affecting the development of a computer package; the role of information in the formulation of planning policies; and detailed factors influencing the use of geographical information. The preceding evaluations have referred at least indirectly to many of the practical implications of the research. It is not therefore regarded as necessary to return to the original analyses, rather to highlight the results of the evaluations which are of relevance to the current discussion. Each facet of the research will be examined in turn.

(a) Factors affecting the development of the computer package

(i) Individual planning departments are characterised by unstable conditions and a unique combination of human and organisational factors. Such factors can inhibit the effective implementation of

information systems and as a result it is vital the particular social and political characteristics of an authority as well as the available resources are taken into account during the development of computer based systems.

(ii) The development of a computer package is influenced by a range of factors many of which are outside the control of a planning department. Such issues restrict the scope of action available to a planning authority and therefore in certain circumstances make it difficult for user requirements to be fully satisfied. This may in turn reduce the prospects of practitioners using the available technology

(b) <u>The role of geographical information in the policy making process of local authority planning departments</u>

(i) Information including data held in computers is not generally employed by practitioners to perform a substantive or decisive function within the policy making process. This contrasts with the widely accepted assumption of system designers. As a consequence it is possible information systems have been developed and organised in a manner which fails to meet the requirements of users thereby affecting utilisation.

(ii) Information performs a background, tactical and even political role in the policy making process. As a result policy makers require timely accessible, flexible, relevant and reasonably accurate information. It is also important that data is made available to practitioners in a usable form such as summaries or graphical illustrations of key issues. Alternatively facilities must be provided which can quickly and easily achieve this end.

(iii) Policy makers exercise considerable discretion over the manner in which they undertake their work therefore utilisation is dependent upon the extent to which both the content and the means of accessing the information reserves of a department meet user needs.

(c) Factors directly influencing the utilisation of geographical information

(i) The use of information systems by practitioners is affected by human and organisational as well as technical issues.

(ii) The effective utilisation of information requires the commitment and involvement of staff throughout an organisation and as a consequence is encouraged by the presence of:

- a departmental information management strategy which examines the role and priority of information and considers the organisational arrangements, facilities and skills necessary to meet these objectives as well as the individuals and agencies an which information provision will depend;
- a training and staff development programme which incorporates the development of technical skills and confidence by practitioners and also seeks to encourage mutual understanding between users and technocrats;
- organisational stability in terms of personnel and the administrative structure of a department;
- a decentralised and accessible computer package.

With these considerations in mind it is proposed that the adoption of a user centred strategy would make a significant contribution to the utilisation of information within planning authorities.

6.53 A user centred strategy

The findings of the case studies provide the basis for the development of a framework which should improve the prospects of practitioners utilising the information held in computer based systems. It is appropriate to concentrate on automated systems as planning authorities are increasingly using technology to store and manipulate information while at the same time particular problems are associated with their effective implementation and utilisation. It is proposed that the adoption of a user centred strategy would facilitate the process of system development. The critical element of this strategy is the emphasis placed on the involvement of staff throughout the organisation and more particularly giving users responsibility for the decisions associated with the development of information systems. Users are the group most directly affected by the development of computer based systems yet they have often been excluded from the decision making processes which determine the nature and organisation of the resources they are expected to utilise. User participation in system design frequently takes the form of membership of a formal working party by a member of middle management or in the case of a particular project consultation of the individuals who will have direct contact with the technology by a computer analyst. The aim is for the priorities of users to become the focus of the process.

Traditional approaches tend to separate design from use, with computer analysts responsible for the development of the systems which are subsequently utilised either directly or indirectly by practitioners. As a result the focus of the design phase is placed on the technical aspects of system development, while consideration of the organisational issues associated with effective utilisation is a peripheral part of this activity. The user centred strategy aims to avoid this division and also

provide a means of ensuring the social and political as well as technical dimensions of system development are considered at an early stage.

