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DESIGNING A METHODOLOGY
FOR AN OFFICE COMMUNICATION AND INFORMATION SYSTEM
FOR EXECUTIVES IN THE MALAYSIAN PUBLIC SECTOR:
THE CASE OF THE PRIME MINISTER'S OFFICE

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Doctor of Philosophy

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February 1990

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The University of Aston in Birmingham

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SYNOPSIS

Modern managers are under pressure to fulfil a complex managerial task, that of handling information resources. Information management involves matching a manager's lack of information processing capacity against his information needs. The complexity of the task increases with the size of the organisation. A system that supports executive information needs will help reduce managerial and informational mismatches.

In the context of the Malaysian public sector, the task of overall management lies with the Prime Minister and the Cabinet. The Prime Minister's Office is presently supporting the Prime Minister's information and managerial needs, although not without various shortcomings. The rigid and formalised structure of the public sector heightens the managerial and organisational problem of coping with a state of rapid change and complexity.

The principal features of the research are twofold: the development of a methodology for diagnosing the "problem organisation" and the design of an office system. The methodology aims to understand the complexity of the Malaysian public sector. The outcome is an effective model. "Design", on the other hand, concerns developing a syntax or language for office systems which provides an alternative to current views on office systems. The design is with reference to, rather than for, the Prime Minister's Office. The desirable outcome will be an office model called Office Communication and Information System (OCIS).

Key Words: System, systems approach, management cybernetics, information management, office system

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LIST OF ABBREVIATIONS

AI	Artificial Intelligence
CEIMS	Chief Executive Information and Management System
CM	Cybernetics Methodology
CSF	Critical Success Factor
CSG	Confidential Secretary General
CSN	Chief Secretary to the Nation
DI	Department of Information
DP	Data Processing
DS	Statistic Department
DSS	Decision Support System
EPU	Economic Planning Unit
ES	Expert System
FA	Feedback Adjuster
FAOR	Functional Analysis of Office Requirements
IC	Information Category
ICU	Implementation and Coordination Unit
IM	Information Management
IPP	Information Processing Procedure
IS	Information Systems
IT	Information Technology
LAN	Local Area Network
MAMPU	Manpower and Administrative Modernisation Planning Unit
MC	Management Centre
MIS	Management Information Systems
MPS	Malaysian Public Sector
OA	Office Automation
OCIS	Office Communication and Information System
OIS	Office Information System
OS	Office System
PABX	Private Automated Branch Exchange
PC	Personal Computer
PM	Prime Minister
PMD	Prime Minister Department
PMO	Prime Minister's Office
PROFS	Professional Office System
PSD	Public Services Department
RD	Root Definition
SERU	Socio-Economic Research Unit
SSM	Soft System Methodology
VO	Variety Operator
VSM	Viable System Model
WAN	Wide Area Network

CHAPTER ONE

RESEARCH BACKGROUND AND OVERVIEW

1.1 INTRODUCTION

The research is about developing a methodology for designing an office system. The design aims to produce an office that makes use of communication and information systems for organisational effectiveness. This chapter introduces the background leading to the research process. It begins with an overview of the general issues and problems related to the public sector, in particular the Malaysian public sector. This is followed by the events leading to the research process. Next, an outline of the methodology is briefly examined, followed finally by an overview of the thesis.

1.2 ISSUES IN THE PUBLIC SECTOR

Introducing changes in order to improve their public sectors is an important issue for many countries. In most cases, the desired outcome is to arrive at a higher level of efficiency and effectiveness. While efficiency refers to the improvement of the public sector's own internal administrative machinery, effectiveness implies developing better services to the people. Both, however, are equally crucial for an organisation to survive. Improvements in the direction of efficiency and effectiveness call for better organisational communication and control, supported by management capabilities.

A large public sector is inherently complex. With such complexities, management process and problem-solving are far from trivial. It demands a high level of competence to handle complex problems; these are in practice solvable through better interpersonal communications and supported by effective information systems. Basically, it requires integration of individuals and organisation, rather than merely making available expertise and information to the individuals.

The structure of the Malaysian public sector is characterised by its rigid, hierarchical set-up where interpersonal communications and flow of information are between several vertical layers. Each ministry or department performs certain designated tasks within a conventional structure viewed as a formalised system. However, complex management problems and issues are unpredictable and do not normally correlate with the rigid lines of these ministerial and departmental structures. An issue faced by the government may fall within the responsibility of several different ministries. A particular ministry involved in this problem-solving process therefore belongs implicitly to a more indeterminate structure, which I will refer to as a notional system.

In the public sector, such systems take the form of inter-ministerial and inter-departmental committees, project teams and working groups. Their sizes and particular component ministries will depend upon the nature of the entailed issues. While formalised systems deal with distinctive pre-planned tasks, notional systems handle specific issues which change frequently and cut across the boundaries of different ministries and departments. This creates a dilemma in that there is frequently a mismatch between formalised and notional systems. Information system

design does not cater for this degree of complexity. This is why a systemic study of the public sector is relevant to understand issues and problems which concern many, if not all, ministries.

The public sector is also faced with a huge task of dealing with a complex environment. One environmental aspect having an impact on the public sector is Information Technology. The advent of technology in the fields of computing, microelectronics and telecommunications services, has had a tremendous impact on information and its usage. These three interrelate in constituting the varied set of methodologies and techniques known as information technology (IT).

Over the years IT application has reached new heights. Today it is often mentioned that we are living in an "information age" and the so-called "information revolution" is being promoted as highly advantageous for mankind. In large complex organisations, IT is regarded as one of the, if not the key tool in controlling day-to-day operations, as it facilitates better management, planning, decision-making and communication. It is often, mistakenly, regarded as a panacea for everything. The question that may be posed is whether IT, and particularly information systems (IS), can develop into a real force to affect organisational and individual performance, thereby assisting organisational problem-solving.

If IT application and IS design is not integrated with the overall organisational mission and strategy in a systemic way, the answer to the above-posed question is a definite no. When IS were becoming popular in the mid-sixties, the assumption was that there would automatically follow beneficial changes in organisations. Today we observe a situation in

which this early promise is not seen to have produced such dynamic changes to organisational structures and individual behaviour, especially as related to computer usage.

In Malaysia, the computer was first used in the public sector for data processing during the mid-sixties. Today IT has become an integral part of most ministries and departments. The stress has been initially on hardware growth. As a result, most government ministries and departments today have computers, ranging from personal computers to mainframes, and the future indicates more such usage, as reflected by the increasing demand for computers today.

This trend in computer growth is not adequately matched by actual utilisation. A survey by the Chief Executive Information and Management System (CEIMS) Unit of the Prime Minister's Office (PMO) in 1987 (Appendix 1) shows this to be the case with most computerised IS. Another more serious issue addressed here is lack of cohesion in their usage across the public sector as a whole. Under-utilisation and a lack of integration in usage of IT result in the technology not realising its potential as providing useful tools to aid problem-solving and improving organisational and managerial performance.

New uses of computers are increasingly becoming popular especially to help develop management information systems (MIS), decision support systems (DSS) and expert systems (ES). With regard to MIS in the Malaysian public sector (MPS), such computer systems are generally centralised, have huge operating and maintenance costs, are complex to operate and require experts to use and access them. They will have to change to adapt to the

new state of IT which is flexible, low-cost, user-oriented, suited to decentralisation and to general applications. However, it is not easy to adapt to changes when present systems and understanding are mainly based on information and organisation structures from the past. We have inherited the same public sector structures, but the state of IT has drastically changed. Given the changing state of technology and existing human resources in the MPS, pressure to design effective information and office systems as tools to improve organisational and managerial performance is overwhelming.

The present research aims at addressing the above issues of managerial performance and organisational dilemma. The outcome will be the description of a methodology for performing a systemic study of the public sector, a pre-requisite necessary to design a system to provide an alternative viewpoint on the notion of an office to support management. Such a systemic study will address some of the problems to do with one-dimensional or rigid understanding and application, which is presently limiting the effective take-up of technological tools in the context of a complex organisation such as the public sector.

1.3 RESEARCH BACKGROUND

Reviewing the research background implies the exploration of the problem situation, the purpose of which is to trace the problems and circumstances leading to my involvement in this research.

The following discussion is centred around two points - namely, my intention in carrying out the research, and what I expect the outcome of

the research is going to achieve.

My main motivation for undertaking the research was influenced by the cumulative effect of my twelve years' experience in systems analysis and design in MPS, and the growth of IT applications in Malaysia.

Prior to undertaking this research, I was involved in a number of IS design and development projects in various organisations of the MPS. Among the more prominent systems that I have been involved in are the development of the Project Monitoring System (PMS) of the Implementation and Coordination Unit (ICU) in the Prime Minister's Department (PMD) and the development of CEIMS for the PMO. Over the years of their implementation, a number of issues emerged. The more prominent issue is the lack of interest shown by the users towards the system, either in using or improving the information generated by the system. Normally, users adopted this apathetic attitude due to their inability to understand the use of the systems.

In the past, systems were designed and developed without any strong conceptual foundation although the design, especially CEIMS, was done with the participation of the central agencies of the PMD including the Treasury. As CEIMS data covered the entire MPS, such involvement was inevitable. So too was PMS which used MPS data. All too frequently methodological issues were raised only later, after these systems had been implemented and problems began to emerge. Initially however, due to the need for speedy design requirement where developers were under pressure to meet a completion deadline, the question of appropriate methodology was often neglected. The main issue addressed here is to have a system that

satisfies the end-user.

This is clearly shown in a study carried out by CEIMS (Appendix 1) three years after the system was implemented. I believe users will make use of a system if the information provided by the system is perceived as crucial for the organisation to survive. Without such perception, the organisation is likely to have survival problems and be in a constant state of instability and insecurity. This task is not trivial and cannot be achieved by a simple information system design involving a single organisation. Although a simple system design may provide a short term solution benefitting a few organisations in MPS, the overall MPS situation is still problematic insofar as effective information resources' utilisation is concerned.

In the long run a more sophisticated approach is required, calling for the joint participation of IS designers from all of the MPS organisations. This will involve aiming at improving the overall systems of communication, integration, coordination and information flow within the MPS, as these are related to information use and management. The design of an initial system in the PMO, will provide the hub enabling the more general and wide-reaching utilisation of both information resources and people involved in IS development. This insight is in line with efforts being made today to elevate the role of CEIMS to the status of a national computer centre. By using the cybernetic concept, this potential of relating the micro project (PMO) to macro project (national computer centre), is highlighted and its realisation made more likely.

Related to the methodological aspect, I was influenced by systems

approaches while pursuing my Masters degree at Aston University in 1980. Many of my ideas have arisen from the work of such people as Stafford Beer. Others, particularly Raul Espejo, contributed to my understanding of certain tools in information management, and a methodological appreciation of how they might be used in a complementary fashion with management cybernetics.

Being attached to the PMO and running the operations of CEIMS for two years, my research is geared to benefit the PMO. It was originally agreed that the research topic would be "Effective design of a decision support system (DSS) for top and middle executives". The research is an attempt to plan and design a DSS for the use of the chief executive in MPS. Upon completion, it may be used as a guide and reference for future IS design, although it has to be recognised that there is no single model that fits all IS. This topic revolves around the concept of DSS emphasising specific areas - namely information technology (IT) where design will take full advantage of IT advances; middle and top managers or executives as the target user group; the public sector); and the use of cybernetic methods.

A further aspect of relevance is the general issues of IT in MPS. This is because of the dramatic growth of IT in Malaysia. The main issues here concern the lack of proper distribution and use of IT; under-utilisation of available IT products; uncoordinated use of technical expertise in systems design and development; the growing gap between management users and technical designers; lack of computer appreciation by management users; and finally the lack of awareness by analysts of the wider environment (outside the domain of IT).

The outcome of the research, I hope, will benefit the people involved in IT, IS and information management in MPS. They include the IS users (i.e. middle and top level civil servants) and IS designers (i.e. systems analysts).

1.4 RESEARCH METHODS

In the research, three methodologies are developed: overall research process; diagnostic approach to study organisation; and method to design information and office systems. The general theme here is the use of the systems approach and management cybernetics, which are essentially problem-solving methodologies.

There is a range of options available today to carry out a research process. The concern is with the choice of a method relevant to the argument of the thesis. Wood-Harper (1989) refers to the methods presented by Douglas, Van Horn, Galliers, Weick, among others. He classifies the following methods: conceptual study; mathematical modelling; laboratory experiment; surveys; case studies; phenomenological research/hermeneutics; and action research. A Case Study method is adopted for this research. The idea here is to provide a rich description of an actual situation (which is the PMO) related to problems associated with PMO and MPS. The thesis aims at using these actualities to facilitate the development of a methodology to design a better alternative to the existing PMO. In Chapter Three, the research process will be discussed.

In organisational diagnosis approach, the concern is to provide means to

understand and analyse an organisation, to recognise weaknesses and propose solutions. For this research, a cybernetic method is applied. The justification and the use of this approach is elaborated in Chapter Six.

There are a number of available office and information systems design methodologies. Some of the methods discussed comprehensively by Avison and Fitzgerald (1988) are STRADIS (Structured Analysis Design and Implementation of Information Systems) by Gane and Sarson, IE (Information Engineering) by James Martin, SSADM (Structured Systems Analysis and Design Methodology) by Learmouth and Burchett, JSD (Jackson's Systems Development), ISAC (Information Systems Work and Analysis of Changes), ETHICS (Effective Technical and Human Implementation of Computer-based Systems) by Mumford, Checkland's SSM (Soft Systems Methodology), and Multiview.

The above methods deviate from the conventional systems analysis methods. As stressed by Avison and Fitzgerald, they characterise the following approaches: the systems approach; planning approaches; participation; prototyping; automated tools for IS development; software engineering and formal methods; data analysis; and research themes. Multiview is a hybrid methodology which brings in aspects of other methodologies and adopts techniques and tools which are used as a contingency approach, applied as the application demands. With respect to office methodologies, the works of Schafer, Hirschheim, Vogel and Nunamaker are outstanding. I will discuss some of these in Chapter Two. The design method used in this thesis is discussed in Chapter Seven.

The use of cybernetics is central in carrying out this research. Cybernetics is resorted to, as opposed to others, because other methods have been applied before in the design of information systems. Secondly, cybernetics is a consistent and well-established science, but not sufficiently applied in practice. Therefore, this is an opportunity to apply the cybernetic outlook. Using cybernetics, models of Office Communication and Information System (OCIS) are developed based on logic so that they can be compared with the existing situation. Validation is based on past experience using these cybernetic principles in practice.

1.5 OVERVIEW

This thesis contains nine chapters, and is supported by relevant appendices. A list of abbreviations is provided, one prior to this chapter, and another (which is concerning the organisations in MPS) in Exhibit A2.2 of Appendix 2.

Chapter One introduces the global problem situation in MPS that resulted in the undertaking of this research.

Chapter Two provides background information on the various theories in a systems approach, relevant to organisation, decision systems, management cybernetics and information management. The main areas of interest are management cybernetics and information management. There is also a description on the current state of the art in office system practices and IT which will assist the design process.

Chapter Three is about the perspective adopted and the consequent

approach. Cybernetics and soft systems methodologies are both prominent. Various new ideas attached to the research theories are introduced here, including "conceptual modelling", "diagnosis" and "design". Data collection and analysis are also discussed with mentions of the problems faced in handling data.

Chapter Four discusses the structuring of managerial and organisational problems in the context of MPS. This focusses on the problem of managing complexity faced by top executives (in our case, the Prime Minister) and finding ways of utilising available resources given the constraints of existing structures to improve performance through better design. The problems of the PMO, used in the case study, are discussed. The strategies for design are also introduced here.

Chapter Five is an overview of the MPS with discussion on the structure, operation, and personnel involved. A general description of the role of the executive is laid out with an emphasis on the Prime Minister (PM) as chief executive of the public sector. The role of the PMO with respect to the PM's relationship with the public sector is also discussed.

Chapter Six suggests a methodology for making visible the identity of the MPS and its problem of structural imbalance between "actual" ministerial structure and "problem-solving" situations - that is, between "formalised" and "notional" systems. Illustrations will be made with reference to the design of conceptual models, activities, and viable system models (VSM). The outcome of this diagnostic study will be used to support office design.

Chapter Seven is the focal point of the thesis. It deals with a cybernetic model for design of an office, i.e. OCIS. The primary concern here is to relate management cybernetics to office systems. In the final analysis, we will uncover key differences between the two entailed office models - the one based on cybernetic methodology; the other based on current office design and practices. The PMO is used as the case study.

Chapter Eight appends previous discussion on OCIS design and complements Chapter Seven. It is an elaborate design of the "Management Centre", an integral tool of OCIS.

Chapter Nine provides conclusions relating to the role of a cybernetic framework in office design and how the design provides a better management and information support alternative to the PM in his management of the public sector. The conclusion also considers the potential contribution of the research, what the research is going to achieve from the researcher's point of view, and the future possibilities along the line of present research work.

CHAPTER TWO

BACKGROUND STUDIES

2.1 INTRODUCTION

The purpose of this chapter is to revise relevant literature in order to facilitate the research process, from problem formulation right through to design. The literature includes basic theories and actual studies of working organisations. A wide range of disciplines are referred to - systems approaches, organisation theory, decision systems, management cybernetics and information management. Theoretical issues are supported by reviews of current practices and applications in information technology (IT) and office systems (OS). Although these are multidisciplinary in nature, the emphasis will be upon management cybernetics and information management (IM).

2.2 VARIOUS THEORIES

2.2.1 SYSTEMS APPROACH

Different writers provide different ways of defining the word "system". Traditionally, a common property of a system is the interaction among its parts. This is evident in a definition of system provided by Ackoff and Emery. According to them:

"A system is a set of interrelated elements each of which is related directly or indirectly to every other element, and no set of which is unrelated to any other subset." (Ackoff and Emery 1972)

Clemson (1984) summarises that most definitions seem to stress three attributes of a system: it has a set of components; it has a structure that determines the connectivity of the components; and it is a subjective concept. It is in relation to subjectivity that there arises an interesting problem. Advocates of the systems approach and management cybernetics look at systems in this perspective, which is:

"a way of looking at the world" (Weinberg 1975)

"... a mental construct of parts and relationships which make up a whole, the whole being that which is captured by the name ascribed by the individual to the particular situation of interest. The situation could be a concept, an object, a problem, a human activity, or indeed an organisation." (Espejo 1986)

The reflection here is that there is more than a single way of ascribing a system's purpose. Individuals perceive systems differently.

A central concept of systems thinking is the emphasis on holism. Contrary to reductionism, the holistic property emerges from the relationship of interrelated parts found not in the "parts" but in the "whole". This emergence is often referred to as systemic. Ackoff makes the following comments on holistic or systemic thinking:

"A system has holistic properties possessed by none of its parts. Each of the system parts has properties not possessed by the system as a whole." (Ackoff 1971)

For instance, we cannot explain a car's speed by describing the properties of its independent components such as tyres, engines, and so on. In this instance the relationships among the car parts produce outcomes that the parts are unable to produce themselves. In the study of theories in decision systems, management cybernetics and information management (IM) in an organisation, we therefore cannot explain organisational performance

solely by reference to the capabilities of the people and other components. It is the relationships among these organisational components that enable us to define performance.

The generic label "systems thinking", embraces various disciplines, among them general systems theory (GST), cybernetics, systems analysis and IM. These different fields may exist in isolation, or have overlapped boundaries indicating that they are mutually using some systems concepts. GST applies "across the board", while cybernetic theory tends to favour the scientific over the philosophical, although it is used in both theoretical and applied contexts (Troncale 1977).

The concepts most often linked with the systems approach are synergy, open systems, purposeful systems and expansionism (Richards and Gupta 1985). According to them, these concepts form the backbone of systems theory. "Synergy" is that quality of a system that makes it more than what can be explained by the separate components of that system. As such, an aphorism such as "the whole is more than the sum of its parts" is changed to "a whole is different from the sum of its parts". We will not be debating this point, as the purpose of the chapter is to review different understandings of the notion of systems approach.

A different focus on a systems approach is to focus upon the distinction between "hard" and "soft" problems. Checkland has this to say of "soft systems methodology":

"Systems-based methodology for tackling real-world problems in which known-to-be-desirable ends cannot be taken as given. Soft systems methodology is based upon a phenomenological stance." (Checkland 1981)

and on "hard systems methodology":

"Systems-based methodology, also known as 'systems engineering', for tackling real-world problems in which an objective or end-to-be-achieved can be taken as given. A system is then engineered to achieve the stated objective." (Checkland 1981)

According to Espejo:

"The Systems Approach is an emerging paradigm for inquiring into the complexity of present societiesapplying systems thinking to managerial problem situations." (Espejo 1980a)

The trend of this line of thinking is towards softer methodologies more compatible with the proliferating complexity characteristic of social organisations. Thus, the systems concept offers a way of ensuring that the approach remains problem-oriented rather than means-oriented and that information systems (IS) are created as part of problem solving rather than because sophisticated techniques are available (Churchman 1968).

The way towards developing problem-solving tools related to the research methodology (as discussed in Chapter Three) is suggested in the work of various authors. I will focus upon two main streams: Soft Systems Methodology (Checkland 1972,1978,1979,1981, Wilson 1984) and cybernetic methodology (Espejo 1986).

2.2.2 ORGANISATIONAL THEORIES

An organisation may be defined as a measure of distinction between the properties and the behaviour of the system on the one hand, and those of a simple sum of the system components on the other (Malinovsky 1984). As such, the systems approach has a bearing on the study of organisations, because like system, an organisation has systemic properties which emerge as different viewpoints constitute it. As far as this research goes, the aspect of organisational study that needs attention is its structure, which is an inherent property of an organisation.

Organisation structure (Hall 1982) is the arrangement of organisational subsystems (or subunits) and the accompanying division of labour and hierarchy of authority relations. It is the arrangement of the components and subsystems within a system which has a pattern of relationships among the units (Rogers and Agarwala-Rogers 1976). These relationships may be expressed in terms of power, status, or other variables.

Structure can also be understood in terms of its dimensions, like the degree of formalisation, centralisation, delegation of authority, etc. For instance, in a hierarchical set-up, the position of a person in a pyramid structure normally determines power-relations. This is because the basis of power is normally related to structure - formal position, responsibility for critical tasks, structural location strategically accessible to information, and control over important resources, particularly information.

The formalisation of structure is normally reflected by the organisation chart and establishes the rules and procedures governing the organisational processes. In terms of components, Blau and Meyer (1971) state that organisational structure refers to the properties of an organisation, and not its members. This implies that structure deals with more stable components of the organisation such as long-term or recurrent processes, rather than actual members who constantly change through transfers, replacements and retirements.

An organisation chart is a description of the formal structure of an organisation. Organisations differ in their structures (Davis and Olson 1985) and these can be classed into a variety of types: basic model (hierarchy of authority; specialisation; formalisation; centralisation); and modifications of basic models (product or service organisation; project organisation; matrix organisation).

The most basic model is that of a hierarchical or pyramidal structure of positions. A typical organisation might be divided along functional lines, such as production, marketing, finance, etc. Alternatively, the organisation may be structured by product or service (Figure 2-2). Each product or service group will have its own functions. Public sector organisations are normally characterised by a service-oriented structure. The matrix organisation represents formalised use of integrating, lateral relations, where for each service grouping there is a separate integrating department which has lateral relations with each level of the functional organisation. Figure 2-3 is a typical matrix structure. On the horizontal axis is the functional authority while on the vertical axis is the product (or service) authority.

In an organisational study related to management cybernetic, communication is viewed as an essential ingredient. The structure of an organisation affects communication flows and vice versa. When looked at this way, structural study emphasises the relationships between individuals, and not individuals themselves. Communication in an organisation may be either formal or informal (Rogers et al 1976). Formal communication has greater stability and predictability, while informal communication is more fluid and unpredictable. Structures affect the flow of communication, because the shape of the structure both limits and directs communication flows. Information overload or breakdown may well be caused by the structure.

2.2.3 DECISION-MAKING AND DECISION SYSTEMS

A consideration of decision-making processes and concepts is essential for the research, as decision-making is an integral part of the management process. Various literature is available and many studies have been carried out in these areas. The cybernetic perspective of decision-making will be discussed in Section 2.2.6 following the discussion on management cybernetics and IM.