It was demonstrated in Chapter 2 that the majority of analyses of computer use in organisations examine a limited range of variables with the focus placed on technical issues and the formal features of the operational environment. This perspective is reflected in the majority of strategies proposed to assist the process of system development. However, based on the assumption that the effective implementation and utilisation of automated systems requires consideration of organisational as well as technical factors (Bjørn-Andersen et al. 1986; Robey 1987) a number of studies conducted in local government in the United States (Danziger and Kraemer 1986; Kling 1977; Rubin 1986) and in the private sector (Hedberg 1980; Mumford 1983; Mumford and Pettigrew 1975; Scott 1989; Srinivasan and Davis 1987) have suggested the need for strategies based on user participation in system design. This approach is embodied within the user centred strategy but in addition the effective utilisation of automated systems is regarded as part of a wider debate about the general use of information. As a result it is argued that senior management must provide a framework which identifies the information priorities of the department and the role of information in the work of practitioners as well as creating the conditions necessary for such activities to take place. It is unlikely effective user participation in the design of computer based systems will take place without the vision of senior staff. This vital element of leadership frequently appears to be overlooked.

The discussion will focus on the contribution of senior management, users, technical experts and intermediaries in the realisation of a user centred

strategy. This will be followed by an overview of the structure of the approach.

The contribution of staff at all levels of the organisation

Senior management

The findings of the case studies demonstrate that the effective utilisation of the data reserves of a planning authority is significantly influenced by the presence of an overall information management strategy. The central objective of this strategy is to identify the information priorities of the department and establish the role of information in the work of planning practitioners. It is vital that senior management examine these fundamental issues, with the results of their deliberations well known and accepted by staff throughout the organisations. On this basis and a realistic assessment of the resources at the disposal of the authority in terms of personnel, skills and funding, informed decisions can be taken as to the most appropriate means of storing and processing the information required by the department. Consideration of technology therefore follows from the identification of the information priorities of the organisation. A technically elegant system is of little value if it holds information which nobody in practice wants.

It is not envisaged that an information management strategy needs to be lengthy or highly detailed, rather it should represent a robust framework which indicates the role, objectives and methods for information provision within an organisation. Individual planning authorities must decide whether it is appropriate to make the strategy public and ratified by elected members or in contrast have the status of an internal working paper. The latter has been favoured in instances where the local authority's central computing section is keen to centralise the majority of

information systems under its control. Irrespective of this issue it is vital practitioners throughout the organisation are aware of the link between information and planning practice.

Given computer based systems are considered of value, senior management need to examine the most appropriate method of ensuring the effective implementation and utilisation of such systems and create the necessary conditions for the realisation of this approach. The findings of the research suggest a user centred strategy should be adopted and to this end it is important attention is given to developing a training programme, establishing the necessary administrative arrangements, ensuring where possible organisational stability and independence and providing the facilities for a decentralised and accessible computer package. Senior management are therefore responsible for the provision of the framework which enables the realisation of a user centred strategy, with a crucial although less tangible factor the creation of a friendly and supportive environment.

The formulation of a training and staff development programme is particularly important with respect to ensuring the effective utilisation of information systems and enabling users to make informed decisions about their information and technological needs. If such a programme is to yield beneficial results senior management must allocate sufficient staff time to enable their involvement and also provide the necessary funding. The programme itself should combine the development of the analytical and computing skills of non-technical staff with team building exercises which aim to increase mutual understanding and respect between users and the technical experts. Each of these aspects will be examined in more detail.

Skills training is generally conceptualised in terms of formal courses. However, informal learning in the workplace is often more valuable than attendance at official courses as the former relates the available technology directly to the tasks being undertaken by the individual concerned. It also avoids the negative effect of staff finding themselves on courses which assume they have more knowledge than they actually possess. It is important that the individuals responsible for training are supportive and have a good understanding of the activities of users. As skills become more dispersed practitioners are in a position to learn from each other which tends to produce the best results. The development of staff confidence in their computing skills is an important element in ensuring the utilisation of information resources, while it also provides the basis for informed user participation in the decision making process. It is not suggested that users should acquire the detailed technical skills of computer analysts, rather they should possess sufficient knowledge to appreciate the technical aspects of system development.

Communications difficulties between technical and non-technical staff based on differing perspectives and underlying priorities were found by the research to be one of the major barriers inhibiting the utilisation of information and computing resources. There is often very little common ground between these groups of individuals particularly where they are in physically separate parts of a building. As a result there is a tendency for derogatory stereotypes to develop where users perceive computer analysts to be unsympathetic and unapproachable, while the technical experts regard users as vague and unappreciative of the precision required to design a computer based system or answer an inquiry. It is extremely important attention is paid to increasing mutual understanding between these groups.