2.2.3.1 DECISION PROCESS

A basic decision-making process is clearly illustrated in Simon's model (Simon 1960) as consisting of: Intelligence to search out problems or opportunities; design to analyse problems or opportunities and generate feasible solutions; and choice to select among alternatives and implement the chosen one. Decision-making is presented in many different

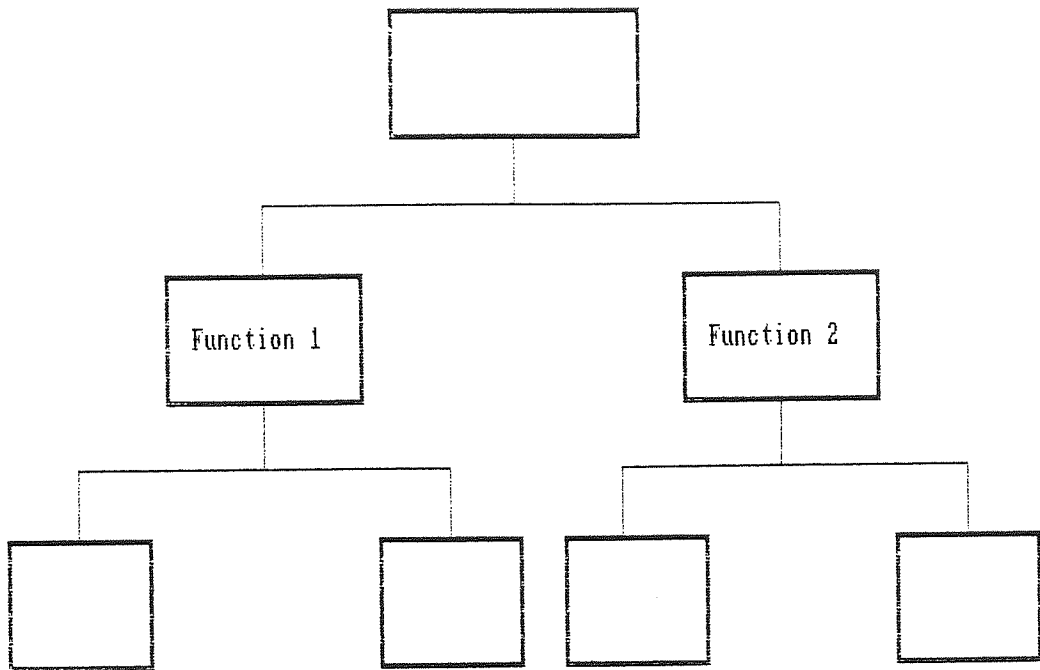


Figure 2-1 Hierarchical Organisation: Functional Specialization

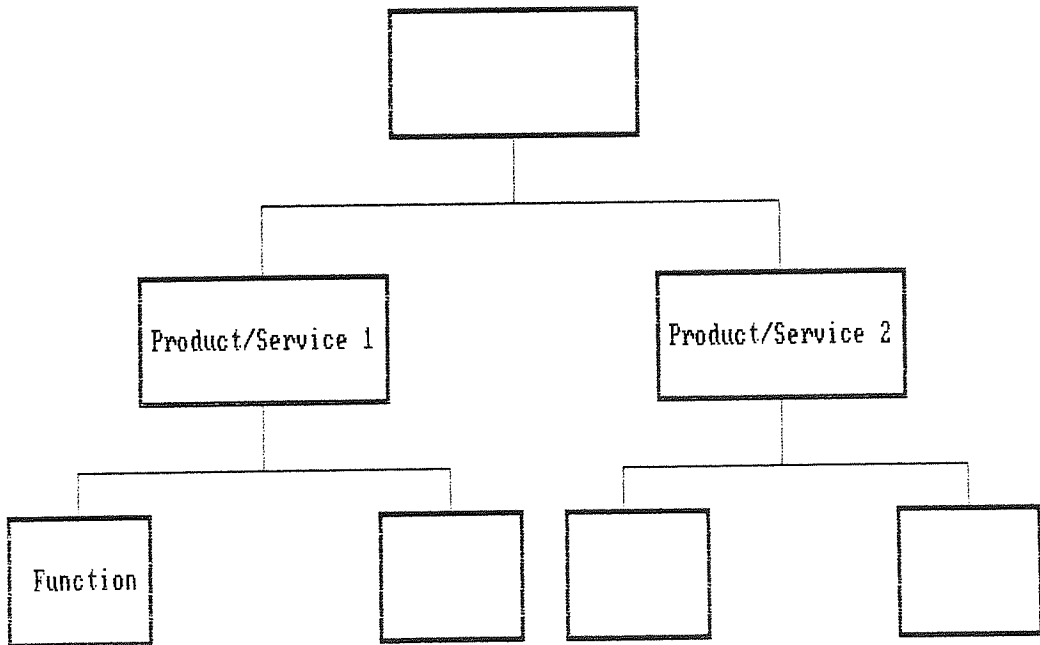


Figure 2-2 Hierarchical Organisation: Product or Service Organisation

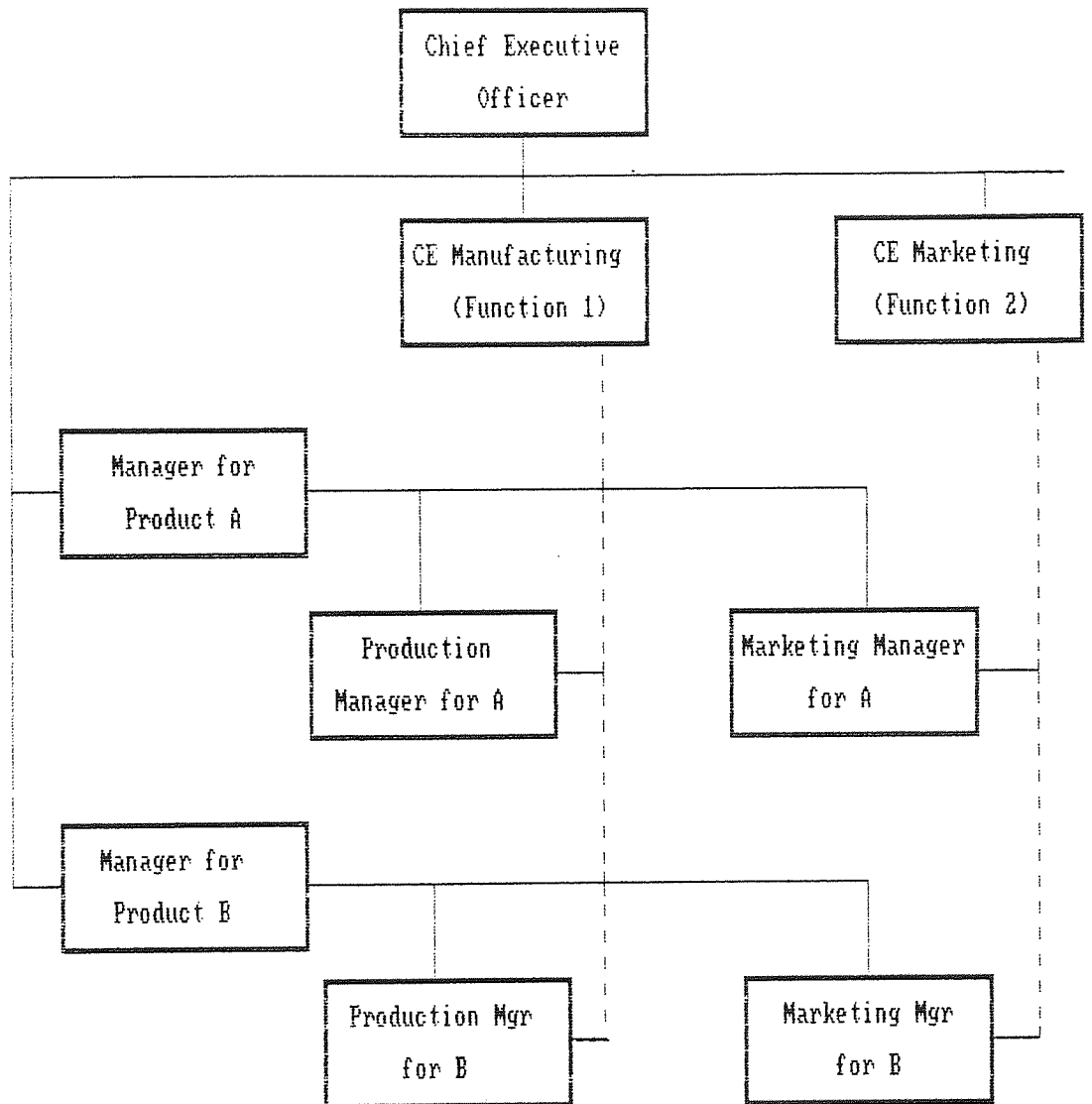


Figure 2-3 Matrix Organisation Structure

perspectives, for instance: qualitative, quantitative, individual, group, organisational, political decision-making. In an analysis of the various decision-making "schools of thought", Keen and Scott-Morton (1978) present a framework consisting of five major schools of thought. These are respectively based on: the rational model; the "satisficing", process-oriented model; the organisational procedures model; the political process model and the individual differences model. There is no one general methodology of good decision making (Eden and Harris 1975), and there are many ways of classifying types of decision as seen from the views of different writers.

2.2.3.2 DECISION-MAKING AND MANAGEMENT OF COMPLEX ORGANISATIONS

Specifically of relevance to this research is the challenging issue faced by managers of the complexity of the organisation they are managing, especially when the decision-making process is unstructured and needs qualitative judgement. Some of the comments made by different writers address organisational issues on politics, conflicts, differing values, informalities, and subjectivities:

"Problems and decision making are predominantly set within politics, interpersonal considerations, idiosyncratic values and personal perspectives." (Eden et al 1983)

"...the need for joint decision making given conflicting situations in an organization" (March et al 1958)

"Decision-making more often than not is a subjective process, Although he may often think that he operates as an independent part of an organisation we will in fact assume that he is a part of a sub-system operating within a wider system." (Eden et al 1975)

According to Pettigrew (1973) and Cyert and March (1963), organisational decision-making is also considered as a necessarily political process.

2.2.3.3 INDIVIDUAL AND ORGANISATIONAL DECISION-MAKING

Closely associated with the above-mentioned studies on complexity, is the understanding of individual and organisational decision-making. Studies on individual decision-making consider the aspect of style, background, and personality of the manager for whom the system is intended (Keen and Scott-Morton 1978). In addition to an understanding of the individual, there is needed an understanding of the constraints imposed by the organisation as a decision-maker. On organisational decision-making, they state that:

"The concept of decision making seeks to understand the output of standard operating procedures invoked by organisational subunits. The emphasis in design is to discover what these procedures are and how some of them might be supported and improved. In particular, this viewpoint stresses the importance of identifying organisational roles, channels of communication, and relationships."
(Keen and Scott-Morton 1978)

As Barnard (1938) puts the matter "Organisational decisions do not relate to personal purposes, but to organisational purposes".

On the other hand Clemson (1984) lays down some of the reasons why individual and organisational decision-making processes cannot be discussed as two separate issues: organisations are made up of individuals; decision-making processes within an organisation will be largely self-organising; the culture of a particular organisation provides a powerful orientation that pre-judges problems and solutions; by the law of requisite variety (see Section 2.2.4), decision-making capability of the organisation will be inadequate to regulate the organisation as fully as the management wishes; and management can regulate only those aspect of

the organisation that they have modelled.

The design of an individual-based system requires looking into various aspects of individual decision style and model. One has to have insights into individual cognitive style of management and their idiosyncratic behaviour. As executives move from one organisation to another, due to transfers or promotions, the system design based on this decision criteria will face shortcomings in terms of flexibility.

On the contrary, system-based design needs more flexibility and to be able to cope with changes. However, individual decision styles should never be excluded from any system design. It is just that the emphasis is on organisational decision-making, dealing with ways of improving individual effectiveness. The improvement of individual decision-making effectiveness must also take account of the status of technology, in that IT is envisaged as an amplifier of individual capability, and the designed system will be more effective as the individual feels at ease using the technology.

Another relevant aspect is group decision-making, as opposed to individual decision-making. The nature of organisational structure has an influence on decision-making. A less rigid structure, for instance, will encourage group decision-making. In MPS, where problem-solving requires an integration of various ministries, group decision-making proves beneficial. So too is the case of a Cabinet decision involving the PM.

2.2.4 MANAGEMENT CYBERNETICS

Wiener is the pioneer of cybernetics, which he defines as:

"....the science of control and communication in the animal and the machine" (Wiener 1948)

Beer, one of the seminal figures in the field, further expands the concept making it applicable to management, where his perception of cybernetics is:








...the science of effective organisation" (Beer 1979)

His work on management cybernetics provides most of the basic reference material for this research (Beer 1959, 1966, 1974, 1975, 1979, 1981, 1983, 1984, 1985). He described various tools which are helpful in designing and diagnosing organisations. These tools include the Viable System Model (VSM), which focusses upon complexity, recursion and variety engineering. While "Brain of the Firm" (Beer 1981) looks at organisation from the neuro-physiology perspective, "The Heart of Enterprise" (Beer 1979) unfolds a theory of organisation structure from first principles, notably using Ashby's Law of Requisite Variety (Ashby 1964) and the law of recursion to arrive at insights into the "management of complexity".

The following sections (2.2.4.1, 2.2.4.2, 2.2.4.3) explain and illustrate the significance of several key concepts. These are related to the research and it is explained how they provide a framework to understand organisational processes. Exhibit 2-1 lays down the modelling conventions used.







EXHIBIT 2-1: Modelling Conventions

1. Symbols used in VSM:

-  Operational Element
-  Management Unit within an Operational Unit
-  Environment
-  Information Flow
-  Amplifier
-  Attenuator
-  Coordination Function

Note: These conventions are applicable with reference to modelling using Beer's management cybernetics.

2. Other Symbols:

-  Process
-  Comparator
-  Variety Bloc (used in Regulatory Mechanism)
-  Activity  Activity (Used in Resolution Modelling)
-  Decision

Note: These supplementary symbols are used in non-VSM situations. Some symbols are explained in individual legends of diagrams.

2.2.4.1 VARIETY, REQUISITE VARIETY AND REGULATION

Variety is "the total number of possible states of a system, or of an element of a system" (Beer 1981). It is a measure of complexity, because it counts the number of possible states of a system (Beer 1985). It is also a measure of the possible behaviours of a situation or a specified system. The more complex the system, the more possible states it has, and the higher its variety is. As variety proliferates, the control task is to maintain the system within a set of states acceptable to the owner of the system. The general requirement of a manager is to regulate or manage an organisation, through getting enough variety to match the variety of the situation he manages. This management of variety will normally be with reference to possible, acceptable and preferred states. The last is of highest priority to the manager (as ideals, objectives and goals).

The act of regulation is described as the selection of a response that maintains essential variables within narrower limits than they would otherwise be as a result of some disturbances (Clemson 1984). A good regulator will inhibit the flow of variety from disturbances in respect of the effects on essential variables (Ashby 1964).

The application of the "black box" theory is useful to illustrate the regulation of a complex situation. Espejo (1986) refers to the black box metaphor as a powerful device to study the management of complexity. The basic regulatory requirement is as shown in Figure 2-4 while Figure 2-5 shows the regulation of a situation requiring additional error-control and anticipatory regulations. In these models, it is assumed that management

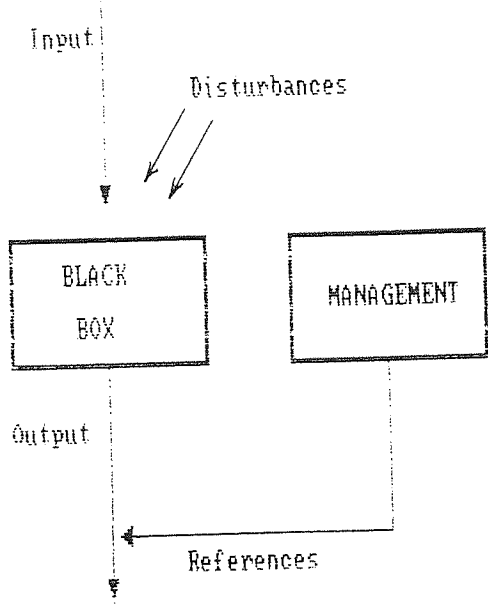


Figure 2-4 Regulation of Black Box

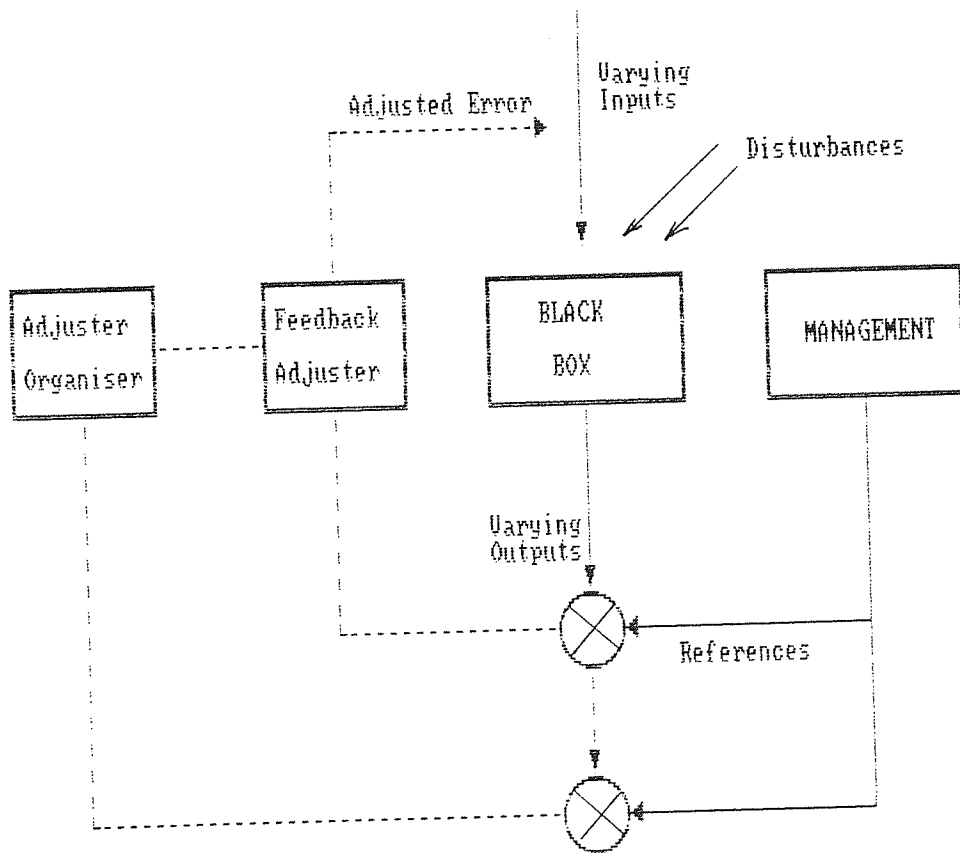


Figure 2-5 Regulation of Black Box: Viable System

Legend:



Comparator

has to remain outside the complexity of the box so as to be able to concentrate on activities relevant for steering the operation. The first diagram (Figure 2-4) represents the situation when the manager has control of the system in terms of his perception of the behaviour (output) as these are affected by the input and environmental disturbances. Thus he feels no need to intervene.

In a more complex situation (Figure 2-5), he has to deal with errors by providing a feedback in the form of model called the feedback adjuster (FA). The FA model needs to be updated and adjusted from time to time to adapt to discrepancies between actual (future) and anticipated outcomes. A model adjuster (MA) or adjuster organiser (AO) is used to cope with such a situation which helps the management to maintain requisite variety in the situation. Both models point towards mechanisms which encourage viability. While FA induces self-regulation, MA or AO induces self-organisation. These aspects are inbuilt loops of Beer's VSM.

The Law of Requisite Variety (Ashby 1964) states that "only variety absorbs variety". What this law really means is that the complexity of the regulator relative to the system to be regulated is crucially important. The regulator can do more than deal with aspects of the system which, taken collectively, match the complexity of the regulator itself (Clemson 1984). The degree to which an organisation can be regulated is thus understood as limited by the variety allowed by the organisation's regulatory systems. This is shown diagrammatically in Figures 2-6 and 2-7.

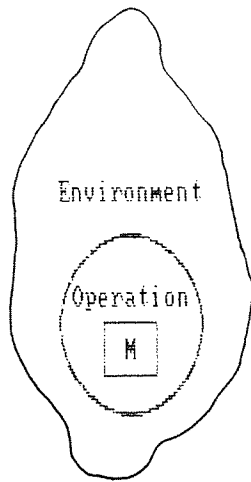
The relationship of the three distinct entities (management, operations and environment), is that management has a lower variety than operation,

and operation has lower variety than environment (Figure 2-6). Essentially this is because the complexity of an environment is always greater than one aspect of it (i.e. an operation), while the complexity of an operation is always greater than one aspect of itself (i.e. management). The interaction of one system with another in which it is embedded is by diffusion across the boundaries between them (Figure 2-7). Ashby's law implies that these different varieties will tend to equilibrium as either the variety on the right-hand side is amplified or the variety on the left-hand side is attenuated in a process of diffusion. These strategies are not mutually exclusive, and both may be operating (Beer 1979).

In practice, such diffusion of variety can be managed by the design of mechanisms which either attenuate or amplify variety (Figure 2-8). These are referred to as variety operators (VO). Attenuation or filtration is the process of reducing variety or complexity by means of providing structural, operational and informational mechanisms. Amplification, on the other hand, serves the increase of variety.

Variety engineering is to do with designing a balance between the varieties of these entities. In managerial context, the concern is the interaction of a manager with his relevant organisation. As the variety of the organisation is higher than that of the manager, there will tend to be imbalance.

The relevance of variety to our study is that it enables us to appreciate the high degree of complexity of MPS. Requisite variety has been extensively used by Beer in developing his model of the organisation



Note: Environment is the relevant totality of physical and social factors external to the boundary of the system (operation and management)

Figure 2-6 Requisite Variety: The Embedding of Parts

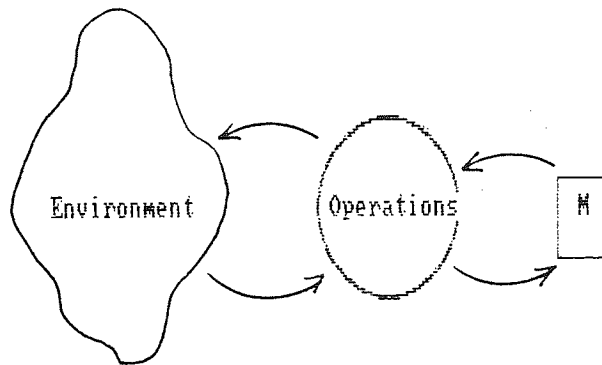


Figure 2-7 Requisite Variety: Diffusion Process

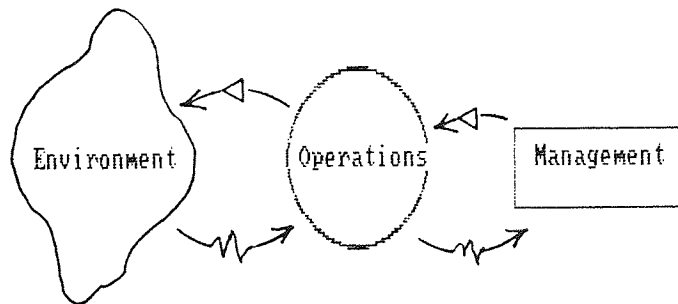


Figure 2-8 Variety Engineering: Amplifiers and Attenuators

Legend:

- ←|▴|→ Amplifier
- ←|⚡|→ Attenuator
- M Management

structure of a viable system, while viable system modelling is a crucial part of our study in the cybernetic study phase of the research. Requisite variety is a way of determining the effectiveness of regulation. It is a powerful aid in designing the regulator.

In the research, the PM, as manager of MPS, should have the capacity to regulate the different organisations and functions of MPS. For example, he needs the ability to appreciate and regulate the competing demands of multiple functions in a manner leading to a balance between environmental and internal pressures on resources. The system to be designed needs to support the PM in performing such a role and in this manner improve managerial and organisational effectiveness. Variety engineering suggests that we design mechanisms enabling the PM to amplify his own variety while attenuating the variety of MPS.

2.2.4.2 VIABLE SYSTEM MODEL

The principle of viability states that viability is a function of the balance maintained along two dimensions: autonomy of sub-systems versus integration of the system as a whole; and stability versus adaptation (Beer 1979). Organisational effectiveness is a function of these balances. A viable system is one that is able to maintain separate existence, and having the capacity to solve its own problems. If it is to survive it needs to be able to respond to the changes of a turbulent environment. To quote Beer:

"Viable systems have the ability to make a response to a stimulus which was not included in the list of anticipated stimuli when the system was designed. They can learn from repeated experience what

is the optimal response to that stimulus. Viable systems grow. They renew themselves - by, for example, self-reproduction. They are robust against internal breakdown and error. Above all they continuously adapt to a changing environment, and by this means survive quite possibly in conditions which have not been entirely foreseen by their designer." (Beer 1966)

The VSM, as shown in Figure 2-9, is Espejo's interpretation of Beer's model of a viable organisation. Beer's aim was to unearth the laws underpinning the viability of systems so that we might understand how systems are capable of independent existence. In the model, existence within an environment is depicted as a result of the dynamics of five functions: - policy, intelligence, control, coordination and implementation - and the connectivities between them. Beer refers to them as Systems Five, Four, Three, Two and One.