Staff training is a critical, although not the only condition senior management must provide as a basis for the development of a user centred strategy. At a practical level it is necessary administrative arrangements are devised to enable staff throughout the organisation to be involved in the development of information systems. It is also important that as far as possible senior staff ensure organisational stability. The periodic reorganisation of tasks and personnel or failure to recognise the vital importance of key individuals can seriously undermine the effective utilisation of information systems. Forces external to planning authorities which influence the development of computer based systems and the information priorities of planning practitioners are obviously outside the control of senior management. However, by developing a strategy which avoids the separation of design from use it should be possible to reduce the disruption caused by the dynamic nature of both the planning environment and the external organisational context.

The findings of the case studies demonstrate that at a more detailed level organisational independence as well as the decentralisation and accessibility of the computer package facilitates the development and utilisation of information systems. Senior management can contribute to minimising departmental reliance on outside agencies and also must take responsibility for the dispersal of important elements of the computer package such as the computing specialists. However, having established the conditions for user participation, detailed choices concerning the organisation of computer based systems and also the agencies and individuals on which the operation of such systems will depend increasingly becomes the responsibility of users.

Users

The user centred strategy is based on the assumption that the utilisation of information will be enhanced if those most affected by computer based systems are fully involved in the decision making processes associated with their development. The participatory strategy proposed alters the role of users from clients dependent on technical staff to a position where these individuals take responsibility for ensuring automated systems supply the information they require in terms of format, content and manner of availability. General awareness would be increased through training therefore providing users with the necessary knowledge and confidence to take informed decisions.

Given the importance of organisational factors to the utilisation of information systems it is vital that the staff with the fullest appreciation of their context and needs are given a central role. Users are most aware of the existing organisational limitations and the strengths and weaknesses of their context in terms of resources and personnel. The direct involvement of non-technical staff therefore results in the design and implementation phases encompassing consideration of the organisational as well as the technical aspects associated with system development. Issues such as the likely impact of technology on the existing power structure, work practices and system of rewards would be addressed alongside the technical specification rather than once there had been substantial investment in resources. As a result the relationship between the organisational benefits of a computer based system and an individual's workload, career development and remuneration would be considered at an early stage.

The involvement of individuals at all levels of the organisation also has the benefit of making staff better informed. This should reduce rumour and suspicion which leads individuals to feel threatened. As a consequence user participation should diffuse the anxieties which lead to a lack of staff cooperation and in some circumstances an active effort to impede system development. It also provides staff with an appreciation of the reasons underlying the problems encountered such as delays in the implementation of a new system and through experience help to ensure users have realistic expectations of technology in both the short and longer terms.

Technical experts

The computer specialists perform an important role in ensuring both the direct and indirect utilisation of computer based data by practitioners. In practice the relationship between these groups has been beset by difficulties (Benson 1983; Bostrom and Heinen 1977; Danziger and Kraemer 1986). The user centred strategy proposes to overcome these problems through the decentralisation of computing personnel. Generally the technical experts have been located in specialist computing sections. Danziger (1979) argues that these groups have seen themselves as 'skill bureaucracies' rather than 'service organisations'. The decentralisation of computing personnel aims to place the emphasis of their work on user satisfaction rather than technical sophistication. It is envisaged that the computer specialists should become part of a team of practitioners responsible for a particular aspect of an organisation's work rather than members of a technical elite. Overall the value of staff possessing purely technical skills is diminishing to be replaced by individuals who have an appreciation of the technical and organisational nature of the process of system development. A survey conducted by Willis (1990)

demonstrates the importance organisations developing GIS attach to their own professionals who have acquired experience of GIS rather than individuals with only technical qualifications. The role of computer specialists should be as facilitators, assisting practitioners to realise their objectives through an understanding of user needs (Greenberger et al. 1976; Keen and Scott-Morton 1978; Rockart and Flannery 1983).

Given the proposed change of emphasis to the work of computer specialists sensitive management and the provision of training are crucial. Traditionally technical experts have been gatekeepers of the information reserves of an organisation as a result of their knowledge of how to develop computer based systems and possession of the skills to access that material. It is important that these individuals are assured that the dispersal of basic computing skills facilitated by the development of user friendly software, is not a threat to their position or status. Expertise with respect to complex technical issues will remain the exclusive domain of computing specialists while increasing general awareness offers the prospects of the demands of users being based on a more realistic assessment of the technological implications. It is also important that rather than simply developing specialist skills, training provides an opportunity for users and the technical experts to gain an appreciation of each others work as well as addressing issues associated with working in teams. The simple act of social interaction provided by these courses is likely to greatly assist the process of more effective working.