System One consists of the various parts, or sub-systems, of the organisation concerned with implementation where each is autonomous in its own right. These are VSMs at a lower level of recursion. Coordination (System Two) is necessary to ensure that the various elements making up System One act in harmony. System Three controls and is responsible for the internal stability of the organisation by ensuring that System One implements policy effectively. The intelligence activities of System Four include: filtering and amplifying of information between System One and Five; providing for the organisation all relevant information about its total environment; integrating internal and external information. System Five is responsible for policy. It also balances the respective internal and external demands of System Three and Four.

The general working of VSM is the balancing of complexities between these different functions and their inter-connectivities, in order for the

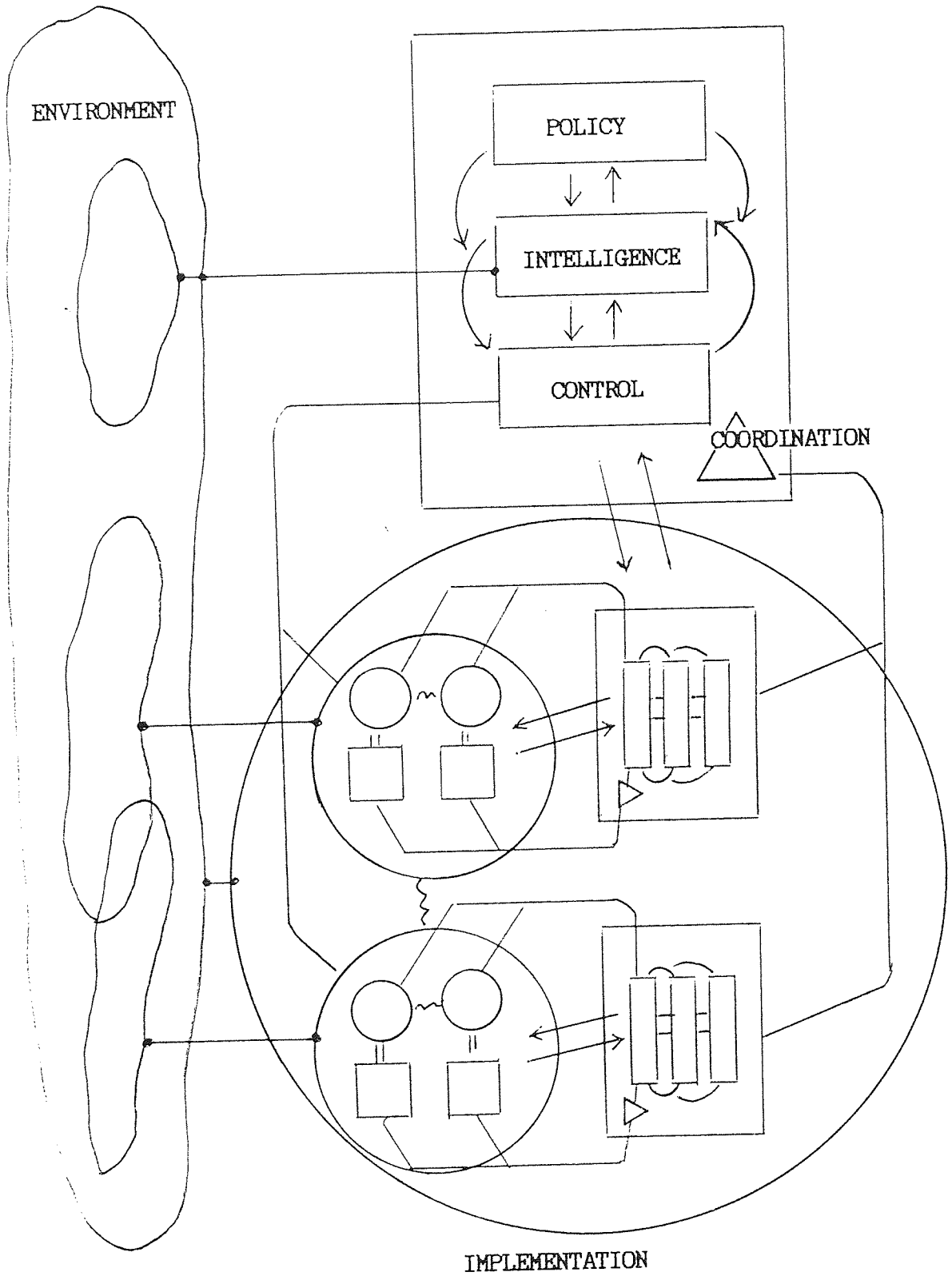


Figure 2-9: Viable System Model (VSM)
 (Espejo's Interpretation of Beer's VSM)

organisation to be able to handle its environment situation. Actual mechanisms to allow for adaptation and monitoring-control emerge in the course of studying these inter-functional interactions. The model is a powerful tool to portray and manipulate the complexities and recursivities in organisations and make possible the implementation of effective control and communications mechanisms and processes.

In the research, the VSM is used as part of the methodology to study the cybernetics of MPS. The aim is to improve MPS effectiveness. This implies the capability of MPS to adapt and respond to changing environmental situations while maintaining internal stability. This ability to adapt is referred to as organisational learning. The process of cybernetic study can be done by establishing the identity of MPS, diagnosing MPS and making structural adjustments to improve the overall communication and control processes. An effective application of the VSM in this study is a pre-requisite for designing the office system. The model is also used to explain the effectiveness of sub-systems (ministries, departments, and so on) within MPS. This is by using the recursion principle to be discussed next.

An understanding of the principle of recursion is vital in designing a VSM. The Recursive System Theorem (Beer 1979) states that if a viable system contains a viable system, then the organisational structure must be recursive, or, in a recursive organisational structure, any viable system contains, and is contained, in a viable system. The principle can be represented by a model (Figure 2-10) of multiple levels of recursion which is useful in diagnosing and understanding an organisation or any of its parts. In the model, S1, S2 and S3 make up the sub-systems of the

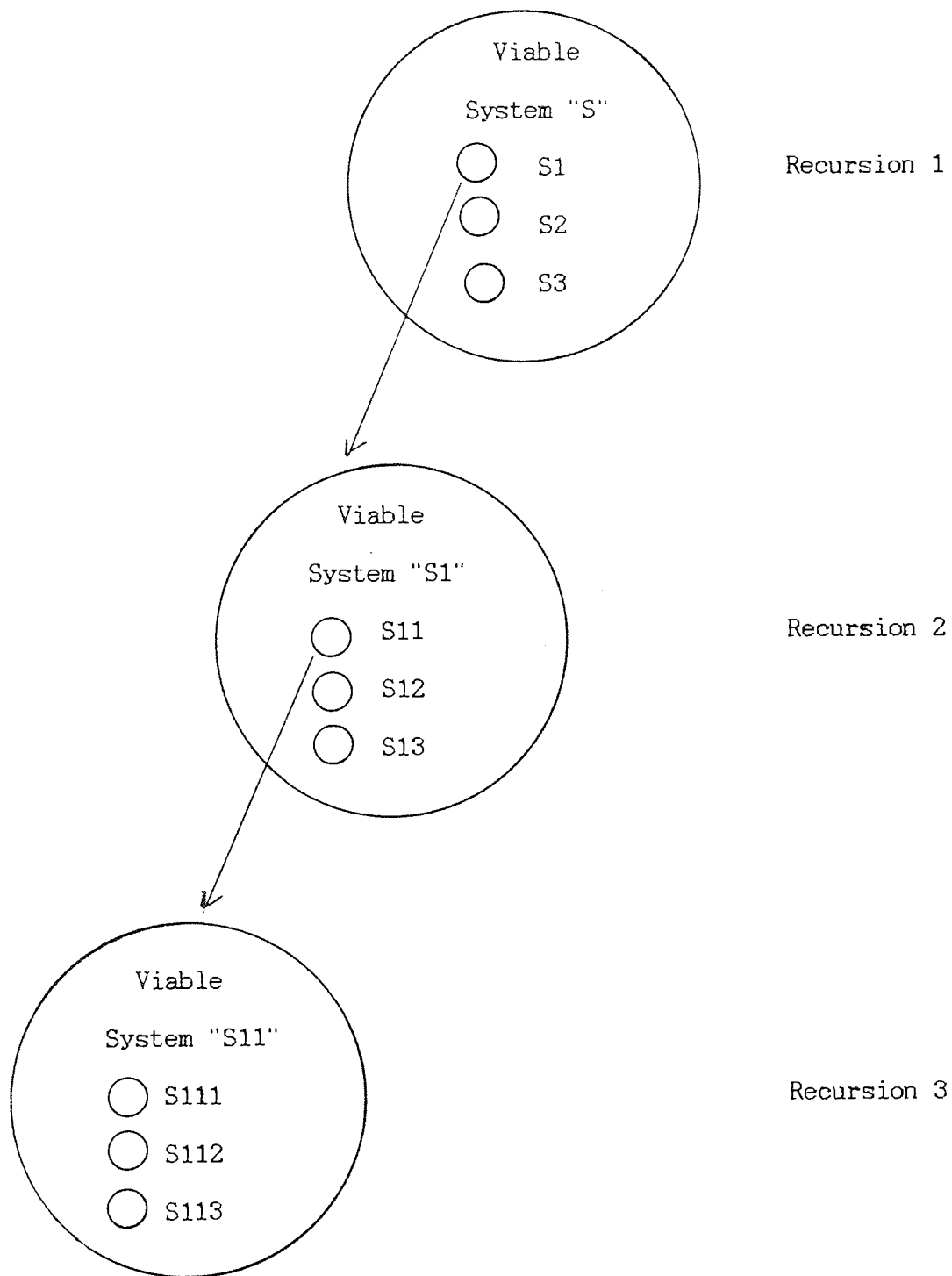


Figure 2-10 Levels of Recursion

main VSM at Recursion 1. At Recursion 2, they are viable systems on their own and capable of maintaining their stability and adaptability. An organisation in each repeated level must be a viable system and not merely a division or unit as normally found in an organisation chart.

The recursion principle is useful in the research in that it presents a useful way of representing an organisational structure, in the form of structural models of the MPS. For instance, system "S" in Figure 2-10 represents MPS while "S1" represents a ministry, and so on. This process of modelling presentation provides a clear understanding of a situation, particularly a large scale complex organisation.

2.2.4.3 REGULATORY MECHANISM

The identification of **regulatory mechanisms** is the process of loop design to educe all possible and relevant relationships involving a system's transformation as indicated through communication flows and relationships among organisational entities (i.e. roles, functions, activities at different recursions and units).

The basic layout to enable design is adapted from Espejo's regulatory loop mechanism as shown in Figure 2-11. The building blocs making up the regulatory mechanism format are the two variety blocs, amplifiers, attenuators, transducers and stability criteria. They are based on the "transformation" of a system as named from the perspective of a viewpoint. Transformation is a technical word used when naming a system in order to determine its identity (see Appendix 3 on Root Definitions). Stability criteria or criteria for effectiveness is the critical

factor which is perceived to determine the success of the organisation named.

The fundamental criterion of effectiveness is the need for a balance between a system and its environment (Davis, Demb and Espejo 1979). That is, the system needs to be able to generate responses to changes which occur in its relevant environment. The capacity of the system to respond should be balanced in line with the relevant changes that occur in that environment. Based on a criteria for stability for a certain transformation, two main variety blocs of different complexities are linked by variety operators and transducers. The imbalance of varieties may be between management and organisation, between intelligence and control functions, or between units within these functions (Figure 2-12). Transduction as stated by Beer (1985), is "leading across" boundaries and is elaborated in his Third Principle of Organisation:

"Wherever the information carried on a channel capable of distinguishing a given variety crosses a boundary, it undergoes transduction; the variety of the transducer must be at least equivalent to the variety of the channel" (Beer 1985)

This mechanism is useful as an aid when designing variety operators (VOs) between the PM and MPS. The designed VOs include information systems, products, processes, procedures and physical channels which will eventually be an integrated part of the system to support the PM. The main criteria is to have effective, rather than many, VOs. The VOs are effective if they provide a better communication between the PM and MPS and ensure a smooth flow of information. This is understood as closing the loops between two variety blocs. The applications of this mechanism is effectively illustrated in Chapter Seven, where it is jointly used with

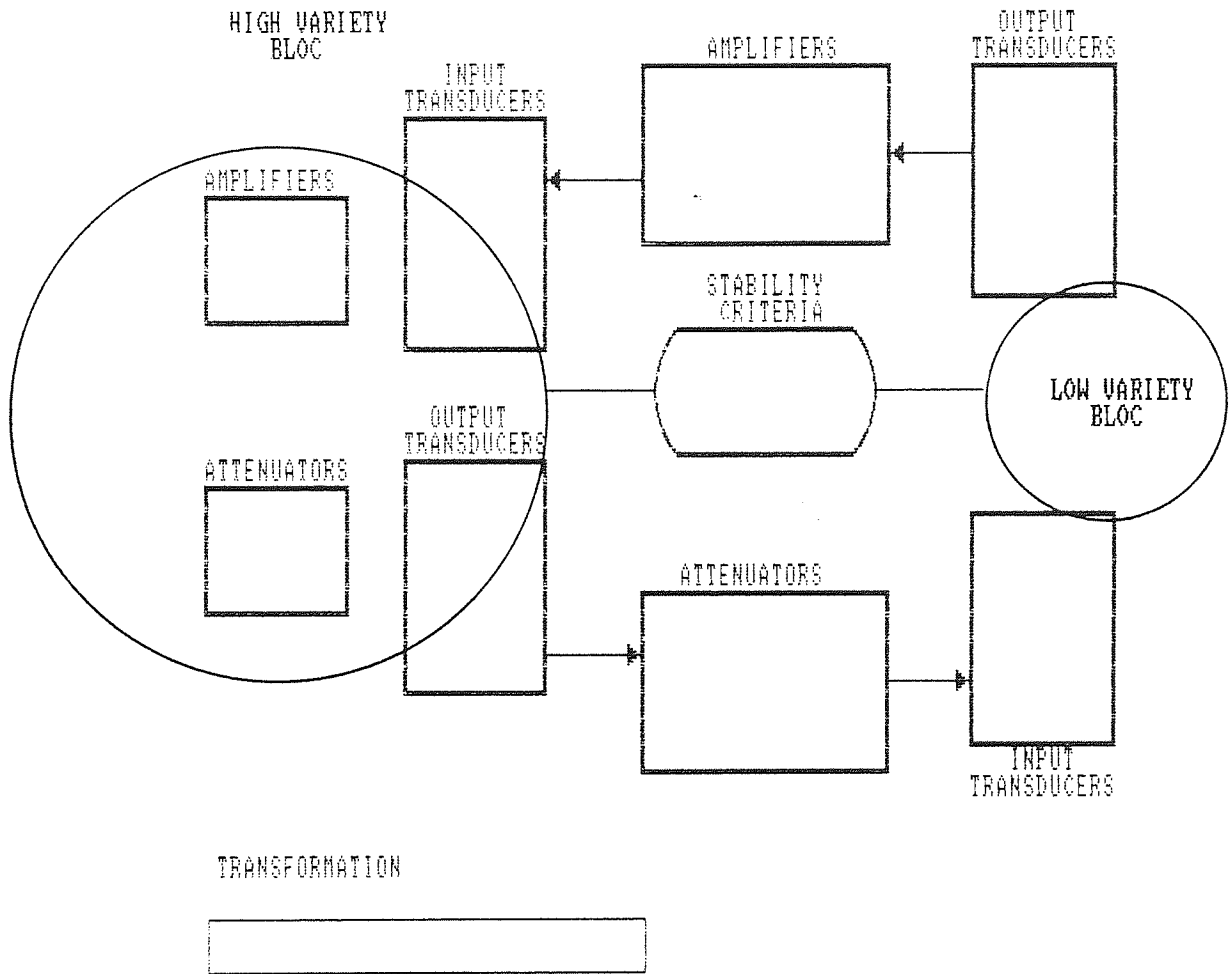


Figure 2-11 Regulatory Loops Format

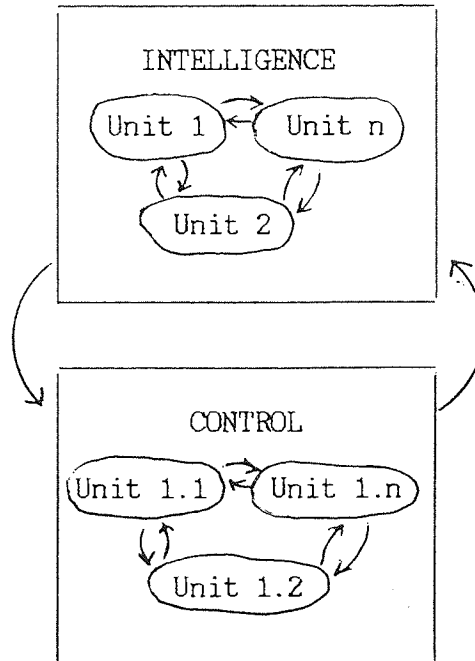


Figure 2-12 Regulatory Loops between Entities

the IM framework (the model which forms the basic strategy for design as discussed in 2.2.5).

2.2.5 INFORMATION MANAGEMENT

2.2.5.1 FRAMEWORK

Information management (IM) concerns processes that support the individual in matching his information processing capacity to his information needs. From studies mentioned earlier (in 2.2.4), a number of frameworks emerged, one of which is the framework for IM as proposed by Espejo and Watt (1988). This IM framework (Figure 2-13) will be the core theory used in the research. It unfolds from the understanding that there is a mismatch between managerial information processing capacity and the

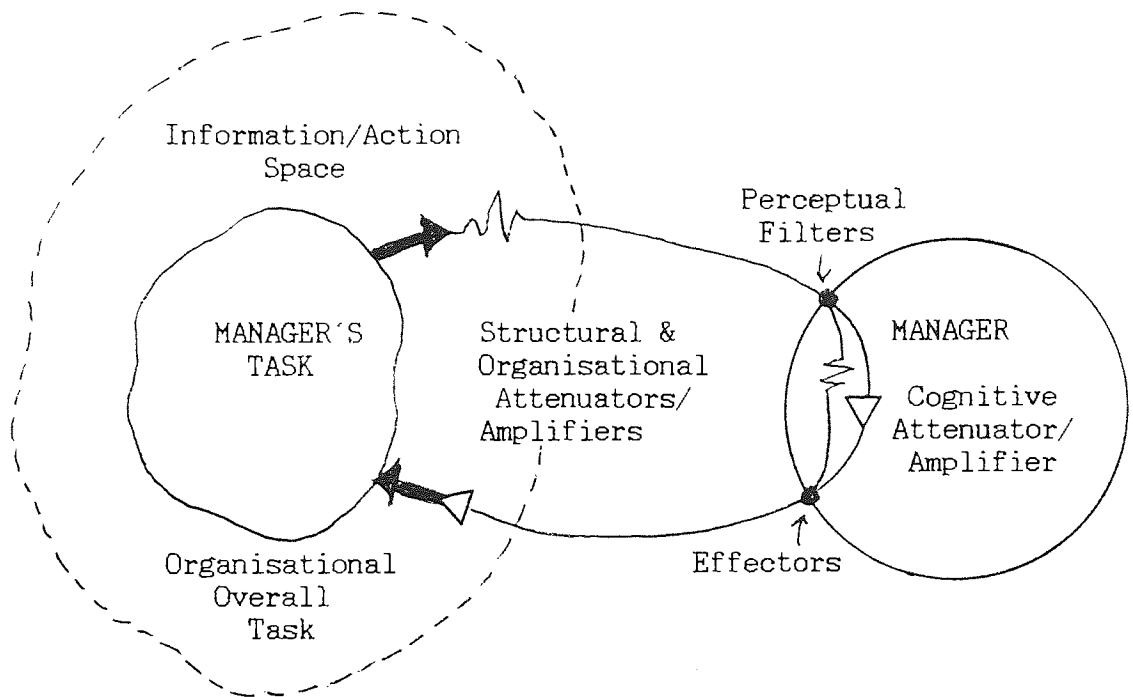


Figure 2-13 Information Management Framework

(Adapted from Espejo and Watt 1988)

amount of data available for processing. The description of the framework is as follows:

- a. Organisational structure provides the main amplifier for the manager, and the main way to attenuate organisational complexity. It acts as a bridge between the manager and his tasks;
- b. Organisational conversations acts as amplifiers and attenuators that relate the manager to other people in the organisation e.g. to get staff commitment through inter-personal interactions or to get valid information; and
- c. Cognitive style of executive represents models (mental models) which can act as amplifiers of managerial variety.
- d. Information/action space is the full complexity of the tasks the

manager is accountable for, which in the case of a managing director is the corporation. Information space (input end) and action space (output end) refer to the same "physical" space but, from the manager's point of view, require different (but complementary) sorts of procedures. In practice, due to organisational structure and the manager's own capabilities, there is always a tendency of "fit" between the manager's information-processing capacity and the information space. The level of satisfaction in this matching, however, is questionable.

- e. Manager's task is the actual activity(ies) the manager carries out. It concerns a domain of operations that is more complex than the manager, thereby creating a situation of imbalance. What is required is that the manager attenuates the variety of the task and amplifies his own variety.
- f. Perceptual filters and effectors are the respective abilities of the manager to perceive and influence situations, i.e. the complexity of his cognitive maps and his decisional abilities, which define his effectiveness as information filter and problem solver.

2.2.5.2 STRATEGIES FOR INFORMATION MANAGEMENT

From the framework (Figure 2-13), three general strategies for IM are adopted for the purpose of design. They are organisational design or adjustment, design of organisational conversation, and design of manager-to-task fit.

(1). ORGANISATIONAL ADJUSTMENTS

This strategy relates to the adjustment of organisational structure, where the organisation is seen as a two-way bridge between the executive and the situations concerned. The organisation concerns formal and informal structures, a complex of relationships - channels, loops, linkages - of commitments, responsibilities, and accountabilities. The manager learns about the situation he is managing through this structure. Organisational adjustment implies designing communication channels so as to lessen the amount of information bombarding the manager, while yet maintaining organisational cohesion. The goal is an improvement in relationships, and increased commitment both of which contribute to enhance control.

(2). DESIGN OF ORGANISATIONAL CONVERSATIONS

Organisational conversations are the mesh of the network called organisational structure. They are essentially to do with mutual commitments. Developing these conversations involves the design of processes that increase awareness about commitments made in the course of conversations, and reduce the chances of breakdowns in communications. This will facilitate inter-personal interaction.

(3). MANAGER-TO-TASKS FIT

This refers to the individual manager's information processing capacity as he develops beliefs, perceives things, processes data and takes action.

In other words, his decision-making capacity will be determined by his cognitive capabilities and styles. The **manager-to-tasks** fit concerns the design of tools/models to enable the manager to regenerate/create (amplify) in his own mind appreciation of situational complexity while extracting patterns (attenuate) from data received about the situation.

2.2.5.3 INFORMATION MANAGEMENT LINKAGES

IM, in this research, is related closely to the concepts of information systems (IS) and IT. According to Earl (1989), IM strategy links with both IS and IT. While IM relates to management, IS is related to applications, and IT with delivery. Figure 2-14 illustrates his viewpoint of the relationships. His IM strategy, which is organisation based, relationships oriented and management focused, is similar with that propounded by Espejo and Watt.