Intermediaries

The appointment of at least one intermediary is regarded as a valuable preliminary step towards the realisation of a user centred strategy. These individuals must be able to communicate with technical and non-technical

staff and have their respect and trust. The intermediary has responsibility for enhancing mutual understanding between users and the technical experts. They therefore act as a mechanism through which users are provided with the facilities to learn about technology and increase their computing confidence, while ensuring the technical experts appreciate the needs of practitioners and give full consideration to the organisational implications of developing information systems. The greater general awareness of the technical and organisational aspects of system development amongst staff provides a valuable basis on which to build a user centred strategy. The intermediaries would continue to have a role once the strategy had been introduced but as the coordinator rather than instigator of activities.

The structure of the user centred strategy

It is important that the continuous nature of the process of developing information systems and ensuring their effective utilisation is emphasised. Changing circumstances alter priorities and require even well established systems to be amended. As a result the development of information systems is conceptualised as a cyclical process of objective setting, design, implementation, integration and use followed by modifications to existing goals, redesign and so on. The stress on user participation aims to avoid the separation of design from use with consideration at all stages of the process given to organisational as well as technical issues.

Mumford (1983) has identified four broad phases within the cyclical process of system development. These are:

- diagnosis of needs and goal setting;
- developing design alternatives;

- adaption from old to new system; and
- integration of the new system.

The key stage is the diagnosis of needs and goal setting with the time expended on a thorough evaluation of priorities and the potential implications of system development likely to facilitate subsequent phases of the process. Pressure to produce results frequently leads staff to embark on the design of an information system before the initial problem has been clearly identified. As a consequence either the whole process is prolonged as time is devoted to redesigning the system so it accords as far as possible with user needs given the existing investment or the resulting product is under-utilised. It is important during the initial diagnosis phase that either the intermediary or group with overall responsibility for the development of a particular system obtain the views of staff throughout the organisation. All aspects of system development must be considered at this stage to reduce the chance of unrealistic and potentially costly assumptions being made. It is important practitioners examine carefully why there is a need to change existing methods of working and given a decision to introduce technology, identify the key objectives and tasks which will be affected. With these goals in mind consideration must be given to the likely implications for individual practitioners in terms of the impact on the conduct of their work, personal career development needs and the type of user support required. The level of environmental volatility must also be taken into account so judgements can be made about the degree of flexibility required (Mumford 1983).

The diagnosis phase performs a crucial function in establishing the framework for system development. The identification of objectives, impact of new technology on the existing social system and the level of

skills and support required by users provides the basis for the design and implementation of a computer based system. Scope should also be provided for the modification of the initial goals given changing circumstances.

6.54 Summary

The evaluations of the case study findings indicate that the development and utilisation of information systems has human, organisational and technical aspects. With these considerations in mind the proposed strategy provides a framework which enables the social and political as well as technical nature of computer based systems to be incorporated in the development process. The user centred strategy emphasises the importance of involving staff throughout the organisation in the decision making process and more particularly giving users responsibility for ensuring the systems developed meet their needs. It would be unrealistic to suggest that a user centred strategy could be immediately implemented in an organisation. It is therefore envisaged that the appointment of at least one intermediary would perform an important preliminary step, to be followed by the gradual decentralisation of responsibility for the development and maintenance of information systems to users. However, the effective utilisation of automated systems is regarded as part of a wider debate about the general use of information. It is argued that without an information management strategy which identifies the priorities and role of information within an organisation and from this basis assesses the most appropriate methods for achieving these objectives, the prospects of effectively utilising information are low. The establishment of this basic framework and the creation of the necessary conditions for such activities to take place is dependent upon the leadership and vision of senior management.

6.6 CONCLUSION AND SUGGESTIONS FOR FURTHER RESEARCH

The evaluations of the case study findings indicate the need for both those studying computer usage in organisations and practitioners to reassess the assumptions which have underpinned their work. The research has explored a range of theoretical perspectives on the use of information in organisations. The results of these investigations question the value of the systems rationalist approach adopted by the existing empirical studies based in British planning authorities. The utilisation of geographical information and more particularly spatial data stored in computer based systems has been shown to be embedded within the social and political processes of the environment in which it is located. As a result the analyses indicate the use of geographical information by practitioners is significantly influenced by organisational factors.