2.2.6 DECISION-MAKING, CYBERNETICS AND INFORMATION MANAGEMENT

An innate feature of managing an organisation is the process of decision-making, which has information as its crucial ingredient. It is traditionally accepted that decision-making constitutes the core of managerial activity (Bonczek et al 1979). They describe both individual (managerial) and collective (managerial systems) decision-making essentially in terms of information processing. The use of IT with decision support systems (DSS) and expert systems (ES), helps to improve the process of decision-making and management. As stated by Sprague:

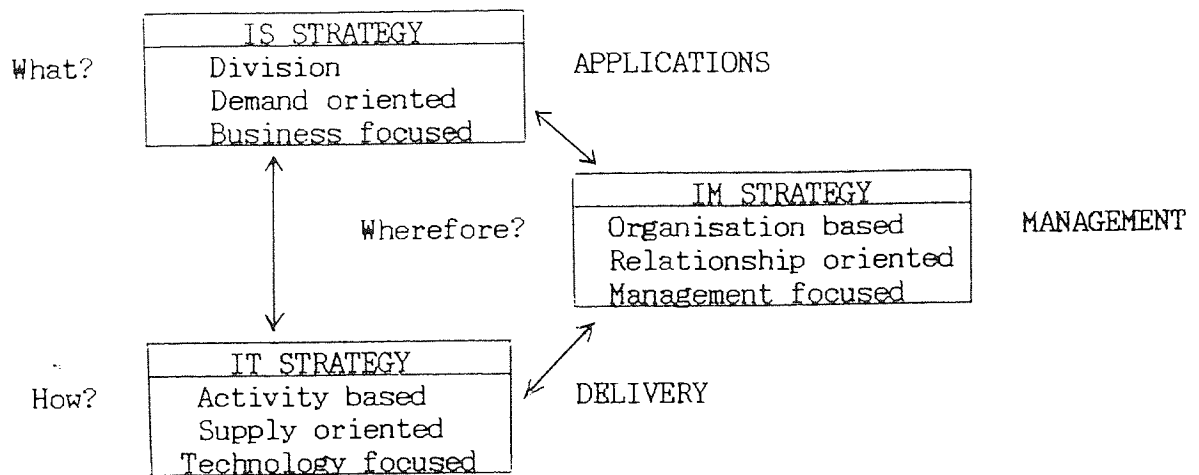


Figure 2-14 Three Levels of Information Strategy

(Adapted from Earl 1989)

"DSS, therefore, is not merely an evolutionary advancement of EDP and MIS, and it will certainly not replace either. It is, rather, another powerful weapon in the IT arsenal to improve the effectiveness of managers in organisations." (Sprague 1980)

In cybernetic terms, decision-making takes into account aspects of organisational decision-making, problem-solving and organisational learning. The learning aspect of decision-making is highlighted by Cyert and March (1963), who mention the changes in an organisational behaviour as part of the learning process. They reiterate that organisational learning encompasses adaptive behaviour over time and that organisational adaptation uses individuals of the organisation as the instrument. Basically, they delineate three different phases of decision process, which are: adaptation of goals, adaptation of attention rules and adaptation of search rules. Therefore, an organisation changes goals, shifts attention and revises procedures through experience. The learning process is validated in the loop-process appertaining to the "black box" concept. Organisational learning is effected after both "anticipated" and "expected" errors are identified.

2.2.7 MANAGEMENT PERFORMANCE

The word "performance" can mean different things: individual/organisational performance, efficiency/effectiveness criteria of performance, success criteria, and productivity. Its measurement method also has different implications. Performance may be viewed in terms of individual performance determinants which is as depicted in a model (Figure 2-15) by Cummings and Schwab (1973).

In the context of the cybernetic viewpoint adopted by this research, while efficiency is necessary to ensure the smooth running of an organisation, effectiveness holds the key to make possible organisational viability. The approach of management cybernetics to matters of effectiveness, is to aim to improve overall organisational communication and control. Thus there is an emphasis on organisational over individual performance levels. The study of executive performance takes account of the effects of executives' performance in the organisational domain of responsibility they are held to control. Components such as people, machines, equipment, finance and information influence individual actions, and conversely individual actions affect organisational performance.

Organisational performance therefore is the cumulative effect of performance by the individuals who make up the organisation. Increased organisational performance can only be achieved with better design of communication and control systems. Thus the stress is upon systemic effects, in the understanding that no single entity alone influences organisational performance.

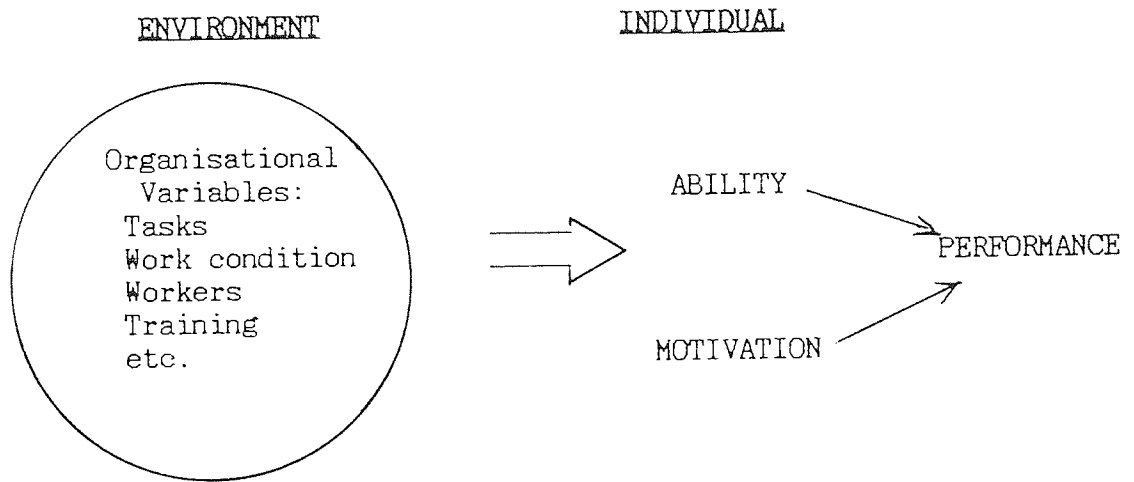


Figure 2-15 Performance Determinants Model

(Adapted from L.L. Cummings and D.P. Schwab 1973)

Executive performance refers to success of executives in managing complex organisation, determined by certain success criteria. These criteria, also known as stability criteria or performance factors are defined as key areas where high performance is necessary if organisational objectives are to be met. Rockart (1978), in his definition of information needs for chief executives, usefully wrote about "critical success factors" (CSF).

Performance or productivity measurement is also significant in our discussion, but is more easily determined in economic-based organisations than in service-based systems such as MPS. The stability criteria here is in large part a function of the satisfaction of the people, and therefore, a difficult thing to pin down and measure. From a systems' standpoint, a measurement process has to take into consideration the combined economic, social, political and other factors in totality rather than an isolated measurement for each factor.

One method of attempting to deal with the problem of efficiency in the public sector, has been the publication of performance indicators for individual agencies (Smith and Mayston 1987). Basing their study on the British public sector, they found that in most cases performance could only be measured relative to other agencies offering similar services. There rarely exists an independent measure of "ideal" or "standard" performance.

Beer (1979) has propounded a method of measuring performance, the model of which will be shown in Chapter Three.

2.3 CURRENT SITUATION

2.3.1 APPLICATIONS OF CYBERNETICS AND INFORMATION MANAGEMENT

Stafford Beer's contribution to the applications of management cybernetics can be found in his work throughout the world. Perhaps his most ambitious project was in Chile (Beer 1981) with involvement by Espejo (1980b), and Schwember (1977) and others. Beer has led other major projects in Canada (Beer 1985), Uruguay (Beer 1986) and Wales (Beer 1987). The VSM has been applied among other things in education for New Zealand Vocational Training (Britton 1984, Britton and McCallion 1985). See Espejo and Harnden (1989) for a full range of applications. Most of Espejo's work is apparently based on VSM applications (Espejo 1977, 1979b, 1980b).

Floyd (1984) attempts to look at policy-making and planning in local government from a cybernetic perspective. There are other people who use Beer's management cybernetics with some simplification and improvement

(Clemson 1984). Espejo and Garcia (1984) use Beer's work for designing and implementing an information system that facilitates distributed planning in organisations, using the application called "Cyberfilter". Espejo (1977,1979a, 1979b,1982a,1982b,1986) and, to some extent, Espejo and Watt (1978,1988) further expand the use of basic cybernetic concepts and Beer's management cybernetics to explore the area of information management. Others discuss related cybernetic topics such as the impact of cybernetics on organisational study (Morgan 1982), corporate strategy as guided by the insights of cybernetics (Morgan 1983), and cybernetics decision and political analysis (Steinbruner 1974). Thompson develops a set of propositions about organisational design and behaviour from a theoretical base different to that used by Beer, although it generally supports Beer's work, and vice versa (Thompson 1967). Various materials related to organisational studies come in handy to support the understanding of management cybernetics although their approaches may differ.

With regards to information management (IM) and decision systems, a number of useful studies have been carried out by Espejo and Watt (Espejo 1977, 1979a,1982a,1982b, Espejo and Watt 1978,1988). Galbraith's work on IM from an organisational development perspective is also useful (Galbraith 1973), while Mitroff discusses MIS and cognitive styles of management and fitting the managers to their tasks as one of the IM strategies (Mitroff and Kitmann 1975). Simon (1977) does empirical observation on MIS and finds that they are generally not used by managers and are regarded as failures, and in his earlier findings discusses self-regulation in MIS (Simon 1969). Zani (1970) also describes failure of MIS in that most MIS designs do not give significant attention to the intended function of

organisational models within the organisation. Miller (1956) looks at the psychological aspect of management information strategy. Common criticisms of MIS (Ackoff 1967) call for better utilisation in decision support.

Cybernetics is relatively unknown in Malaysia. Development and design of IM and decision support systems are mostly based on traditional approaches, which are unsystemic and do not involve cybernetics.

2.3.2 INFORMATION TECHNOLOGY

2.3.2.1 LITERATURE AND TREND

Information technology (IT) comprises devices and techniques used to handle information, and encompasses various technologies such as computing, microelectronics, and telecommunications (Simons 1985). As such, it is geared primarily for information processing purposes. Numerous information tools (both hardware and software) are used in this process - data processing (DP) tools which include mainframes, minis, micros or personal computers (PC) and their peripherals; office automation (OA) equipment such as wordprocessors, and other document processing tools; and telecommunication tools such as telephones and public data networks.

Applications supporting these tools are databases, data storage, data communications, MIS, DSS, artificial intelligence (AI), expert systems (ES), OA applications such as wordprocessing, electronic mailing, graphics; and communications applications which include distributed

systems, computer networks such as local area networks (LAN), wide area networks (WAN), and others.

In this research, I am not emphasising IT as such, but its relevance to the research development i.e. its relation with IM. Literature on relevant IT applications is found in Appleton (1977), Crowe and Jones (1974) on databases application to IS, Holroyd et al (1985) on ES as complementary tool for decision-making, Winston (1984) on the use of AI to make computers more useful, and Flores (1982) on future office tools and IM strategies. Sutherland and Morieux (1988) state that current applications of IT mostly lie in the areas of office information systems (OIS) and end-user computing (EUC).

The following describes the current international and Malaysian trends in IT applications. In the world scene, AI and ES (classed as advanced IT) have generated government involvement through mammoth investment in research and development. Although USA initially led the way for AI and ES development, it is the Japanese plan in 1979 for a "fifth-generation computer" that had a huge impact on the rest of the technological world (Simons 1985). The difference from the earlier generation computers is that the fifth-generation computer has a knowledge-based function, intelligent user-system interface, and inference function based on accumulated knowledge. UK's Alvey programme and Europe's Esprit were launched in 1983 as a response to the Japanese initiatives. The Alvey project calls for a collaborative effort by the UK government, industry and universities with the aim of developing IT products. The USA government response to the Japanese challenge comes from the Defence Advanced Research Projects Agency (DARPA) of the Department of Defence in

1983. However, it is still thought that Japan trails the US in ES development as seen from the initial ES work by Hitachi in 1981, which is a couple of decades behind many American firms (Simons 1985).

In Malaysia in the last decade, the public sector has invested extensively in computerisation. The first computers were installed in the Departments of Statistics, Inland Revenue and Telecoms in the 1960's. Today, computers have a firm footing in most MPS organisations. A 1982 Computer Survey revealed that there are 153 computers - 59 mainframes and 94 minis in MPS organisations (Kadir 1986). The reason for this progress is the realisation that computers may be able to assist management in national administration and development.

The advent of the personal computer (PC) in the late seventies has generated and renewed interest in the potential usage of computers. This trend, however, has caught on more rapidly in the private sector than in MPS. The infiltration of PC does not create management interest initially. Recently, however, the trend indicates increased management interest. The latest advancement in computer applications in the fields of MIS, DSS, OA, ES and AI, generates the further problem of finding means of integrating these with the already advancing technologies such as databases, distributed systems, computer networking and graphics. MIS and DSS are two popular areas of discussion in Malaysia related to the use of computers in management. A seminar related to computerised MIS was held through a combined effort involving the Manpower and Administrative Modernisation Planning Unit (MAMPU) and IBM in 1986, the purpose of which was to provide exposure to MPS executives in IT-related fields. It is commonly accepted among DP personnel and management in the public sector,

that there is an urgent need to improve IM and decision support among top executives. The CEIMS in the PMO, for instance, is developed in a similar fashion to that of the White House when it was first set up in USA (Beal 1984, Hinckley 1984, Carter 1976 and Smith 1984). In MPS, usage of most departmental computers are extended to be able to cope with the needs of information support for management decision making.

In the literature pertaining to information systems for top-level executives, Alter (1976) points out that databases have not satisfied the need for effective information at higher levels of management. Beal does work for the U.S. President on decision-making in crisis situations (Beal 1984). Beer himself worked on a number of contracts for top level government users (Beer 1981,1985). Other work looks at executives' use of the computer terminals (Carter 1976), the White House decision-making using computers (Hinckley 1984, Smith 1984), planning and management (Mintzberg 1976), chief executives information needs and the use of CSF (Rockart 1978,1979). There are many other examples.

2.3.2.2 RELEVANCE TO RESEARCH

IT is widely accepted as a powerful tool in the overall design and applications of IS. The relevance of IT to the research is the support it provides, alongside IS, to IM strategies (the relationships between IT, IS and IM were shown in Figure 2-14). As this research is about the design of an office and information system, IT is considered to be the tool to help build IS applications for management use, thereby supporting the IM situation.

The use of tools such as PCs, word processors, computer networks, and so on greatly facilitate office functions such as planning, decision-making and advising. This can speed up communications and information processing which are the key activities of an information office. In the context of the research, PMO serves as an information office for the PM. However, the design of IT processes in the research is situated within the overall design of communications and control systems. This is vital so as not to divert ourselves from the intended holistic design into a technical design.

The relevant aspects of IT are mainly related to information and office systems design. The discussion is made more apparent by viewing IT by its two components: hardware and software tools.

1. **Software** Software tools used in the research process are for data collection, design, analysis, diagnosis, and information processing. For data collection, I have used Viplan (Appendix 4). Online IS using databases (such as SQL and ORACLE), query programmes (such as INTELLECT) and decision support systems (DSS) were made available for the purpose of information storage and retrieval. In the OS for the PM, IT plays a major role in that existing databases and information systems on mainframe computers primarily support the PM and MPS executives. ES is another IT software tool that needs to be incorporated in the modelling of our OS.

2. Hardware Apart from the software component of the technology, several types of machines, equipment and communication tools form the necessary hardware support to supplement our OS design. The PC is one of the key hardware tools. PC applications have become increasingly popular among the management group, and regarded as a useful "end-user" tool. Other IT applications relevant to our design are communication tools such as public data lines in the form of Private Automated Branch Exchange (PABX), graphic facilities, electronic document communication tools and word processing facilities.

Hardware and software tools are used complementarily with one another. We can, for instance, use a PC or a mainframe terminal to access databases or IS with the support of a network system. All this adds up to the integrated application of computing, telecommunication and microelectronic technologies. IT enables the concept of "end-user computing" (EUC) to be realised, through the applications of stand-alone systems such as PCs, supported by end-user software and network systems. It is hoped that, with IT, the PM and other MPS executives are ably supported in their pursuit of information.

The use of IT can affect MPS structure and productivity. For some time there has been considerable interest and speculation about the effect of IT on organisation structure. Keen (1981) stresses that IT is increasingly making it possible to place the information where the user is, rather than vice versa. Thus IT enables major changes in the

structure of organisations (Koenig 1986). On IT influence on productivity, Broadbent and Koenig (1988) mention the extreme difficulty of measuring the productivity of those functions typically supported by IT, and as one ascends the hierarchy from operational towards management and strategic levels of organisations, it becomes yet more difficult. The use of IT in MPS aims to improve the productivity of the PM and MPS executives, assuming that systems at their disposal are well designed and support them with relevant information. While it is widely recognised that IT has not achieved its full potential in IM, technological change has undoubtedly contributed to a certain degree by increasing levels of productivity. However, in MPS there is a strong belief that IT is relevant to increased productivity and performance, although lacking in quantitative evidence.

2.3.3 OFFICE SYSTEMS PRACTICES

In this section our interest is in the current world trend in OS applications, where OS is often equated with the term OA. For this research however, OS refers to more than automation, as will be discussed in later chapters. Our discussion centres around trends in main OS applications, with major contributions by OS vendors in developing and marketing established OS software, tools and technologies. New alternative tools for OS will also be mentioned.

Towards the end of the last decade, information technologists began to toy with the idea of the electronic office replacing the conventional office. The subject of office automation (OA) has been generating increasing interest ever since. The idea of combining computing, telecommunications

and office services into a technology designed to increase the productivity of the burgeoning office sector has been highly seductive (Liston 1986). Today, a further step has been taken whereby IT has merged into a sophisticated office information system environment. While the use of IT in office environment is becoming popular, its effective use is still doubtful. This situation can be improved if office technology products are used integrally.

Today's OS applications (Naffah 1984) are best summarised to include: individual workstation services (including document production, electronic spreadsheets, business graphics, enhanced telephony, managers' programming aids, ES, and integrated systems); cooperative workstation services (electronic mail, teleconferencing, teletex service, viewdata/teletext, and facsimile document transmission); corporate databases (information retrieval and query languages, image banks); office workstations (high performance multipurpose workstations, autonomous personal workstations, connected office terminals); and networking capabilities (WAN, LAN, PABX, interlinking networks).

OA, however, should not be taken to refer to any particular combination of technologies or specific set of tools (Wainwright et al 1984). It rather encompasses all technologies and tools used to support information work in offices. According to Wainwright, some of the type of tools are word processors, computerised PABX, personal computing, graphics facilities, online information sources and electronic document communication. Of these, WPs are the least used by managers. Available tools that may be increasingly used are professional support systems (such as IBM's PROFS), intelligent knowledge based systems (IKBS), videoconferencing, electronic

filing of texts and pictures, voice annotations and local and wide area networks.

The implementation of OS involves the use of a multitude of tools including software, hardware, communication networks, and office equipment. Many established OS software is flourishing in the market today as a result of increased competition among OS products and greater demand by non-technical users.

One of the best known OS products is marketed by IBM, who, over the years, has developed a wide range of individual office applications. To cater for a wider range of needs, in 1982, IBM produced a software product called PROFS (Professional Office System). It is widely used by IBM's community of mainframe VM (Virtual Machine) users throughout the world. As an integrated system, PROFS is able to deliver a broad collection of electronic office services to a wide variety of users (Kellog 1986). Its applications include word processing, electronic messaging, electronic document distribution, electronic filing and retrieval, calendar management, and teleconferencing. It has attracted users around the world, including the existing CEIMS in PMO. Today, through an intelligent workstation, PROFS can be used in both mainframe and PC environments, as well as being compatible with other databases. This wide usage is enabled by a networking environment. Another such product is DISOSS (Distributed Office Support System). It differs from PROFS with respect to their operating systems.

Another product is OBE (Office-by-Example) - an integrated office information system that has been under development at IBM. It supports

office features such as database tables, word processing, electronic mail, graphics, images, and so forth. Videoconferencing (Drayer 1984) is another of IBM's OS tools. There are 29 such centres installed throughout IBM in 1982.

Other integrated software includes Xerox's STAR, Lotus's Symphony, and Lotus's 1-2-3. In contrast with IBM's OS products which loosely integrate different applications (requiring translation between different data formats and possibly interactions with the file system (Whang et al 1987)), these products are tightly integrated systems that support common data structures for information exchange, as well as common operating environments.

More recent OS applications are outgrowths from the fields of AI. OMEGA (Barber 1982) is technically a knowledge-embedding language used to embed a specific job description into an office worker's workstation in support of problem solving. However, as with many existing OS models such as SCOOP, ICN, and OFS, it is viewed as not being appropriate for OS development (Hirschheim 1985).

Technology is the key to better OS applications, not in terms of sheer computing power, but in terms of the communications capability it supports. Related to the cybernetic view on communication and control, OS applications that put these as priority over technology are few and far between. Beer's Management Centre, COLAB, COORDINATOR and GDSS are among the new tools promoting improved effective communications in OS.

Management Centre, which originates from the concept of an operation

room, is a tool that facilitates communications, coordination, integration and problem-solving for the benefit of managers. Its concept and design will be discussed in detail in Chapter Seven.

COLAB is an experimental meeting room designed for typical use by managers (Stefik et al 1987). It is based on the fundamental requirement of providing a coordinated interface for participants - therefore a multiuser interface system. At Xerox PARC, COLAB has been created to study computer support of collaborative problem solving processes in face-to-face meetings. Its design is for small working groups of two to six people using personal computers over a local-area network. The concept of meeting room using IT has been applied in the US President's White House system (Hinckley 1984) - with the creation of a conference centre that brings the latest audio-visual technology and state of the arts graphics, maps, and so forth.

COORDINATOR is a workgroup productivity system that is in widespread commercial use on personal computers (Flores et al 1988). It is a system for managing action time, grounded in theory of linguistic commitment and completion of conversations. It is therefore a communication tool that supports organisational conversations. Communications may also be improved in an open-space office environment which has become a widely accepted thing today.

Vogel and Nunamaker (1990) studies the multi-methodological impact of GDSS (Group Decision Support Systems). It is about face-to-face conferencing, and its implication on efficiency and effectiveness based on the number of people involved and the technology used.

Governments also have their roles in OS application development. In the UK, the use of technology in OS is applied in Central Government departments (Liston 1986). Wilson (1985), in a report which reviews the current developments in OA in the UK public sector, identifies (in March 1984) more than 20 test sites spanning a wide range of organisational types, from the National Health Service, through local government generally, to public corporations such as the National Coal Board and British Gas. Seven of the sites (with related manufacturers in bracket) involved in the Central Computer and Telecommunications Agency or CCTA are: the Cabinet Office (using Xionics System); the Department of Trade and Industry (Rediffusion computers based on a Data General minicomputer); the Export Credit Guarantee Department (IBM mainframe with IBM PCs for OA applications); British Rail (Office Technology Ltd); Ministry of Health and Social Security (Systime); Department of Transport (Philips); Ministry of Defence (Datapoint); and National Economic Development Office (Systime). Among the other manufacturers involved in other public sector organisations for OA development are ICL, Honeywell, Hewlett Packard, Burroughs, Digital Equipment, Racal Information Systems, and Wang.

In the private sector, in virtually all the large organisations, OA is in its infancy (Wilson 1985). In Europe, the ESPRIT programme encourages OS development, along a variety of fronts: - in functional analysis for office requirements; multi-media user interface at the workstation; intelligent workstation; local wideband communication system (involving Philips, Plessey, General Electric Company, Siemens, Nixdorf, etc); broad site local wideband communication system; broadband Office Communication system (Olivetti and Nixdorf); and so forth. The FAOR (Functional Analysis of Office Requirements) project is in fact the outcome of one

ESPRIT project. Schafer et al (1988) stresses FAOR notion of an office as "an open, dynamic, not geographically confined socio-technical system, where information and communication technology is utilised in socially coordinated action in order to achieve the objectives of the organisation of which the office may only be one part. Moreover, in the office individual objectives are also pursued." This implies a broad understanding of the office. The FAOR approach is built upon the premise that an office is an amalgam of "hard" and "soft" characteristics. The approach in fact embodies a "multiperspective" component - perception via alternative viewpoints; activity framework; benefits analysis; and methods/tools. FAOR also embraces the principles of Checkland's Soft System methodology (SSM), but in a simplified form.

In conclusion, recent and future developments in OA and OS provide significant new opportunities to improve performance, to enhance the working environment and to generate new services and products. However, the potential offered by the technology has not always been realised in practice. The solution suggested by cybernetics is to improve the systemic aspect of OS design, with the emphasis on organisational communications, as attempted in the research.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The purpose of this chapter is to provide an insight into methodologies and related terminologies. The following phases will be adopted, and are introduced and discussed in this section: problem definition, understanding of fundamental concepts, use of methodology, applications of methods and design of system. After this introduction, I will discuss the methodologies relevant to the research, the specific research approach and data collection problems. Finally, I will introduce various research-related terminologies such as method, diagnosis, design and conceptual modelling.

3.2 RESEARCH REQUIREMENT

3.2.1 PROBLEM DEFINITION

To carry out the research, a problem has to be identified, related to the current situation in the Malaysian public sector (MPS). This has been described in Chapter One, which provided an overview of the current problems related to the use of information systems and technology in the Malaysian public sector. It also argued that it is necessary for the research to be undertaken.

3.2.2 UNDERSTANDING FUNDAMENTAL CONCEPT

Fundamental concept has also been covered in-depth in Chapter Two, and therefore will be mentioned briefly. Sound theoretical knowledge is the logical pre-requisite to methodological studies. It is needed in order to be able to identify the relevant topics for the thesis. This is through literature searches, and pinpointing relevant sources through both formal and informal means.

3.2.3 USE OF METHODOLOGY

In the words of Checkland (1981), methodological theories are concerned with ways to go about investigating the subject matter. Methodologies are used to tackle real-world, ill-defined, complex problems in social systems. According to Espejo:

"A methodology is therefore a set of interrelated activities aimed at facilitating the intervention of analysts in organisational problem situations." (Espejo 1986)

This research uses the ideas of "soft systems methodology" (Checkland 1981) and "cybernetic methodology" (Espejo 1986).

3.2.4 APPLICATION OF METHODS

Methods are specific programmes of actions which will produce standard results (Checkland 1981). A sub-system of such programmes are the processes necessary to implement a research methodology. The latter might include as a further subsystem, models, tools (products), and structures.

Processes are on-going activities enabling a transformation to take place for the system to be designed. They are often identified as tasks, tools (products) and techniques used to accomplish procedural components of methodology. Data collection and analysis, identifying research topic and cybernetic study of problem situation are instances of processes.

Models are necessary to describe real-world situations. For the research, the models designed are based to a large extent on cybernetic modelling conventions which include structural recursion models, regulatory mechanism and viable system model (VSM).

The use of tools or software products such as Viplan (as described in Appendix 4) helps in the process of data collection and analysis. A number of other products are used in the system design, some of which are PROFS, SQL, INTELLECT, DbaseIV, Cyberfilter, and so forth. Cyberfilter (Espejo 1984) is a DSS tool which aims at creating an effective balance between managerial capabilities and organisational complexity.

3.2.5 DESIGN OF SYSTEMS

Design is inventing and developing a possible course of action. This involves generating processes to understand the problem, in order to point towards solutions and to test solutions for feasibility (Simon 1977). This final research requirement involves the design of process, product or tool, organisational structure and information systems. Among these, product design does not require actual design of new products. Rather, it implies selection and integration of appropriate software or other products. Products such as Viplan will be essential as part of the data

analysis phase.

3.3 RESEARCH METHODOLOGY

The research uses a more systemic methodology rather than a linear and reductionist approach. The problem-solving approach along the lines of soft systems methodology (SSM) and cybernetic methodology (CM) is being adapted here, the outcome of which is seen in Figure 3-3. While Figure 3-3 is the research problem-solving methodology, Figure 3-4 is the flowchart of the overall research process where the input and output are recognised. Schedule 3-1 is the research schedule for the three years duration that the research was carried out.

SSM (Figure 3-1) and CM (Figure 3-2) are applicable in problem-solving situations involving ill-structured and complex problems. In a systems context, such problems are referred to as "soft". The concept of "Root Definition" (RD), as described in Appendix 3, is central to SSM. RD, used in CM, is in a slightly simplified and different manner. The first step in the CM is finding out the problem situation, which is describing the relevant structures and processes of the organisation. The problem structuring phase refers to the naming of systems, which is adapted from soft system's RD. Its aim is to decisively identify a system or systems in order to structure or formulate the problem. This is followed by the next phase which is studying the cybernetics of the situation, made simple with the aid of various tools. The modelling phase follows. The systems "named" earlier are modelled, either conceptually or descriptively.

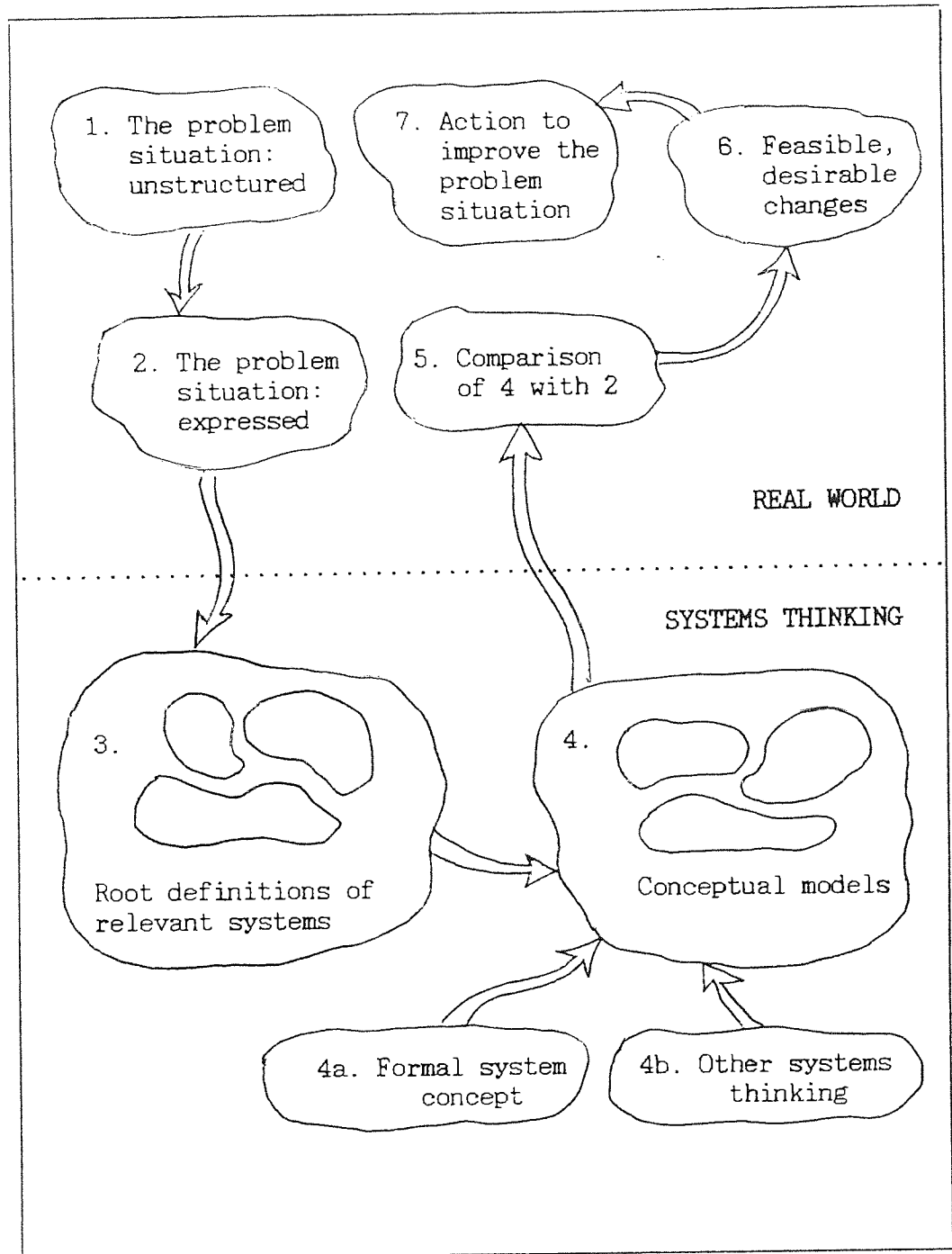


Figure 3-1: Soft Systems Methodology

(Adapted from Checkland, 1981)

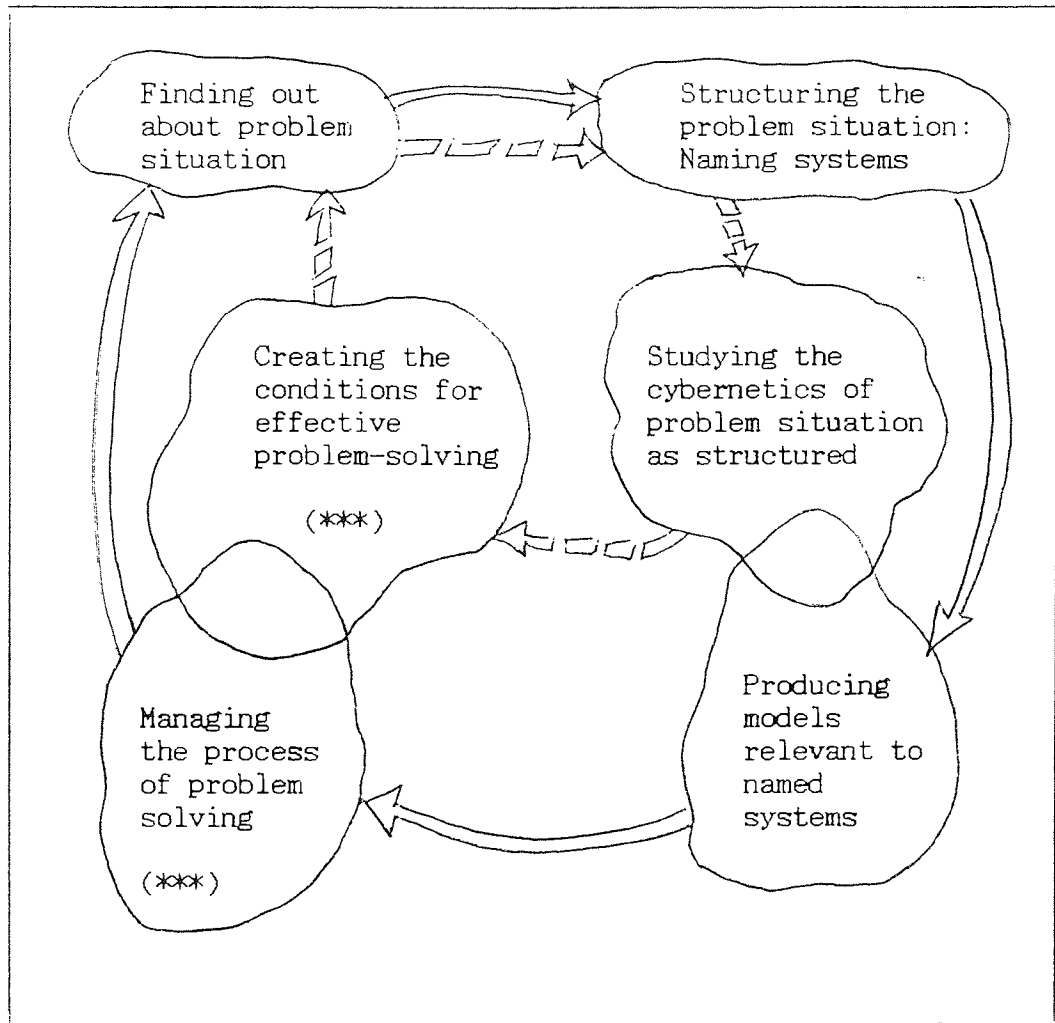


Figure 3-2: The Cybernetic Methodology

(Adapted from Espejo 1986)

Note:

(***) This represents the part of the methodology not being applied for this research. They are applicable for "action" research.

▢▢▢ Inner loop of the methodology

➡ Outer loop of the methodology

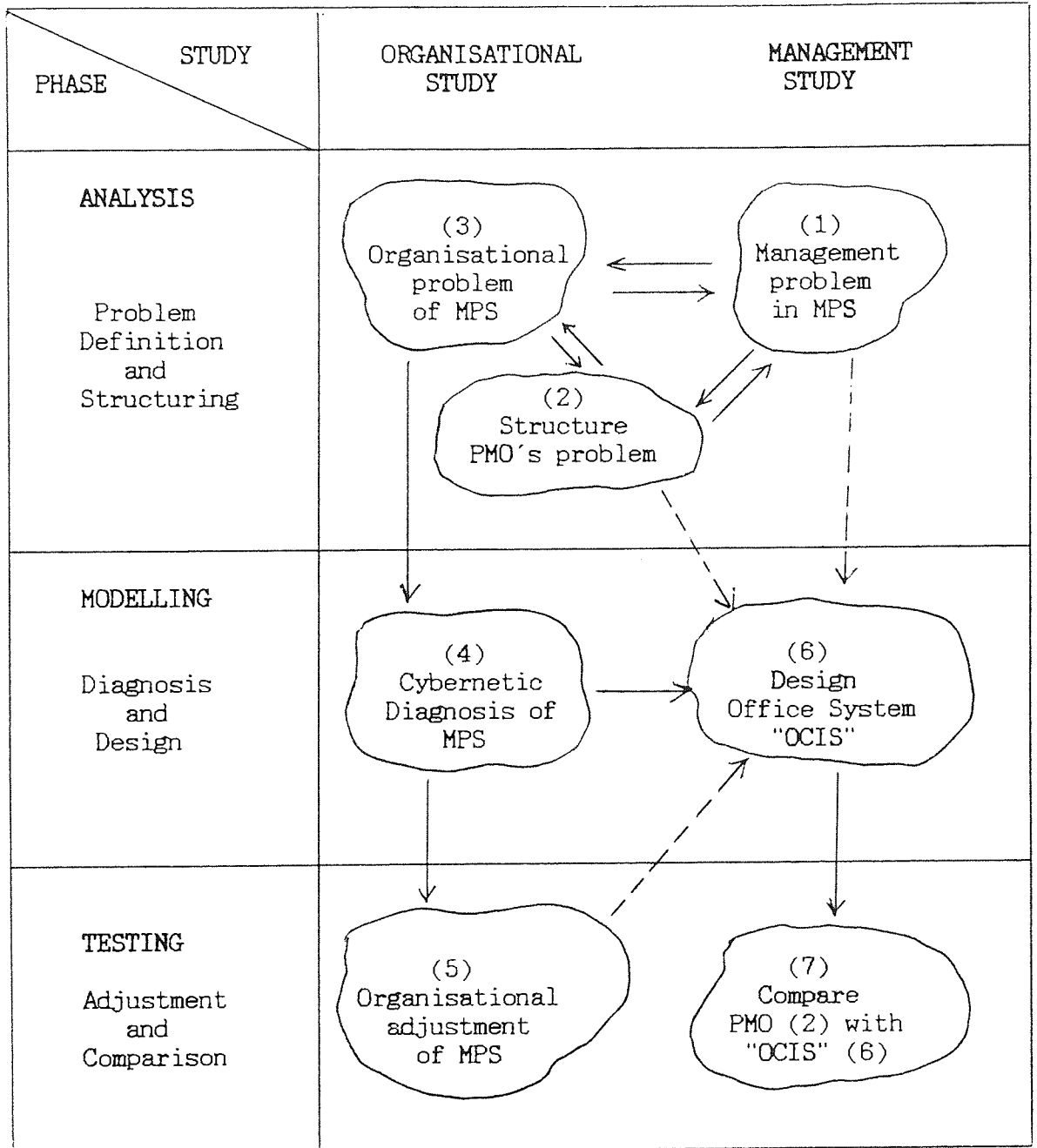


Figure 3-3 Research Methodology

Abbreviations:

MPS Malaysian Public Sector
 OCIS Office Communication and Information System
 PMO Prime Minister's Office

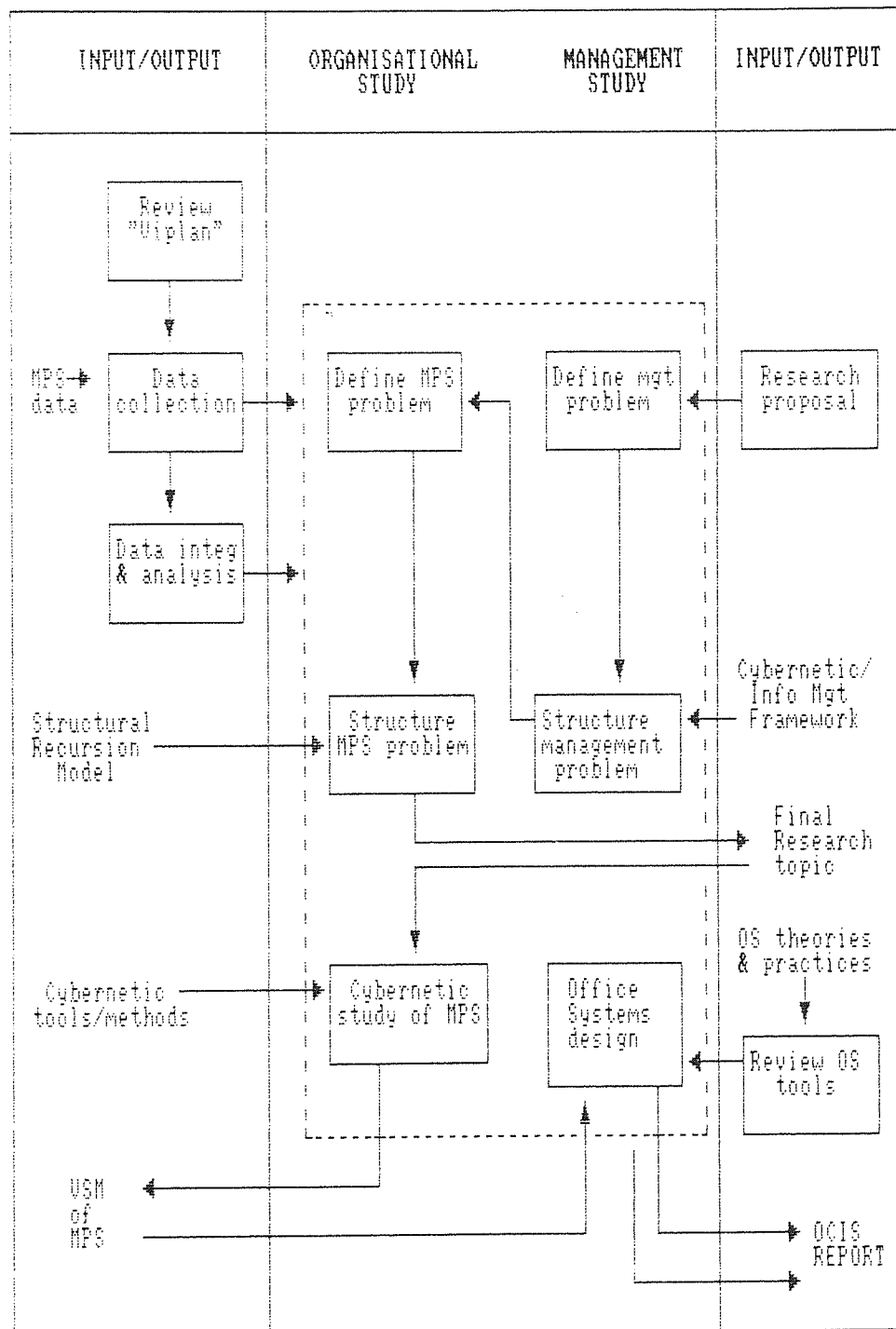


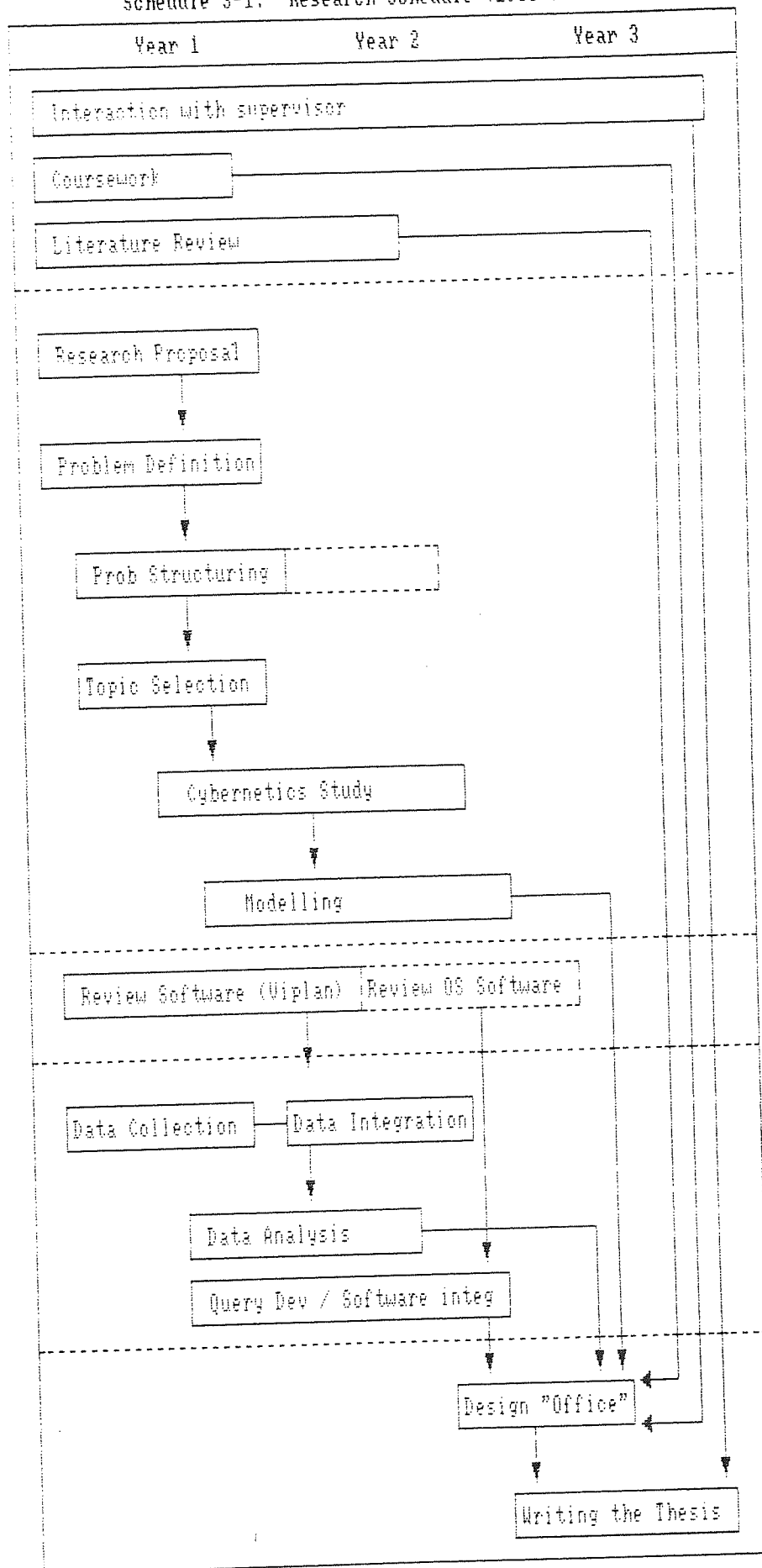
Figure 3-4 Model of Research Process

Abbreviations:

MPS Malaysian Public Sector
 OCIS Office Communication and Information System
 USM Viable System Model

Note: "Uiplan" is a date collection/analysis software tool

Schedule 3-1: Research Schedule (1986-89)



This is followed by creating conditions for effective problem-solving and finally, managing the process itself. These processes are iterative and need not be followed in strict sequence.

The research, not being "action research", need not apply the total methodology. Aspects of the methodology best suited to non-action research (used complementarily with Checkland's SSM) are: finding out about the problem situation; structuring the problem situation (naming the system); studying the cybernetics of the problem situation; and producing models relevant to the named systems.

Figure 3-3, which uses some of the ideas from SSM and CM, is a systemic way of tackling the problem, and can be basically presented in a matrix form. There are three main phases which can be studied from the points of view of management and organisation. These are analysis, design and evaluation. The phases do not strictly follow the number sequence. The numbers are only guidelines. Phases (6) and (7) are discussed in detail in Chapter Seven.

Two types of studies are carried out, namely management and organisational studies. I will explain the research process of Figure 3-4 as follows:

- (1). Research input: The research proposal is performed iteratively with problem definition and structuring. Its outcome is a topic for the thesis which has the consent and approval of the researcher's client. Data preparation involves the preparation of the research outline. It requires decisions to be made on the type and source of data used, the nature of data gathering technique. The credibility

of the data collected depends on this process. Related tasks are data collection, integration and analysis. The final research topic decided after problem structuring, becomes the input for the cybernetic study. Other inputs are design frameworks, concepts, methods, tools, models and practices related to the research area.

- (2). Research transformation: This is the carrying out of the actual research and involves management and organisational studies. The methodology is shown in Figure 3-4 which includes analysis (problem definition and structuring), modelling (diagnosis and design) and testing (adjustment and comparison).
- (3). Research output: The final research topic is decided after the research problem has been defined and structured. In reality, a number of topics are already tentatively considered while making the initial research proposal, but are amended to suit the final problem diagnosed. The result of the research transformation is the report (thesis).

3.4 DATA COLLECTION AND ANALYSIS

The purpose of this section is to discuss methods of data collection and analysis as well as to comment on the problems encountered during the process.

3.4.1 NATURE OF DATA

Data may be categorised as historical and observational and are either primary or secondary in nature.

Historical data are written accounts and records of past happenings and events. They may also be known as literary data. Observational data can either be descriptive, quantified or experimental. Descriptive or normative data are observations which are made directly at the scene of occurrence and then relayed as facts. Quantified observations are data expressed in mathematical form that can be evaluated. They are also called statistical or analytical data. Finally, data from two sets of observations may be compared to form experimental data. These four types of data demand four principal research approaches to deal with each type of data appropriately. However, for the research we will not restrict ourselves to any one particular type.

3.4.2 DATA AND RESEARCH DESIGN

In designing the research outline the following questions are relevant for the data collection exercise: What are the types of data needed? Where are the data located? and How will the data be collected? In this research both historical and observational data are used, whether as primary or secondary requirement. Historical data are used in the preliminary stage of the research during the problem definition phase and when a topic is yet to be determined. They were brought from Malaysia at the beginning of the research. However, as the research progressed, these data proved to be insufficient. Consequently, towards the end of the first year, a brief data gathering exercise was carried out in Malaysia.