Three areas were considered to require detailed investigation with respect to the use of information in planning authorities. These were, the process of developing computer based systems, the role of information in policy making and the factors directly affecting the utilisation of geographical information. The hypotheses linked to each of these fields of study reflect the conceptual framework's adoption of a segmented institutionalist perspective and therefore concern about the impact of organisational factors. The findings of the research support the assumptions underlying the conceptual framework. The development of computer based systems was found to be significantly influenced by (i) the organisational context, (ii) people and (iii) change and instability, with these factors in conjunction with the organisation of the computer package having a marked effect on the utilisation of information by practitioners. The analyses therefore indicate that information systems are as much social and political in nature as technical. The results also

suggest information performs a background, tactical and even political function in the policy making process of local authority planning departments. This indicates that the role of information in policy making and therefore the demands of practitioners are more complicated than generally acknowledged in the existing studies in the field. The findings of the research have profound implications for the design, implementation and organisation of information systems. Given the significance of human, institutional and organisational considerations to the effective utilisation of geographical information a user centred strategy is proposed which provides a framework which enables the social and political as well as technical nature of computer based systems to be incorporated in the development process.

Investigations undertaken in the private sector and more particularly a series of studies conducted in local government in the United States support the key findings of the research (Benson 1983; Culnan 1983; Danziger et al. 1982; Danziger and Kraemer 1986; Hirschheim 1985; Rockart and Flannery 1984). However, it is not suggested that the experiences of practitioners in Hertfordshire and Glasgow are necessarily representative of all planning agencies or the complete range of computer applications. Given the limitations of the existing studies it is inevitable that the research raises a number of issues which require further investigation.

There is a need for studies based in poorly developed computing contexts and small district authorities to complement the work derived from Hertfordshire and Glasgow. This would provide a basis for assessing the explanatory power and wider applicability of the conceptual framework. Investigations are also needed which explore the detailed components of the theoretical framework. The contribution and characteristics of the

key promoter, senior management, technical experts and users to the effective utilisation of information require detailed analysis. Consideration of the critical features of the organisational context and the impact of instability in both the internal and external environment would be valuable. In this respect there is a need for longitudinal studies which directly examine the changing influence of different organisational factors over time, therefore removing reliance on historical documentation and the memories of long serving officers. It is also crucial that studies investigate whether the background, tactical and political roles information was found to perform in the case study authorities is typical, as this has profound implications for system design as well as planning practice.

The research has focused on computer applications concerned with strategic decision making as a result there is a need to examine the explanatory power of the conceptual framework in the context of operational systems. This would involve consideration of the needs of staff with little discretion over whether they use computer based systems, raising issues concerning job satisfaction and the work environment. In relation to storing and processing geographical information, research is required into the organisational impact of GIS as the introduction of such systems is likely to be accompanied by an extension of corporate activities and therefore have significant organisational implications for the development of administrative practices in local government.

There is finally a need for studies which examine the applicability of the case study findings to contexts outside Britain. Preliminary work has been undertaken which compares British experiences with those of planning authorities in developing countries but much more detailed investigations

are required (Masser 1990; Masser and Campbell 1989). It would also be useful to explore the value of the conceptual framework in well developed computing environments such as planning authorities in the United States.

The findings of the research have significant implications for the development of computer based systems and the effective utilisation of geographical information in planning practice. The case studies based in Glasgow and Hertfordshire indicate the importance of organisational as well as technical considerations but there is a need for further investigations which examine the detailed elements of the conceptual framework and consider the more general applicability of the findings. This work would help to refine the analytical framework developed by the research and provide a firmer basis from which guidance for practitioners could be produced.

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APPENDIX A

THE USE OF SPATIAL DATA IN LOCAL AUTHORITY PLANNING AGENCIES

QUESTIONNAIRE

N.B. Answers should be given in the light of the officer's general local government experience rather than with specific reference to their present post.

PART I - BACKGROUND

1. How long have you been in your present job?

0- 4 years	☐
5- 9 years	☐
10-14 years	☐
15-19 years	☐
20-24 years	☐
25+ years	☐

2. How long have you worked for Glasgow District Council?

0- 4 years	☐
5- 9 years	☐
10-14 years	☐
15-19 years	☐
20-24 years	☐
25+ years	☐

3. What are the principle subjects of your further education qualifications? (Specify)

4. Have you any keyboard skills?

Yes ☐
No ☐

5.(a) Do you have your own home computer?