Like historical data, observational data in descriptive form were also brought from Malaysia at the beginning of the research. They were collections of personal observations of events in the PMO and public

sector during the period of my attachment in Malaysia. However there is a need for more such data, as those already acquired quickly become out of date (i.e. historical). Updated data was acquired during the trip to Malaysia. Also used was statistical data of PMO and the public sector; these data are collected and stored in PMO's CEIMS database systems.

Primary data for the research are those that contain information pertaining to PMO and constitute the main source of input for this research. They are used in designing the office system. On the other hand, secondary data are more generalised information about ministries, departments and agencies in the Malaysian public sector and provide some support to the overall research, especially in diagnosing the public sector using Beer's VSM.

Data regarding the PMO consist of PMO's objectives, functions, activities, working procedures, organisational structure, personnel information, roles, committees and others. Collection of these data are through interview and observation methods with the aid of software called Viplan.

Data of ministries and agencies in the public sector are of two kinds. One is data that consist of organisational objectives, functions, activities and structures. Most of these data are available through the computer system of CEIMS unit in the PMO. The other is data related to management usage of computing technology in these organisations. Information on executive usage of computer hardware (terminals, printers and personal computers) and software (application systems such as MIS, DSS and databases) are collected by means of interviews and questionnaires.

Interviews had already been conducted by CEIMS. The contents of the questionnaires were designed through the combined efforts of CEIMS's Monitoring Unit and the writer. Among the various areas of interest from these interviews are executive opinion and knowledge of general computing technology; the usage of existing facilities in their organisations as well as benefits of these systems; executive training in computer usage; executive user support services; the availability of applications and their usefulness. These data will be analysed by the Monitoring Unit of CEIMS (extract of the report is in Appendix 1).

3.4.3 DATA AND RESEARCH METHODOLOGY

The nature of data gathered is very much dependent not only on their availability, but among other things upon their integrity, timeliness, reliability and meaningfulness.

Methodologically, the domain of data collection includes gathering, recording and analysis.

In analysing the PMO cybernetically, a software tool called Viplan has been used. Data gathering is done manually using a format based on the structure of Viplan. Appendix 4 describes and critically assesses Viplan. Appendix 4.1 is the format for data collection used for interviews. The processes of data recording are followed almost immediately by PMO's data, gathered through interviews, then transcribed into specifically formatted forms and later transferred into Viplan. They are then analysed, updated and improved accordingly. Data analysis is when recorded data in documents (formatted forms) are used to complete the

information for each role in PMO into the Viplan programme.

3.4.4 ISSUES AND PROBLEMS

Data manipulation is itself a problem due to the huge complexity of the organisation(s) from where the data is gathered. Using Viplan, which is relatively a new tool, makes the task both easy and difficult depending on the nature and complexity of the task undertaken. The following are some of the issues that surfaced during the process of data collection and analysis:

- a). Determining the type, scope and volume of data creates a problem in the early stage of the research since they are heavily dependent on the research topic. Normally, it is advantageous to leave the options open. The problem here is when the data to be collected are not readily available. In coping with this problem, I keep an almost complete set of data on PMO in diskettes, and these are readily available whenever required.
- b). Another shortcoming is in the techniques used. It is not easy to decide the techniques when the clients for data collection are top executives. The choice between using different techniques such as questionnaires, interviews using tape recorders or other media, observation or documentation is the key issue. The use of structured questionnaire type forms with the aid of Viplan is a great help in this. Another way forward is to approach the subordinate executives, normally a level or two below the main key role. An alternative is to approach top executives only on key issues such as getting their consent and approval. This is

permissible in Viplan (interviewing the authorised role defined rather than the role player himself). These methods prove to be quite effective in real situations.

- c). Difficulties are also faced during the actual interviewing of executives. Factors to be taken into account are time constraints and executive lack of understanding of the subject matter. Thus, interviews are made at the most convenient available time and approached as simply as possible. Most of the time, the formatted questionnaires are not fully used during the interviews, although they provide a useful guideline. Immediately after an interview session, data from the interviewer's notes are transferred into the formatted interview sheet.
- d). Using Viplan manually is a tedious task and has to be strongly supported by other means. Later on, data collected have to be transferred into the software and further updated and improved. Viplan as a data gathering tool is not flawless and still has some weaknesses which in time may be remedied.

3.5 MODELLING AND TERMINOLOGY

3.5.1 DESIGN AND DIAGNOSIS

Central to the research is the notion of organisational design and diagnosis, both of which are modes of studying organisational problem situations.

Design or organisational design is the mode of study where the purpose is to create a new organisation or to change an organisation's identity.

Diagnosis is the process of making structural adjustments to existing organisations. Its aim is to improve the effectiveness of the organisation from the viewpoint of communication and control processes.

In carrying out the cybernetic study of MPS, neither the "actual" diagnostic mode nor the design mode is used. It is neither practical to design a new MPS, nor desirable just to diagnose the existing MPS. For the research, it is more meaningful to develop a methodology to diagnose MPS citing some selected examples to illustrate the capability of the diagnostic mode. In this way, the diagnosis is a way of illustrating a methodology to support the design of an office system. The diagnostic mode involves the study of an "actual" organisation and is descriptive in nature. The design mode is the actual design of an organisation and is prescriptive in nature and depends on an expert description of the technological processes. Thus, by employing a methodology for diagnosis, an illustration of the description of how MPS works based on my perception of MPS is attainable. The result is an example of the model of MPS. The intention is not to create a new MPS with a totally new identity.

Organisations may be diagnosed using "theory-in-use" and "espoused theory". Theory-in-use is a study done by observing what the organisation is doing. The diagnostic points are concluded following these observations. Espoused theory is studying what the organisation is supposed to do based on the existing identity of the organisation. Here, the diagnosis is made using cybernetic methods by improving the communications and control processes of the organisation.

3.5.2 CONCEPTUAL MODELLING

Models are discussed in relation to cybernetics and systems ideas. In the context of human activities, models are descriptions, simplifications, abstractions,... of "real world" situations (Espejo 1986). They are logical "aids":

"Conceptual models state the list of activities that are logically necessary to produce the transformation named in the root definition. In the cybernetic methodology this activity can be done either with reference to logic or reality." (Espejo 1986)

Conceptual modelling approaches problem situations through the unfolding of complexity. This involves identifying and indicating "levels of resolution".

Conceptual models list a number of activities, and each of these activities are unfolded into sub-activities. The number of times each activity is unfolded depends on the complexity of the activities and how they are absorbed by management. Since a manager is limited by his information processing capacity, the availability of variety operators (filters/amplifiers) in the form of structures will enable him to manage more effectively. Unfolding these activities is done by working out several "levels of resolution" (Figure 3-5). Each new unfolding of activities defines a new level of resolution. The higher the level of resolution, the more the level of detail. All modelling in the research will be at one level of resolution only, such as systems S1, S2 and S3 of System "S" in our diagram.

3.5.3 MODELS IN VSM - THE INTELLIGENCE FUNCTION

VSM and other related models are useful prior to the cybernetics study of MPS. Intelligence Function or System Four dealing with "outside and then" (Beer, 1979) emerges from the requirement of a viable system to be able to deal with its environment.

ACCEPTED environment of the system is outside the collection of individual systems (referred to as implementation sub-systems) environment (Figure 3-6). This is the sum of the whole environment belonging to these implementation sub-systems put together, plus an expanding environment of its own.

The "unknown future", which is the system's PROBLEMATIC environment, is also outside the collection of implementation sub-systems environments, and concerns the future.

In terms of management requirement, the former calls for REACTIVE type management, while the latter needs INNOVATIVE management skills. Such innovation is needed since the environment is highly specific to the viability of the system, and research with flair is essential. In reactive management, the environment pertains to general interest although requiring special knowledge and dedication.

According to Beer:

"Every regulator must contain a model of that which is regulated"
(Beer 1979)

meaning that within the main system there must be a way of presenting itself in the form of a corporate model.

There is also the requirement for an integration of intelligence activities due to a multitude of intelligence activities performed by various intelligence units. Beer's model on "Key components of System Four" (Figures 3-7 and 3-8) will be used in discussing such integration within intelligence.

As pointed out by Clemson (1984), the task of System Four is to come up with a model that: (a) provides some insight into the workings of the unit; and (b) can be used in the sense that the relevant managers will work with it, at least enough to discover its flaws. In short, we need to design two main models: the system corporate model; and model of the intelligence function itself (by having this, we are modelling the environment).

Referring to Figure 3-7, the model of totality is the system's model. This is an explicit model of the entire organisation the design of which is the responsibility of the intelligence function. Without such a model various managers in the intelligence, control and policy functions will have no reference of an integrated model of the organisation. Instead they will tend to see fragmented aspects, rather than experience a whole.

The elements (or activities) of the intelligence function are illustrated in greater detail in Figure 3-9. They are actually models of the organisation's environment. The systems elements for a marketing organisation may, for instance, have activities such as product design,

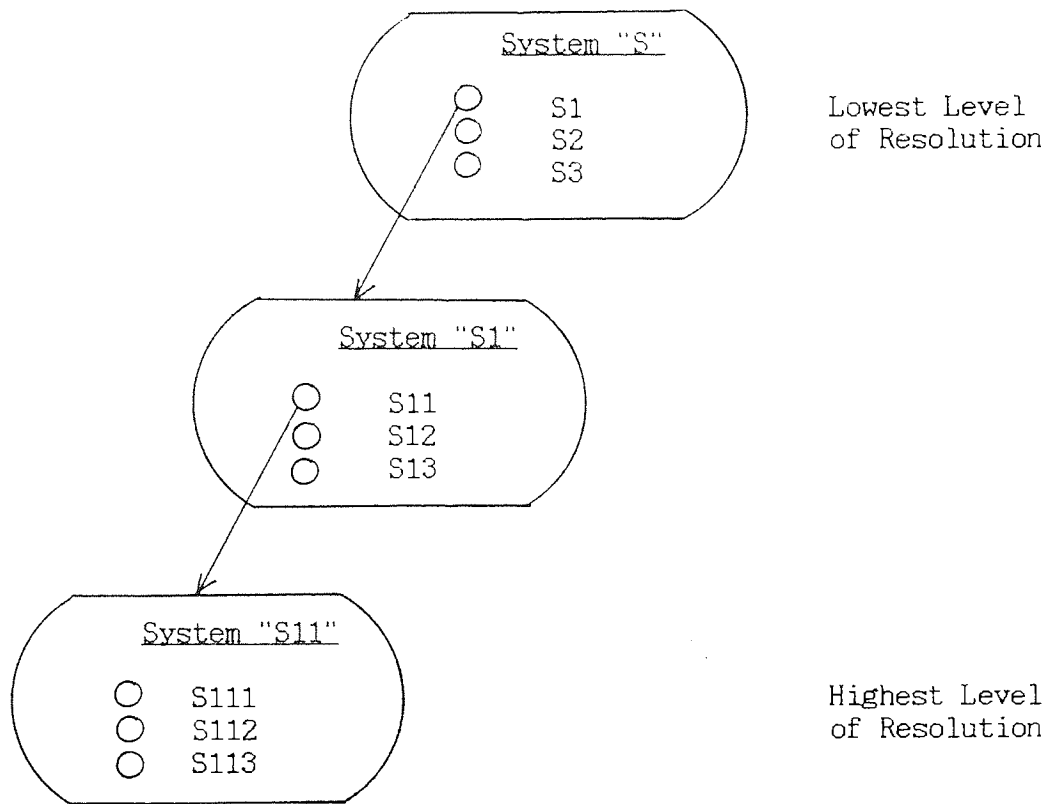


Figure 3-5: Conceptual Models: Complexity Unfolding

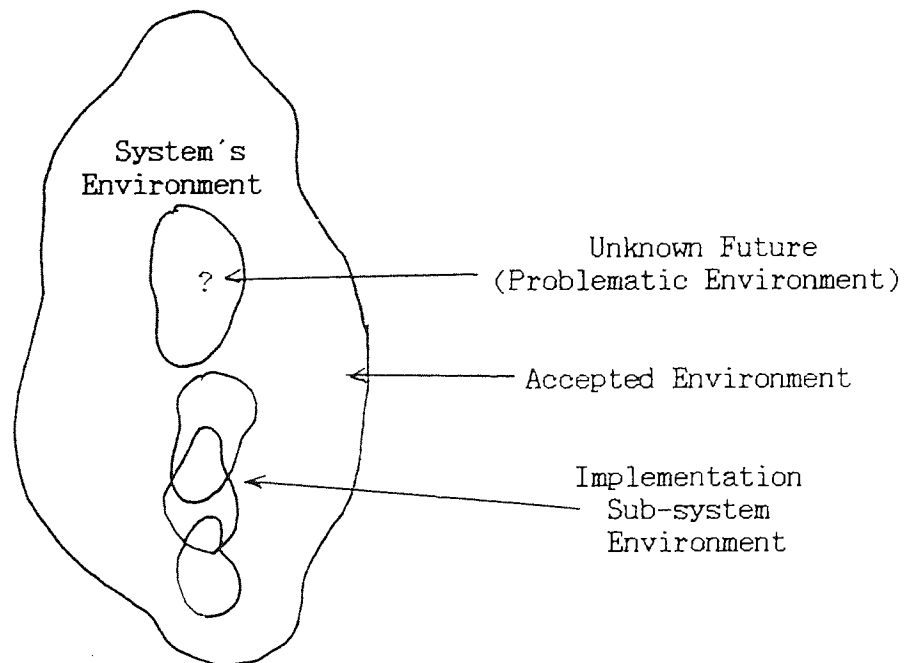


Figure 3-6 The Environment

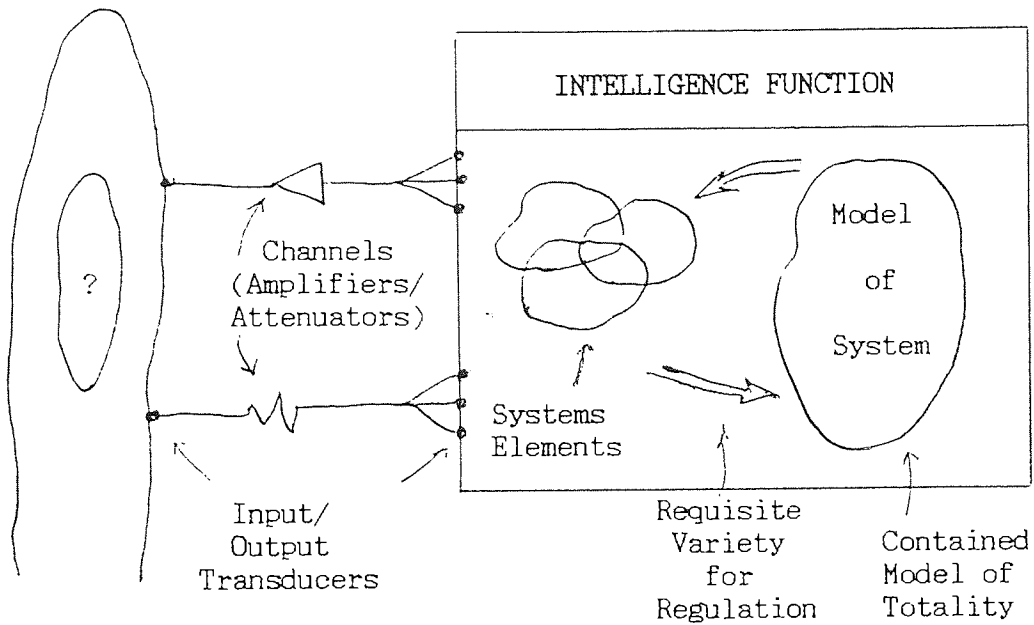


Figure 3-7 Key components of Intelligence Function

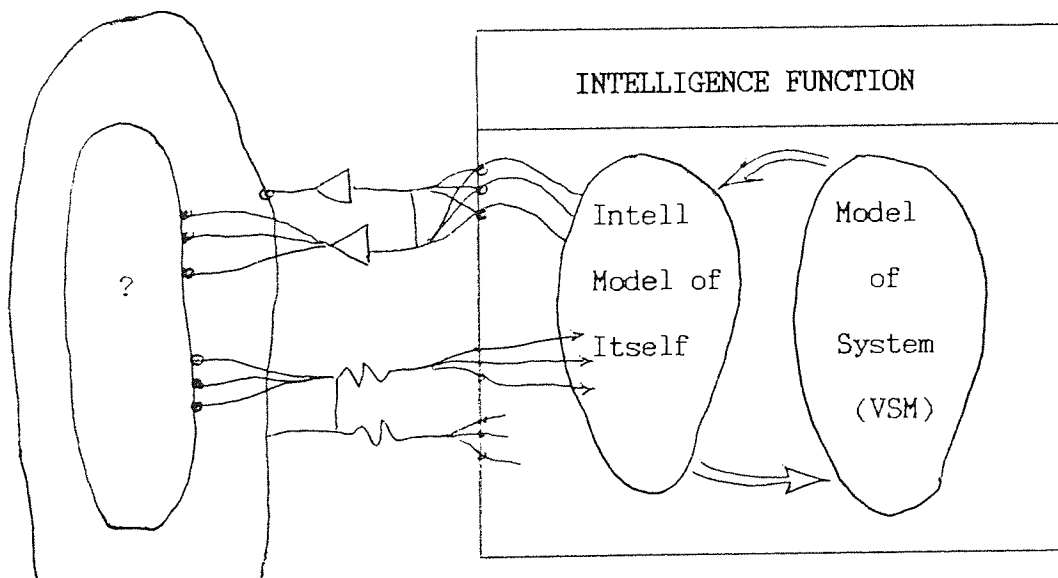


Figure 3-8 Intelligence Function to interrogate the Problematic Environment

(Adapted from Beer 1979)

market potential, production technique and technological development. The shaded portion is termed total intersect and defines the centre of the enterprise's real concern about its future. The requisite variety for regulation must exist between elements of the intelligence function and the model of the system (Figure 3-7). The channels for filtration/amplification and transduction are there to link the intelligence function with its environment. The environment of a system includes elements outside the system's complete control which, at the same time, determines the system's performance.

In discussing the activities involving intelligence, the notion of time dimension is considered. The diagram (Figure 3-10) based on Carley (1980), outlines this situation.

There are two other dimensions of the intelligence function to be considered. PLANNING is "an activity that concerns itself with proposals of the future with the evaluation of alternative proposals and with methods by which the proposals may be achieved" (Simon et al 1958). Smith (1976) defines it as "a process for rationally determining the framework of future decisions".

RESEARCH works are carried out in order to understand the environmental situation. They may be in the form of socio-economic assessment, performance indicator, past/present and future researches.

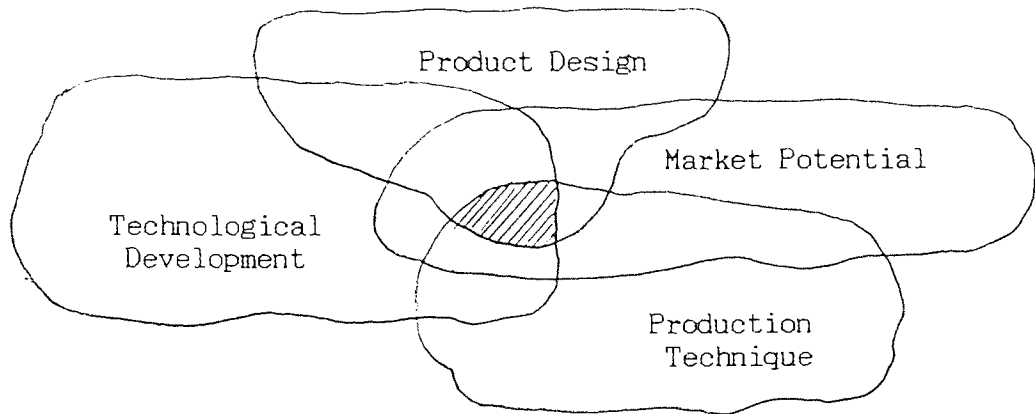


Figure 3-9 Elements of Intelligence in the System
- a Marketing Organisation

(Adapted from Beer 1979)

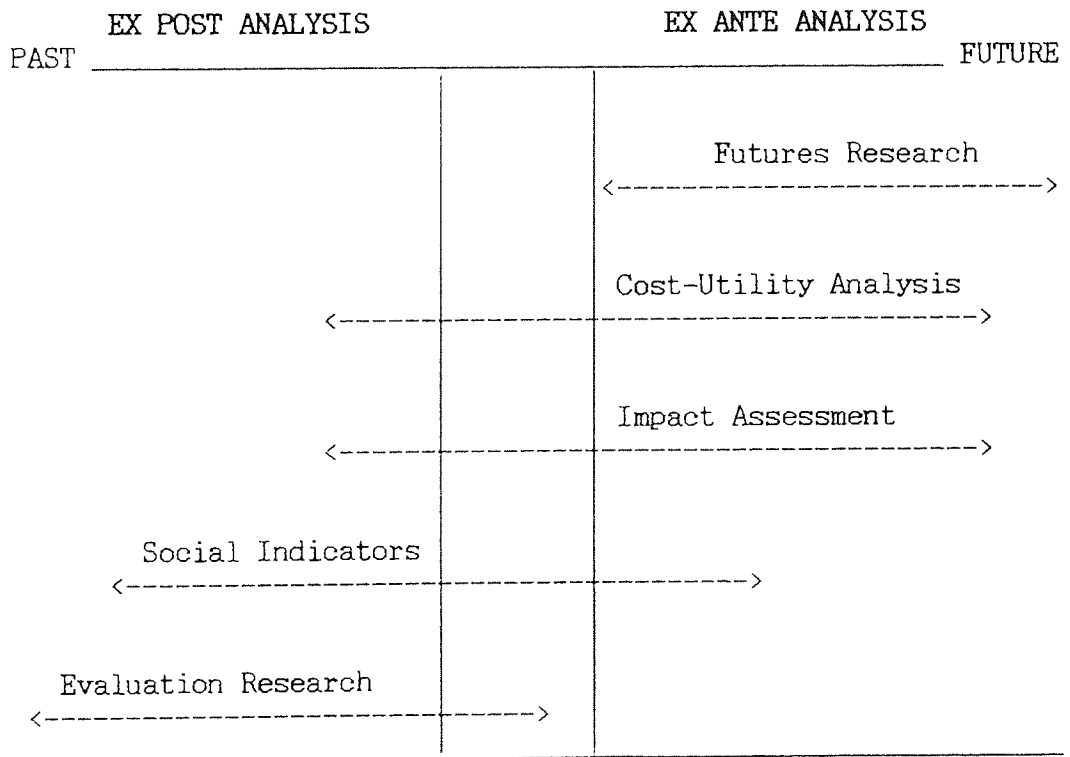


Figure 3-10 The Time Dimension in Analysis

(Adapted from Carley 1980)

3.5.4 MODELLING TECHNOLOGICAL AND PRIMARY ACTIVITIES

Technological activities are activities logically necessary to produce an organisation's transformation. Primary activities are those activities producing the organization, i.e. activities that implement the tasks implied by the organizational identity. They are technological activities which have the regulatory capacity to enable them to be hived off as independent organisations. The regulatory capacity in primary transformation is given by regulatory activities. These are activities managing or servicing primary activities, such as finance or computing service depending on global identity of the main organisation.

In modelling technological or primary activities, the key requirements are: (a) defining boundaries of the system, which in turn is determined by the strategies of the system that enable implementation of its identity; and (b) unfolding of complexity in the system based on activities.

3.5.5 PERFORMANCE MODELLING

Beer (1979), in his approach to measure performance, recognises three values for any given activities (ACTUALITY, CAPABILITY and POTENTIALITY). Figure 3-11 shows performance measurement using RATIO and PRODUCT rather than absolute values. Actuality is defined as what the organisation manages to do now. Capability is what the organisation could be doing. Potentiality is what the organisation might do. The first two are to do with existing resources under existing constraints.

The third is approached by developing resources and removing constraints. The idea is to have a common form of measurement of performance or achievement for the whole of the organisation, divisional or individual activities.

The overall measure of performance is determined by the ratio of actuality and potentiality, as two extremes. This means that capability is floating between them and can change without affecting either. For example, management can change capability by work study of processes, negotiating new agreements, increased morale and improved management quality. The result is that the overall performance index does not change. What happens is that latency measures improve because capability is approaching potentiality, and productivity is lowered.

However, if management is to improve actuality as obviously it should, all the three measurements will be seen to increase. When capability increases, latency increases and productivity decreases. For productivity to increase (or not decrease) we need to increase actuality.

Another criteria in this type of measurement is its applicability in planning, that is by using the mechanism of actuality (short term tactical planning), capability (medium term strategic planning) and potentiality (long term normative planning). The following achievement, latency and performance indices derive from Figure 3-11:

INDEX OF ACHIEVEMENT/PRODUCTIVITY:

$$\frac{\text{Actuality}}{\text{Capability}} \quad \text{or} \quad \frac{\text{Capability}}{\text{Actuality}} \quad \text{whichever is the one to produce ratios between 0 and 1}$$

INDEX OF LATENCY:

$$\frac{\text{Capability}}{\text{Potentiality}} \quad \text{or} \quad \frac{\text{Potentiality}}{\text{Capability}} \quad \text{whichever is the one to produce ratios between 0 and 1}$$

INDEX OF PERFORMANCE:

$$\text{Actuality} \times \text{Latency} \quad \text{or} \quad \frac{\text{Actuality}}{\text{Potentiality}} \quad \text{or} \quad \frac{\text{Potentiality}}{\text{Actuality}}$$

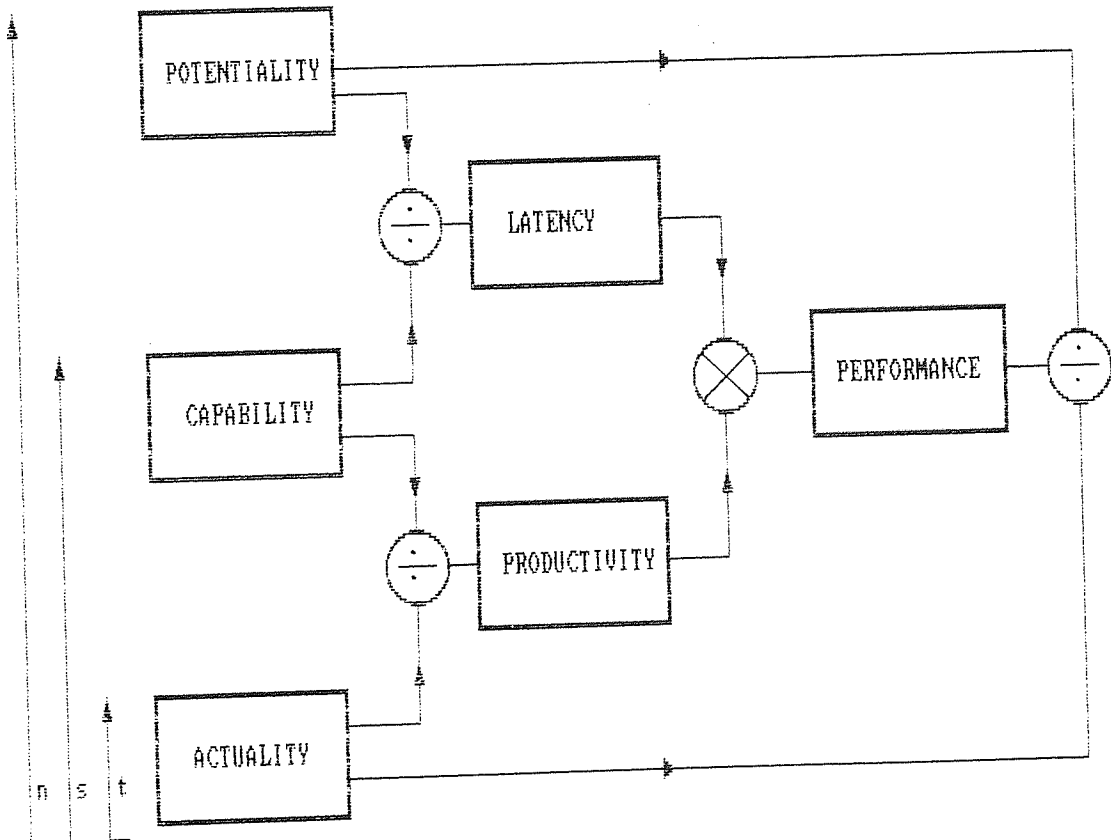




Figure 3-11 Measures of Performance

(Adapted from S. Beer 1979)

Legend:

- n Normative Planning
- s Strategic Planning (Planning by Objectives)
- t Tactical Planning (Programming)

 Ratio

 Product

3.6 METHODOLOGICAL ASSUMPTIONS

Various assumptions are made supporting the research process.

- (1). In the process "cybernetic study of the public sector", the name/identity of the MPS is based on what I assume is the viewpoint of the PM. This identification enables me to use a particular methodology, applying related concepts, methods and tools. Still more important, the validity of the methodology can be substantiated. All outcomes and proposals derived from this research will be validated in terms of these assumptions. The variables used in my assumption will tend to reflect only a single viewpoint which is obviously a simplistic reduction of the actual situation in MPS. This is a simple recognition of the time constraints on the research. As such the research is the first step to a real-world implementation.
- (2). Models used by the author are subject to modifications and adjustments although basic cybernetic modelling conventions are maintained.
- (3). The effective usage of tools is dependent on the quality of data which needs to be timely and reliable. In relation to the research, the use of Viplan and Cyberfilter is to enable maximum utilisation of data and make visible the flow of information which complements the research process. It is assumed that the MPS data used for the research have the above characteristics and are useful to MPS users.

The use of existing PMO's tools such as CEIMS and PROFS (IBM's professional office management system) complements the use of new tools with a possibility of integration of usage.

- (4). Design follows from the assumption that various improvements to the VSM model of MPS have already been made through cybernetic study of MPS.
- (5). The contribution of the research can be viewed in various ways, such as affecting the fundamental concepts, amending existing methodology and improving research methods. Basically, however, the aim is to contribute to an existing field of knowledge, which is office systems design and management cybernetics. The emphasis here is to develop new methods and methodologies as a contribution to existing methods and methodologies. Thus the fundamental concepts of cybernetics, information management, etc are acceptable for this research and require no immediate alteration.

For research methodology, I have derived my own approach (Figure 3-3) based on CM (Figure 3-2) and SSM (Figure 3-1). Other original approaches include the design methodology (Figure 7-4) and organisational study (Chapter Six).

Possible contributions to research methods will be discussed under the following: processes, models, tools and structures. The process of data analysis is greatly enhanced with the use of Viplan (Appendices 4 and 4.1). Information gathered will support the process of designing regulatory loops, especially in identifying

transducers (input and output of a certain role). The process of studying the cybernetics of MPS and PMO also needs mentioning. The steps taken in establishing the identity of MPS (as in Chapter Six) are finally adopted after going through rigorous systemic processes and encountering problems along the way. Various new tools are introduced in the organisational study and office design. Basically, they are "variety operation" tools to enhance communication, information distribution and integration. In the final design, a new office syntax or language is developed based on cybernetics.

- (6). The mode of study is based on a "diagnostic mode" for cybernetic study of MPS and "design mode" to approach new insight into office processes. This implies the development of a diagnostic methodology to support design. Although the design of the OS is based on a study of the PMO, the methodology developed is applicable to any comparable government organisation.

It follows from this assumption that the mode of validation or testing will not be by comparing the actual working of the designed system against the existing one. It will be the comparison of possible differences in the office systems language between the existing PMO and OCIS (the system to be designed). The new meaning of office systems will be more associated with the cybernetic viewpoint of communication and control.

CHAPTER FOUR

THE PROBLEM

4.1 INTRODUCTION

Defining the research problems and selecting an appropriate topic are incipient requirements for a successful research undertaking. Prior to perpetrating a systematic and methodological approach, there already existed an unclear and hazy picture of problems related to the information environment in MPS. However, based on the initial research assumptions as introduced in Chapter One, the scope of the study was narrowed down. The following boundary of the research problem was identified: disciplines of management and decision systems, executive performance and IT; physical boundary of MPS; and the application of systems approach and cybernetics as conceptual tools. The final research outcome will be a systems design that improves situations related to the scope mentioned above.

For our purpose, problems are associated with their degree of complexity. According to Kilmann (1985), simple problems are solvable by the expertise and information of one person, while complex problems cannot be addressed or solved effectively by one person since he cannot possibly have all the information, expertise and knowledge to manage the problem. Complex problems are therefore intrinsic to any organisation, although the larger the organisation, the more complex the nature of the problem.

Related to the public sector, Dunsire (1986) defines the problems that

keep the public sector under control as their size, complexity (which is the bewildering variety of agencies, programmes, policies, instruments, techniques, rules, operations), and the lack of a common yardstick of success and failure, compared with the "profitability" criterion for the private sector.

4.2 DEFINING THE PROBLEM SITUATION

Manifestly, MPS involves extreme complexity, making it difficult to ascertain MPS' problems. In view of the above-mentioned complex nature of a public sector, the general problems of MPS can be discussed in terms of management, organisation and environment, all of which form the core of organisational relationships. In our cybernetic discussion in Chapter Two, these three aspects are related in terms of the VSM. With the scale of problems in MPS, one effective approach is to focus on the problems as viewed by the system's client, i.e. the PM. Apart from MPS- and PMO-related issues, systems design covers a wide scope varying from the very technically-oriented design of decision support systems to highly non-technical designs of very complex organisations. The background study will therefore be made from the following viewpoint: PM's management problems, specific structural problems of MPS; problems of PMO; and design.

4.2.1 PM'S MANAGEMENT ISSUE

The PM's general concern is with how government policies and programmes are put into effect in order to improve the situation in society. He is keen that MPS administration is more responsive to the people. This can

only be done through more efficient public administration and more effective utilisation of the available resources, especially information. In this light, the aim is to produce a better overall managerial and organisational performance.

Very few studies have been made to deduce MPS problems related to management use of information resources. In the present MPS environment, the development of IT provides an alternative means for managers in improving their management of information resources. Despite more usage of IT, information resources are still poorly managed and systems underutilised. Useful information is a scarce commodity although bulk data are available. With the changing management environment in the wake of IT growth, MPS managers are in a dilemma over the choice between the use of existing manual systems and a new computerised information system in performing their everyday tasks.

In a study of the MPS computerisation scenario, Meon (1986) attributes management's overall lack of realisation, participation and knowledge of the potential role of information resources, to a lack of support from other information personnel who are too engrossed in improving their technical skills. The PM wishes for greater use of IT, and the development of different computerised information systems over the years in PMD and PMO (i.e. CEIMS in 4.2.3).

It is difficult to determine the PM's actual information requirements due to his high position in the government and problems of getting access to him. Even if there was adequate access, most of his information requirement is ad-hoc and proactive in nature. Further complexity is

caused by the lack of a common language between PM and analyst. Finally a lot depends on the intuition of the PM and the opinions of executives in PMO.

The present system of determining information needs is initiated by PMO and based on proposals by two main committees: economic committee (headed by EPU); and non-economic committee (headed by SERU). Members of these committees comprise of ministries and departments related to issues in question. Although there would appear to be a channel for discussion and thus an integrating mechanism, there is presently no recognisable criteria or methods for determining information needs.

In his capacity as the head of MPS, the PM relies primarily on organisations (PMO, PMD and ministries) and individuals (personal advisors and experts) to help him in making decisions. He depends on ministries and departments to provide him with the right information. Apart from getting the information initiated by PMO, the PM depends on a number of ministries, departments, other organisations and individuals as sources of information on intelligence (where he needs to understand the nation) and control (where he needs to understand the working problem of the MPS). Presently, there is an ineffective integration among organisations researching for the PM, resulting in the PM getting overlapping information with possibly conflicting details from many sources.

Another issue is that the PM will have his own mental model of MPS, and ascribe its objectives and role according to this model. This perception will not normally be the same as the executives' perceptions of MPS. Information received by the PM does not often provide him with the

clearest of models of MPS or issues. Graphic means are often used to present clear situational models, although success by this means can never be proven. CEIMS survey (Appendix 1) shows a low level of usage of statistics and graphs by the PM and MPS executives (as primary users), although this information is available in the CEIMS database. Information is often passed to him in bits and pieces, and from many sources. The result is a hazy picture of any overall situation.

In the course of carrying out his responsibilities, the PM expresses views and opinions which are hoped to be well understood by the people and MPS. However, for the above reasons his views are quite often misinterpreted. The result is that the press sometimes misreport his speeches and statements. Further, the ministries, PMD and PMO may misrepresent his views when preparing the summaries of his viewpoints for their respective purposes.

For the manager, one of the most important types of information requirement is that of performance. In the last few years, the Government has directed that all organisations in MPS are to set up productivity measurement committees, the purpose of which is to provide criteria for performance measurement. These committees are structured at all levels of MPS, from the highest national steering committee to the lowest office productivity committee. With this structural set-up, activities in MPS could be better monitored, and this development suggests a way to improve MPS. However a difficulty for the PM and other MPS executives, is that the concept of improving performance in a public sector tends to be subjective. As long as there is no guideline to determine/measure the level of service provided to the public, there can

be no attempt to devise a standard measurement tool. At present, everything depends on the individual organisation's initiative and creativity.

Related to the complexity issue is the problem of the size of MPS. The PM is intending to reduce the size of MPS in order to make MPS more manageable, as evident in his speech made in the Malaysian Parliament, where he states:

"The public sector will no longer play a leading role in stimulating economic growth. Steps will be taken to gradually reduce the size and role of the public sector through consolidation to ensure efficiency, accountability, and productivity in the management of Government departments and public enterprises."
(Mahathir Mohamad 1986)

This is reflected in the reduction made to the Five Year Plan allocation, and more privatisation of Government agencies (Fifth Malaysia Plan 1986).

4.2.2 MPS ORGANISATIONAL PROBLEMS

4.2.2.1 GENERAL PROBLEMS

Related to MPS organisational problem is the lack of overall integration and coordination in dealing with specific internal and environmental issues. Environmental problems are those fields particularly related to information technology, decision systems, information systems, systems analysis, and so on. Anderson (1986), who became involved in many consultancy projects in MPS, characterised these issues related to computerisation as follows: large size and visibility; lagging behind the private sector in terms of technology and risks; heavy emphasis on cost

containment, fixed fees, etc.

In MPS, although computerisation is commonplace, there is still lack of suitable facilities, expertise and professionalism to enable effective use of IT (Meon 1986). Most departments have become obsessed with encouraging the use of IT by top managers in the hope of improving managerial performance. This trend is a result of problems of usage, where, more often than not, IT is unable to penetrate MPS executive end-users. Its use is restricted to professional people such as systems analysts, programmers, and the like. Indeed this is to be expected if technology is assumed to be itself a problem-solver, rather than a tool to support managers. In the few cases where systems and technology are actually used by executives, problems such as overloaded data and irrelevant information emerge. Another factor to consider is the lack of communication between various computer systems within organisations in MPS. The outcome is poorly integrated information, where duplication of data and information results in less efficiency and effectiveness of IS.

4.2.2.2 MPS SPECIFIC PROBLEM - NOTIONAL AND FORMAL SYSTEMS

To enable the process of diagnosing MPS (Chapter Six), it is important to come to an understanding of specific problems. A key problem to be elaborated here is the issue of notional and formalised systems. The dilemma for any complex organisation, MPS included, is that of structural rigidity and the ability of this structure to deal with issues which are not suited within the formal ministerial divisions and which develop across many ministries.

Organisations are divided into subunits because of the cognitive as well as physical and social limitations of individuals (Barnard 1938). Each subunit is responsible for a small part of the whole as a way of decomposing a complex problem into a simple problem. As Kilmann (1985) points out, functional organisation breaks down the unmanageable complex problem the organisation is addressing, into such functional subunits as marketing, manufacturing, engineering. Traditionally, in implementing government policies a ministry performs tasks that are specified in advance. These tasks, which are either functional (as in planning, research, finance - the responsibilities of Central Agencies of MPS) or service-oriented (agricultural, educational, youth, trade, etc. - services provided by ministries of MPS) are carried out through pre-planned activities and strategies using available resources. Plans and strategies are occasionally adjusted to suit changes in environmental situations.

In actuality, while implementation of normal tasks is quite straightforward, more problematic and critical issues are difficult to deal with due to dynamic environmental changes which are difficult to anticipate. Especially important is the fact that a problem or issue is rarely the responsibility of a single ministry. The responsibilities often have to be shared among a number of ministries. Some related problems associated with this situation are ministerial coordination, integration of the problem-solving process, determining responsibilities and identifying issues.

4.2.3 PROBLEMS OF PMO

The management of MPS is the responsibility of the PM, while managing the overall MPS problem-solving capacity is the responsibility of all people involved within MPS. As the PM is unable to handle the complexity of MPS, he requires some form of filtration/amplification (variety operation) enabling him to access and act on information, expertise and knowledge of MPS. The relevance of PMO in studying the research problem stems from the fact that PMO can provide such a variety handling mechanism, and provide the crucial link between the PM and MPS, thus enabling the PM to handle MPS complexity.

In view of this, focus upon the specific issue of PMO is a key aspect of the study. The inquiry into PMO can be used to illustrate MPS information management (IM) problems as mentioned in the earlier part of this chapter. The structure of PMO is represented in Figure 4-1. PMO's functional role within PMD and MPS is represented in Figures 5-3 and 5-4. Basically PMO acts as one of the main PM-MPS links. This is highlighted in Figure 4-2, where the following points are to be noted: Confidential Secretary General (CSG) plays a vital role in ensuring that information flows freely between the PM and MPS; CSG ensures that the PM is supported in running his daily activities; and he is strongly supported by PMO's executives who themselves provide a powerful linking role. These links enable the PM to communicate with other individuals, organisations and MPS's environment.

Issues related to PMO's role as an office to provide the PM with

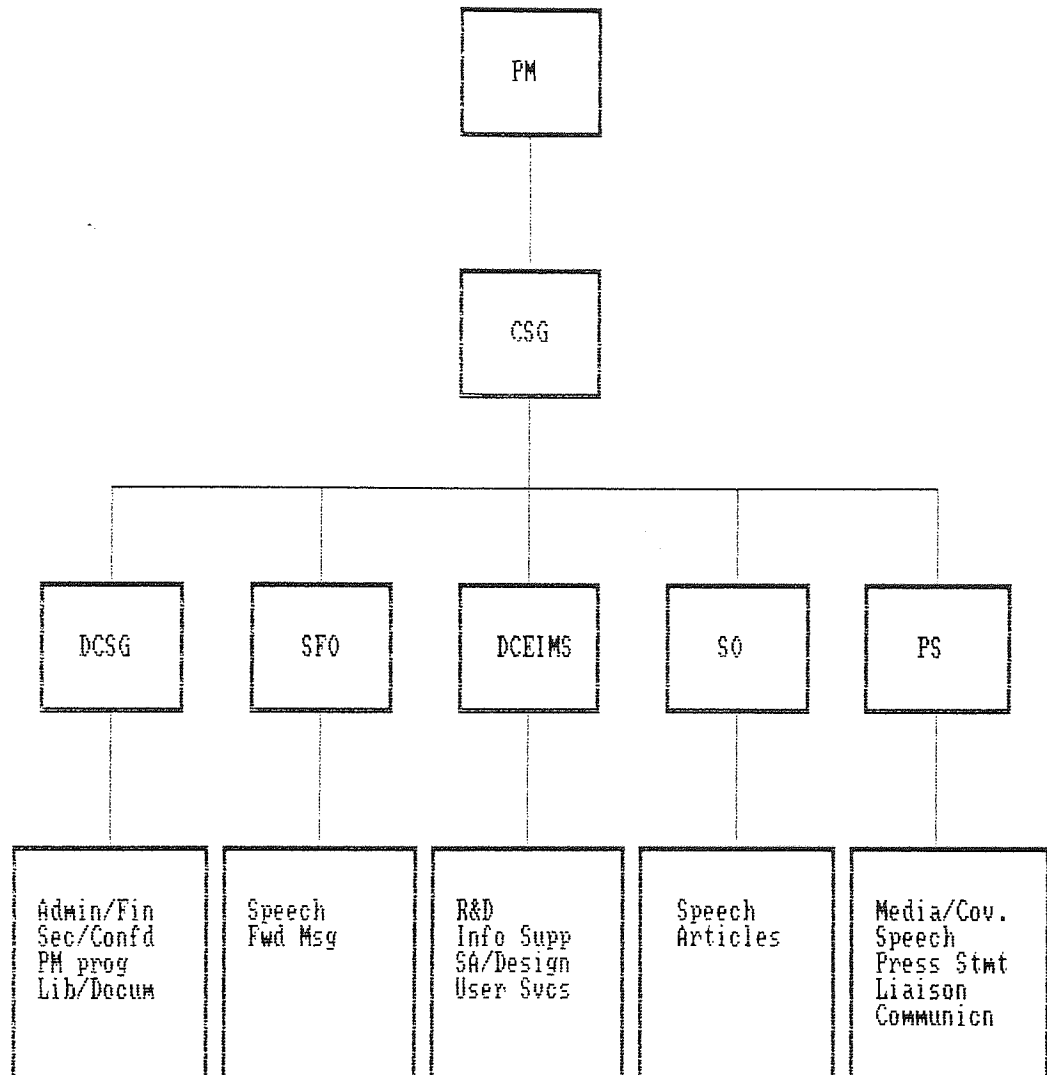


Figure 4-1 Organisation Chart of PMO

Legend:

- PM Prime Minister
- CSG Confidential Secretary General
- DCSG Deputy CSG
- SFO Special Functions Officer
- DCEIMS Director, Chief Executive Information Mgt System
- SO Special Officer
- PS Press Secretary

informational support will be discussed in detail in Chapter Seven. The concern here, is the general problems of PMO as a part of MPS. Any problem faced by PMO will, to a certain degree, reflect problems faced by other organisations in MPS.

One of the greatest causes of concern in recent years, has been the increase in information systems (IS) application with a heavy emphasis on information technology (IT). Not that this trend is perceived as bad, but when the computer is postulated as a solution to problems rather than a tool to facilitate problem-solving, further problems are created. PMO's first computer was installed in 1978. It was to be a coordination tool for promoting resource-sharing of information and other IT resources. It was not until 1984 that IT application in IS escalated speedily.

In 1984, a unit within the PMO, called the Chief Executive Information Management System (CEIMS) was set up. Specifically, it aimed to provide information support for the PM, and thereby assist his decision-making process. At the same time, the system also supported the nation's other top executives (including politicians and government officers). By implication, the consequence was that computer usage by executives became a requirement. This produces both positive and negative effects.

Two years after CEIMS's installation, a survey was carried out by CEIMS (Appendix 1). Among its finding was that the system did produce some good results in that it managed to improve efficiency of certain applications in MPS. It however failed in terms of benefitting its primary user, i.e. MPS executives, notably in its goal of trying to get their involvement in the actual use of the system for management and information purposes.

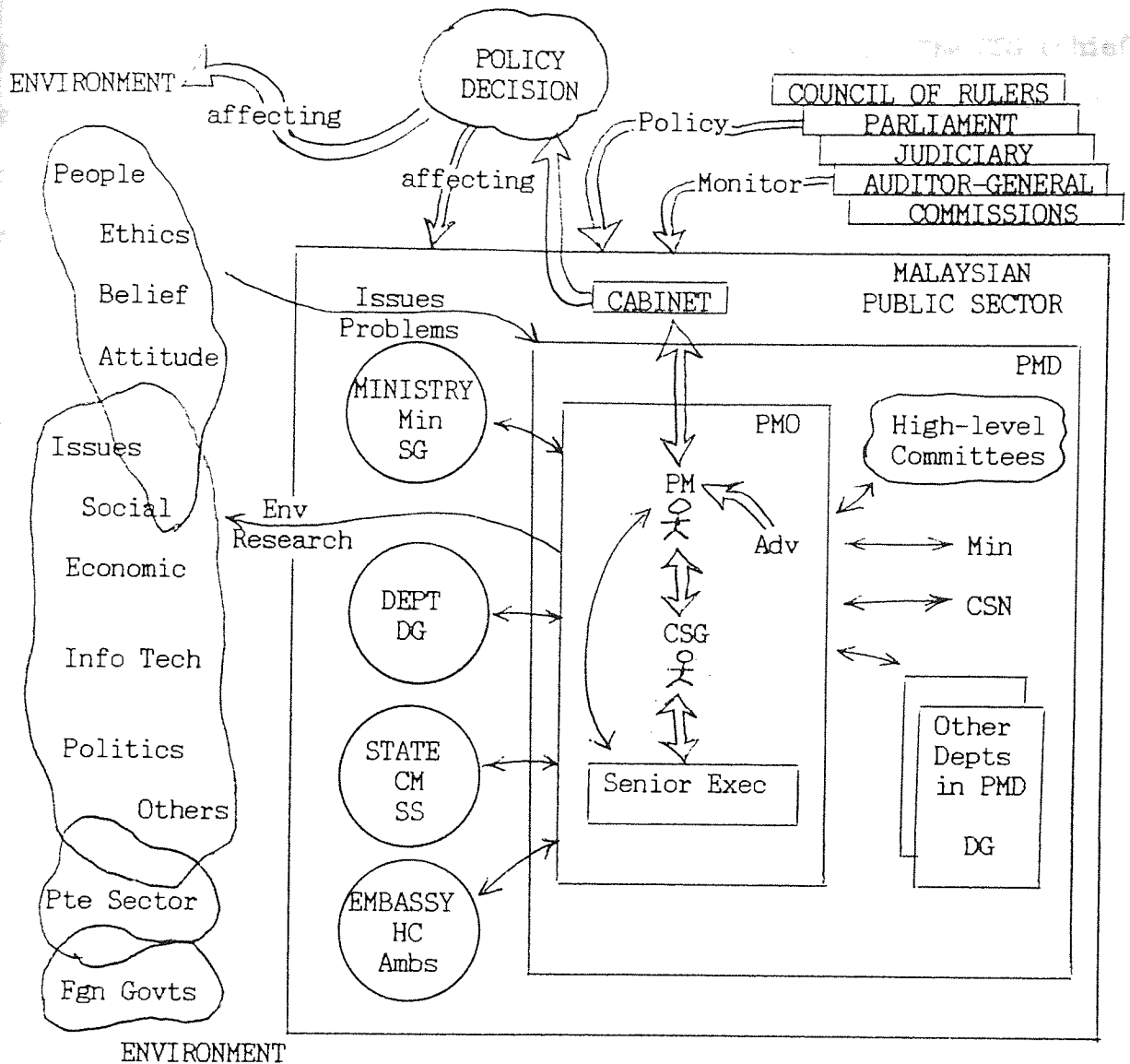


Figure 4-2 A Rich Picture of Problem Situation:
PM's Information Environment

Legend:

- Adv PM's Advisors (Econ, Political, etc)
- Ambs Ambassador
- CM Chief Minister of State
- CSG Confidential Secretary General
- CSN Chief Secretary to the Nation
- DG Director-General
- HC High Commissioner
- Min Minister
- PM Prime Minister
- PMD PM Department
- PMO PM Office
- SG Secretary-General
- SS State Secretary
- SF Special Function

Information Flow and Links
 Most links with the PM are filtered through the PMO (i.e. the CSG. Other PMO executives help the CSG to organise PM's activities & provide information for the PM).