Yes ☐
No ☐ (Go to Q.6)

(b) What do you use it for?

Word processing ☐
Spreadsheet work ☐
Data base work ☐
Games ☐
Not used ☐
Other (specify) ....

6.(a) Do you read computing magazines?

Yes ☐
No ☐ (Go to Q.7)

(b) How often?

Weekly or more ☐
About monthly ☐
A few times a year ☐
Once a year or less ☐

7.(a) Have you bought a magazine about computing in the last year?

Yes ☐

No ☐ (Go to Q.8)

(b) How many?

12+ ☐

11-6 ☐

5-1 ☐

8.(a) Have you ever attended a course on information management or computer related issues?

Yes ☐

No ☐ (Go to Q.9)

(b) What courses have you attended on information management or computer related issues in the last 2 years?

	Subject	Length	Organised by?
A			
B			
C			
D			

9. Which of the following age categories is most appropriate?
(See Card A)

(a)	<20 years	☐
(b)	21-30 years	☐
(c)	31-40 years	☐
(d)	41-50 years	☐
(e)	51-60 years	☐
(f)	60+ years	☐

PART II - DEFINITION OF DATA

1. For the purposes of your work what do you regard as data?

OPERATIONAL DEFINITION:
For the purposes of the research I am concentrating on the use of spatial data in local authority planning departments. This refers to phenomena which can be referenced in space be that in terms of a point, line or polygon and includes data found on paper maps such as the location of buildings, roads and other public utilities and both quantitative and qualitative data related to particular sites such as rateable values, ownership and land use. Socio-economic data such as the census of population is also included under this definition.

PART III - DATA QUALITY AND QUANTITY

1. To what extent do you agree/disagree with the following statements? (See Card B)

0 - Don't know
1 - Strongly disagree
2 - Disagree
3 - Neither agree nor disagree
4 - Agree
5 - Strongly agree

	. 0 .	1 .	2 .	3 .	4 .	5 .
(a) In general planners receive too much data.	.	.	.	.	.	.
(b) Generally those with experience of local government planning matters understand the computer based data generated by the Department.	.	.	.	.	.	.
(c) Generally elected members understand the computer based data generated by the Department.	.	.	.	.	.	.
(d) Generally those with no experience of local government planning matters understand the computer based data produced.	.	.	.	.	.	.
(e) Many people find computer based data incomprehensible	.	.	.	.	.	.

2. To what extent do you agree/disagree with the following statements concerning the quality of computerised data produced within the Planning Department? (See Card B)

0 - Don't know
1 - Strongly disagree
2 - Disagree
3 - Neither agree nor disagree
4 - Agree
5 - Strongly agree

	0	1	2	3	4	5
Computer based data is:						
(a) accurate.						
(b) clear.						
(c) useful.						
(d) complete.						
(e) believable.						
(f) reliable.						
(g) realistic.						
(h) unbiased.						

PART IV - USE OF DATA

1. To what extent do you agree/disagree with the following statements concerning the use of data? (See Card B)

0 - Don't know
1 - Strongly disagree
2 - Disagree
3 - Neither agree nor disagree
4 - Agree
5 - Strongly agree

	0	1	2	3	4	5
(a) Planning problems are seldom clearly defined.						
(b) Generally data answers important questions.						

0 - Don't know
1 - Strongly disagree
2 - Disagree
3 - Neither agree nor disagree
4 - Agree
5 - Strongly agree

	0	1	2	3	4	5
(c) Data stimulates discussion.	.	.	.	.	.	.
(d) Data leads to clearer perceptions of planning problems.	.	.	.	.	.	.
(e) Data leads to a clearer understanding of the characteristics of the local environment.	.	.	.	.	.	.
(f) Data provides surprising results.	.	.	.	.	.	.
(g) Data accuracy is generally hotly contested.	.	.	.	.	.	.
(h) Overall data helps to clarify differences of opinion over planning issues.	.	.	.	.	.	.
(i) Most people accept the data produced by the Department as a realistic representation of trends in the environment.	.	.	.	.	.	.
(j) Generally data is ignored by:						
(i) professional planners;	.	.	.	.	.	.
(ii) elected members.	.	.	.	.	.	.
(k) Generally data leads to agreement about the most appropriate course of action.	.	.	.	.	.	.

0 - Don't know
1 - Strongly disagree
2 - Disagree
3 - Neither agree nor disagree
4 - Agree
5 - Strongly agree

	0	1	2	3	4	5
(1) Personal observation and experience is more important than data in:						
(i) determining solutions to planning problems;	.	.	.	.	.	.
(ii) identifying planning problems.	.	.	.	.	.	.
2.(a) Generally data persuades people to change their position on important issues.	.	.	.	.	.	.
(b) Data influences the process of decision making on planning matters.	.	.	.	.	.	.
(c) Data is used to support the arguments of the Department in authority wide discussions.	.	.	.	.	.	.
(d) The use of computer based data makes it difficult for those outside the Department to dispute the findings of analyses.	.	.	.	.	.	.
(e) The development of computerised systems has increased the use of data by staff within the Department.	.	.	.	.	.	.
(f) The provision of computer based data means people are less likely to accept the findings of manual techniques.	.	.	.	.	.	.

0 - Don't know
1 - Strongly disagree
2 - Disagree
3 - Neither agree nor disagree
4 - Agree
5 - Strongly agree

	0	1	2	3	4	5
3.(a) Data is used to legitimate existing decisions.	.	.	.	.	.	.
(b) Data supports planning decisions that have already been taken.	.	.	.	.	.	.
(c) Data challenges preconceived notions.	.	.	.	.	.	.
(d) Generally data substantiates the claims of;						
(i) senior planning staff;	.	.	.	.	.	.
(ii) elected members.	.	.	.	.	.	.
4.(a) Overall data lowers the credibility of emotional appeals.	.	.	.	.	.	.
(b) Data strongly influences the development of policy	.	.	.	.	.	.
(c) Data increases uncertainty over the appropriate policies to follow.	.	.	.	.	.	.
5.(a) Data is used to monitor policy.	.	.	.	.	.	.
(b) Data is used to evaluate the success or otherwise of planning policies.	.	.	.	.	.	.

PART V - PRIORITIES FOR INFORMATION SYSTEMS

1. Select the FIVE most important issues related to the development of computer based information systems. (See Card C)
(Tick)

(a) Accuracy of data.	☐
(b) Timely production of data.	☐
(c) User involvement in system development.	☐
(d) System reliability.	☐
(e) Extension of available applications.	☐
(f) Organisation of the Information Group.	☐
(g) Training of non-technical staff in computers.	☐
(h) Reduction of data acquisition costs.	☐
(i) Financing development of computer based systems.	☐
(j) Data acquisition.	☐
(k) Increasing staff access to data.	☐
(l) Ensuring confidentiality.	☐

PART VI - THE ENVIRONMENT

1. To what extent do you agree/disagree with the following statements? (See Card B)

0 - Don't know
1 - Strongly disagree
2 - Disagree
3 - Neither agree nor disagree
4 - Agree
5 - Strongly agree

	. 0 .	1 .	2 .	3 .	4 .	5 .
(a) In general elected members give a clear lead on planning policies.	.	.	.	.	.	.

0 - Don't know
1 - Strongly disagree
2 - Disagree
3 - Neither agree nor disagree
4 - Agree
5 - Strongly agree

	0	1	2	3	4	5
1.(b) Senior staff must be committed for the expansion of computer based systems in planning departments.	.	.	.	.	.	.
(c) Elected members must be committed for the expansion of computer based systems in planning departments.	.	.	.	.	.	.
(d) The development of sophisticated computer based systems encourages departments to work more closely.	.	.	.	.	.	.
2.(a) Frequent meetings should be held between the producers of computer based data and data users.	.	.	.	.	.	.
(b) There is little contact between the producers of computer based data and elected members.	.	.	.	.	.	.
(c) The increasing use of computer based data makes departments more dependent on staff with computing expertise.	.	.	.	.	.	.
(d) Departments are increasingly employing staff who possess computing expertise.	.	.	.	.	.	.

End of questionnaire for technical staff

0 - Don't know
1 - Strongly disagree
2 - Disagree
3 - Neither agree nor disagree
4 - Agree
5 - Strongly agree

	. 0 .	1 .	2 .	3 .	4 .	5 .
(e) Computing staff tend to use a lot of technical language.	.	.	.	.	.	.
(f) Computing staff tend to be more interested in what the computer can do than providing data.	.	.	.	.	.	.