The problem situation in PMO can be summarised as follows. The CSG (chief executive in the PMO), is the key personnel as far as the PM's decision-making is concerned. Among the CSG's responsibilities, are maintaining the PM's daily activities, acting as a liaison between the PM and most government and private agencies, doing some research for the PM thereby providing information support for the PM, and others. In performing these tasks, he makes use of the CEIMS computers, in the understanding that the system can provide a vehicle for effective decision-making. In using this tool he depends on voluminous information, most of which is kept in the computer or as hard-copies. Most top executives in the PMO do not use the facilities as frequently as the CSG. Usage that exists, is usually through intermediaries, such as personal assistants or technical support staff of CEIMS.

In his daily tasks, the CSG regularly communicates with most top and middle executives of MPS, including cabinet ministers, politicians and government officers. With the exception of a handful of executives, most are reluctant to use the computer system to a greater or lesser degree, despite the fact that they are exposed to the system through personalised training.

The above situation raises a question. While we have a large number of executives showing little or no interest in using a computer-assisted information support tool, a few who use the tool (including the CSG), are either not satisfied with the contents provided or are not able to fully utilise the system. This may be due to ignorance or other reasons such as the inflexibility of the system to adjust to non-technical users. The latter is a problem of design.

All the points discussed are common problems associated with computerisation and information management which occur at PMO as well as in most government organisations of MPS.

4.2.4 DESIGN ISSUES

From the problems defined emerges another issue. This is the need for a proper design in order to make effective the applications of information technologies in MPS. This implies designing systems that in the long run will encourage any type of user, specifically top and middle executives, to use computer-assisted information tools regardless of the idiosyncratic nature of individuals. Past experiences in information systems design in MPS are either in-house, by consultants or with assistance from computer suppliers. In-house design is carried out by analysts of MPS organisations, sometimes supported by expertise of manufacturers. Most of the designs by MPS analysts are without specific conceptual foundation. Future designs have to take into account a solid conceptual basis. Support by suppliers often results in heavy-dependence on suppliers and their products. Consultants, although providing proper design foundations, often do not have adequate knowledge of the local environment. Too often, the users are dissatisfied with designs produced by consultants (Taib 1986).

Another design issue is to determine the research topic(s). Having discussed various problems pertaining to MPS within the constraints of the problem boundaries, the following topics are identified and proposed:

- a). designing tools to assist the decision-making process of the chief

- executive of the Malaysian public sector (i.e. the Prime Minister);
- b). making effective use of the existing economic and social data through computerised decision-support tools; and
 - c). improving the existing MIS unit of the Prime Minister's Department for the use of top and middle executives within the public sector.

Given the basic constraints mentioned earlier and findings of various problem situations in MPS, a possible research area is:

"Management of complex situations in the Malaysian public sector involving top executives, and finding ways of utilising human-technological resources in decision-making".

The above amplifies common viewpoints of managerial problems in MIS and DSS under the ever-growing influence of information technology.

4.3 PROBLEM STRUCTURING

4.3.1 INFORMATION MANAGEMENT PROBLEM IN THE MALAYSIAN PUBLIC SECTOR

From the problem definition of the situation in MPS, it becomes apparent that the major issue is the PM's management of MPS. To support the PM's management, PMO presently provides the necessary office service and management support. The design implied by the named system, is the development of an information and office system that permits improved (i.e. more effective) management of MPS by the PM through the better use of information resources. This design must permit sensitivity to change, and permit executives to appreciate that, given the support from the system, they will be able to perform better and improve the situation in

the organisation.

4.3.2 STRUCTURING USING CYBERNETIC TOOL

In the cybernetic discourse, problem structuring implies describing the problem situation of the PM. We have identified the PM's management problem as that of information management (refer framework in Figure 2-13), which is:

matching PM's limited information-processing capabilities to a quantity of potentially relevant information (input) which is vastly beyond these capabilities (the need for ATTENUATION); and

matching that same limited capability (as output) with the need to achieve a multiplicity of effects in his environment (the need for AMPLIFICATION).

The problem (typical of any MIS problem) cannot be perfectly resolved, but it can be greatly reduced by design. This is what the research is attempting. The cybernetic method also calls for a naming of the relevant systems. A few names are attributed to the problem situation, which are:

- a). the design of decision support systems as tools to support top executive decision-making;
- b). the design of a system based on the cognitive style of top and middle executives in the public sector, in order to bridge gaps between management styles and information systems, particularly reporting procedures in the government departments; and
- c). the design of a mechanism or interface between top/middle executives in the public sector and their problem situation.

The first is heavily technology-based and the design of such a system may not improve the situation since it does not assure executive acceptance of the tools. The second and third options have the same mission of trying to bridge the gap between the executives and the systems they are controlling. The difference is that while the former is individual-based, the latter is more global and looks at the organisation as a whole. Being individually based, the design of the first system requires looking into various aspects of individual decision style and model. One needs to have insights of the cognitive management style and idiosyncratic behaviour of individuals.

In the latter, this aspect is not overlooked, although the emphasis is on organisational decision-making. It deals with ways to improve individual effectiveness through organisational design, taking for granted the individual cognitive management style, and embracing the fact that any change in organisation will have to fit the expectations of individuals. The improvement of individual decision-making effectiveness will also be with reference to a given technological situation and any changes in the technology used. It assumes the use of technology as amplifier of individual capability, and the system designed will grow and evolve as the individual feels at ease with technology.

In simple terms, the information management problem is that of how the PM manages MPS which in turn depends on how effectively and efficiently the key personnel of the PMO (CSG, senior executives of the PMO and other supporting staff) use the information resources or other resources available and how they convert the resulting information into effective action as a tool to support to the Prime Minister.

Using the principle of "root definition" (Appendix 3), the "SYSTEM" to be designed then is:

"an office that enables executives of the PMO to make effective use of existing resources (man, machine, money, materials and information) with the purpose of supporting the Prime Minister's management of the Public Sector".

The TRANSFORMATION is from "PMO's resources" into "information/action system". The ACTORS, who perform the transformation by using PMO's resources and convert them into a useful tool supporting the PM, are PMO personnel (CSG, executives, information analysts, technical support group, secretarial and clerical staff). The CLIENT or beneficiary of the transformation is the PM. Finally, the CSG is the OWNER of the transformation.

Figure 4-3 shows the relationship between the system to be designed (i.e. "S") and its related environment in the MPS, including its beneficiaries and actors. Using information management (IM) framework, the problem situation related to the PM is as illustrated in Figure 4-4 (derived from Figure 2-13).

The transformation implies that given the highly technological emphasis of the PMO, (i.e. with the use of CEIMS computer and modern office equipment), the system to be designed will enhance the effective use of IT by the clients. The use of computers, hopefully, will not be conceived of as purely technological tools, although their use tends to be held in high reverence. They should neither be too highly esteemed nor spurned.

Basically, the design output is of a human-technological system. In

cybernetic terms, there is a need to narrow the gap between an executive's information/action space with his information capacity, as explained in Chapter Two (2.2.5.2). The cybernetic design of the system will make the system more adaptable to changes. The ambition is to enable the system to be able to adjust itself to any major changes that necessitate structural modifications, such as in crisis situations due to political, social and economic factors, and to be able to take advantage of new developments such as technological advancement. Minor changes may not need structural adjustments but be absorbed through internal self-regulation. However the means to set in place such adaptive potential also needs some designing.

Another implication of such design is the readjustment of office structure.

4.4 INFORMATION MANAGEMENT STRATEGIES

We have described information management strategy for design (as in 2.2.5.2) as: organisational design/adjustment; design of organisational conversations; and design of manager-to-task fit. These strategies are shown in the framework model (Figure 4-4). Strategies I and II deal with organisational structures and inter-personal relationships afforded by the structures, and strategy III concerns the PM's handling of his tasks.

With reference to the design of PM's office system (OS), two structures exist - MPS and PMO. The study of MPS structure is carried out in the next chapter, which is a prerequisite to the final design. Models of MPS are used as input to final design, but no attempt is made to consider every aspect of MPS. The structure of PMO is part of the variety

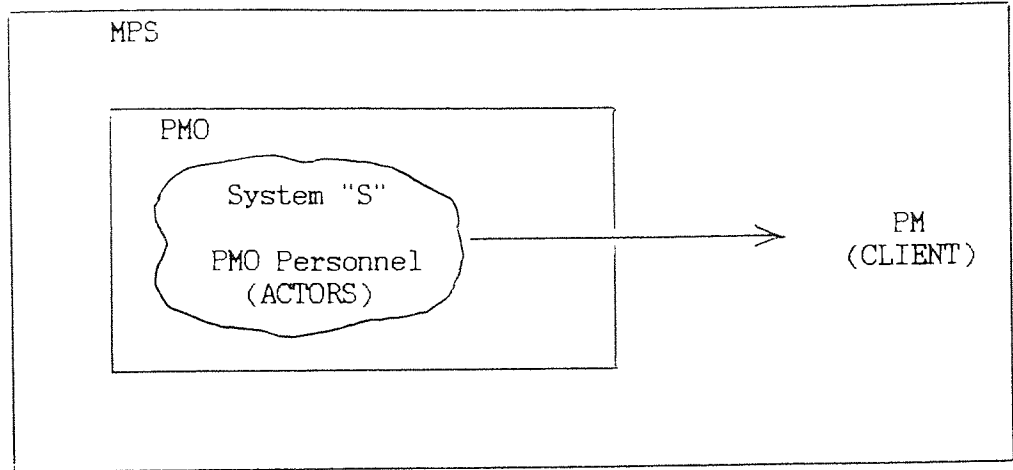


Figure 4-3: System "S": Transformation Situation

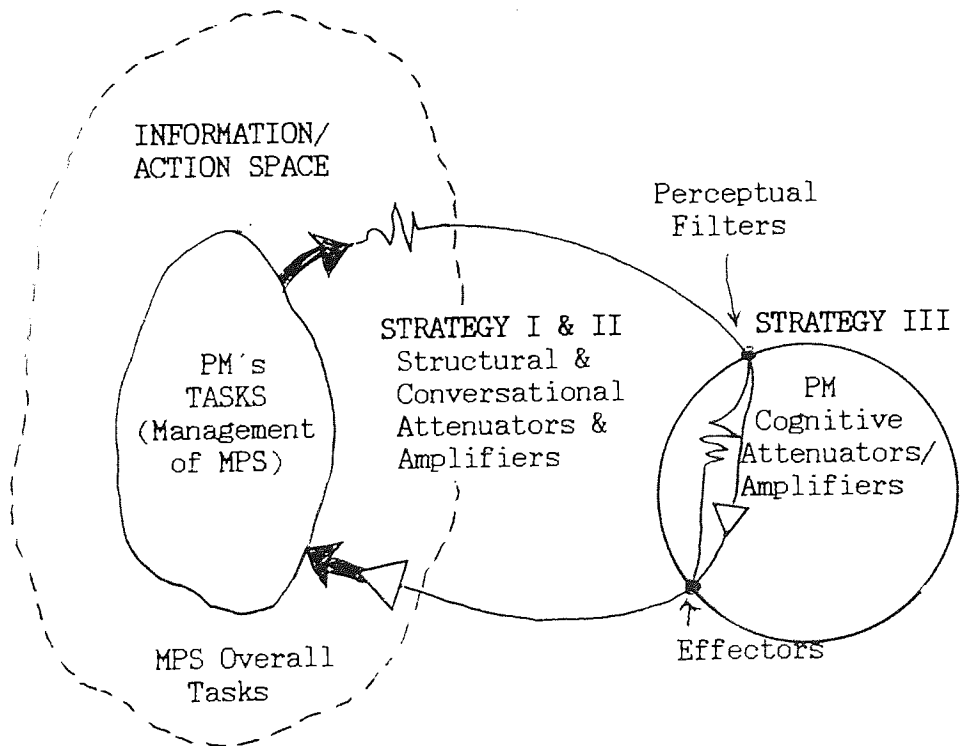
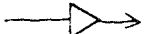
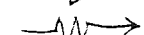


Figure 4-4: Information Management Situation of PM

Legend:
 Amplifiers
 Attenuators

operation (amplification/attenuation) necessary to improve PM-MPS link.

Designing organisational conversations means developing the necessary tools to facilitate inter-personal interaction, i.e. between the PM and MPS employees. Finally, manager-to-task fit is related to PM's personal capacity to handle information. This is a two-way flow related to the PM's perception of MPS, his data processing capacity, and finally the PM's action affecting MPS. This is therefore about designing models of MPS for the PM and providing a tool for the PM to present a model of MPS as he perceives it. The design of the PM's mental models, for instance, can amplify the PM's managerial complexities which will improve PM's information-processing capacity. The system to be designed will consider these three aspects of design to provide a useful information tool for the PM.

CHAPTER FIVE

THE MALAYSIAN PUBLIC SECTOR - AN OVERVIEW

5.1 INTRODUCTION

Various terminologies such as public administration, public management and public service are frequently quoted as belonging to the same category as the term "public sector". However it is more accurate to describe them as meaningfully related to one another. Public sector is physically composed of a group of public organisations, while both public administration and public management relate to the task of the public sector in managing public resources. In both instances, the purpose is to provide effective and efficient services to the public. It is apparent that the objectives or goals of a public sector are often unquantifiable, meaning that it is difficult to measure performance level. The features commonly attributed to a public sector are its size and complexity.

5.2 THE MALAYSIAN PUBLIC SECTOR - ROLE AND STRUCTURE

Malaysia is a federal system practising parliamentary democracy whose administration is shaped through the federal and state governments. As a former British colony, it inherits some characteristics of the British government administrative system. As cited by Hussain (1986), the government sets up an administrative organisational structure at these two levels, composing of federal ministries/departments and state departments in order to implement national administration. This structure or government administrative machinery is the Malaysian public sector

(MPS). According to Zakaria (1982), in Malaysia, the public service is under direct control of the executive, and the public service performs the tasks of implementing the daily affairs of the nation, administering law, managing social services and regulating services organisations such as Post Offices and Telecoms Department. The role of MPS however has changed with time. During pre-independence, that is before 1957, the role of MPS was solely regulatory and included maintenance of law and order, and revenue collection. After independence, its role became focused on ensuring national economic and social development. At present, MPS acts as a facilitator for socio-economic changes as well as managing public entrepreneurship. MPS therefore has shifted from being a public system that barely survives to one that strives for stability and adaptability.

There are various organisations that make up MPS. To quote the Fifth Malaysia Plan:

"The public sector comprises the Federal Government, State Governments, Local Governments and Non-Financial Public Enterprises (NFPE)." (Fifth Malaysia Plan 1986)

There are 13 state governments, 4 local governments and 35 NFPEs (the number of NFPEs will be modified to take into account changes in public equity ownership, revenue and new authorities). The research will focus on the federal government comprising of the federal ministries and their executives (Figure 5-1). MPS, unlike private sector organisations, is formed through an evolutionary process based on historical events. It has, first and foremost, a hierarchichal or pyramid structure. Its activities are handled by rules and procedures creating a degree of formalisation. For the MPS as a whole, the set-up is a mixture of functional and service oriented ministries. The Prime Minister's

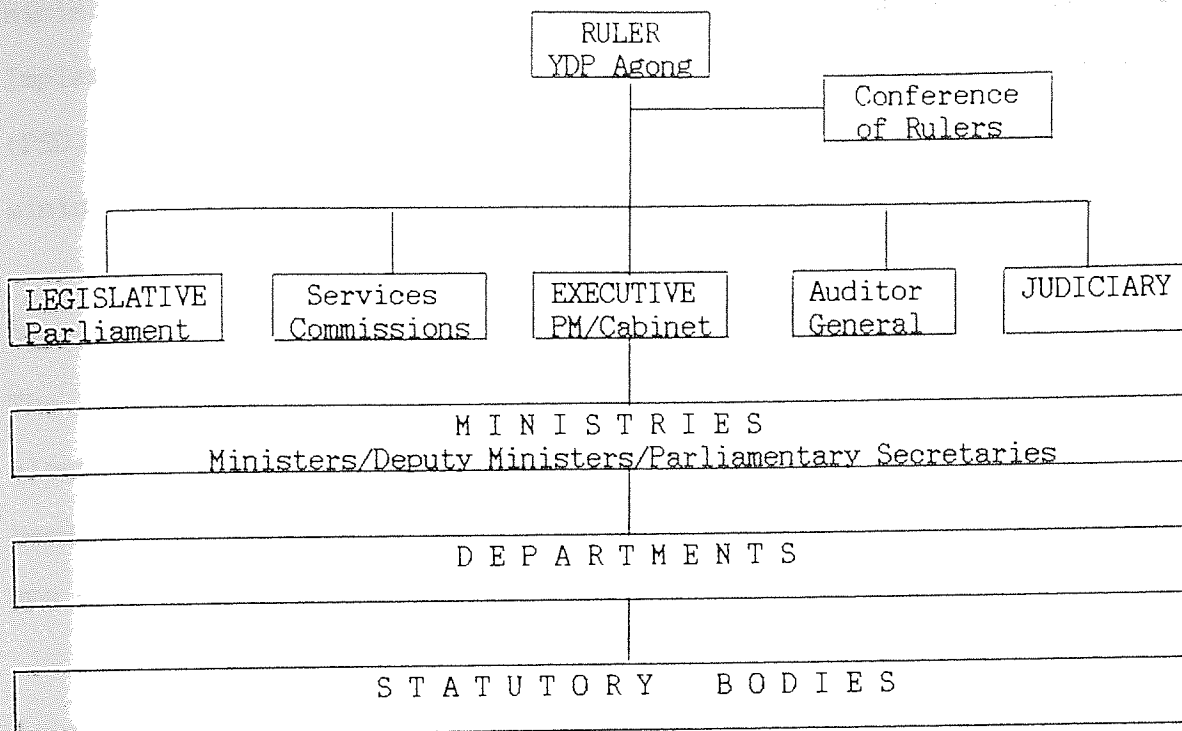


Figure 5-1: Federal Government Organisation, Malaysia

(Source: MAMPU 1986)

Department (a ministry) is a functional cum service organisation, while most of the other ministries are service organisations. Exhibit A2.1 of Appendix 2 lists the respective ministries.

Ministries are administrative organisation structures formed at the federal level in order to implement national administration efficiently, effectively and smoothly (Hussain 1986). There are two types of ministries: ministries performing as central agencies; and operating ministries. The central agencies, being the centres for government executive power, coordinate overall administrative matters of the government. They also act as planners for central government. The operating ministries are responsible for carrying out national development work. Of the 23 ministries, three divisions of the Prime

Minister's Department (PMD), i.e. Economic Planning Unit (EPU), Implementation Coordination Unit (ICU) and Public Services Department (PSD), and the Treasury are the central agencies while the remaining ministries are the operating ministries.

Referring to Figure 5-1, the Agong is the head of the national executive. The Conference of Rulers, comprising Rulers from the Malaysian states, elect the Agong among themselves once in every five years. The effective head of the executive is the PM and his Cabinet. All the organisations of MPS will be responsible to the PM and Cabinet.

A significant feature of MPS is its huge and firmly established civil service. In 1985, those employed in the government services accounted for 15% of the total employed labour force (Fifth Malaysia Plan 1986). This sector is the second largest job generator in which between the period 1981 and 1985, about one quarter was accounted for by the public sector.

Appendix 2 provides comprehensive descriptions of various organisations (including the Cabinet, executive, ministries, departments and committees) mentioned frequently throughout the research.

5.3 MPS - IMPLEMENTATION OF GOVERNMENT POLICY

The working of MPS is simplified in the diagram (Figure 5-2). As an executive branch of the nation, MPS ensures all government policies are implemented according to plan. Prior to this, the Parliament will produce an Act that requires certain government policies to be carried out. However, some policies are not referred to parliament, but are formulated

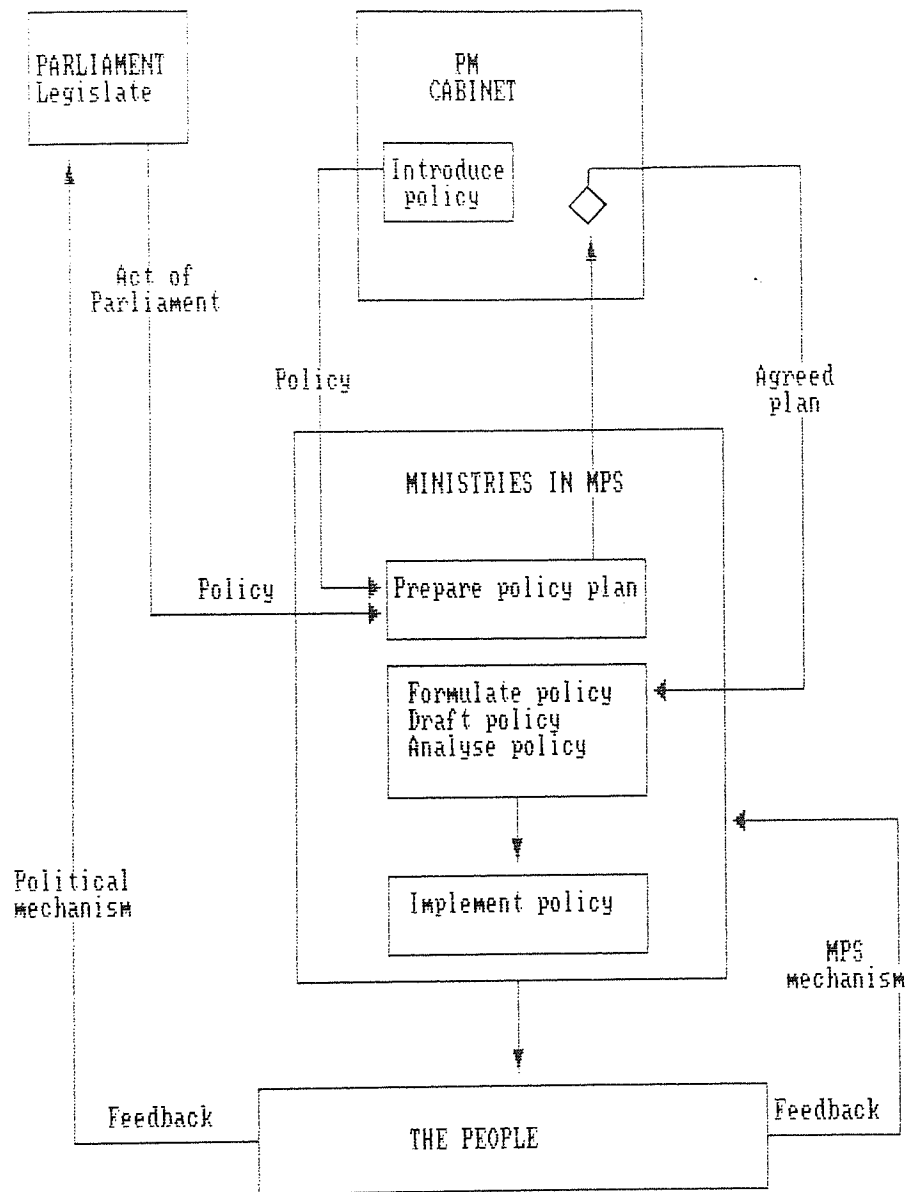


Figure 5-2 MPS Policy Implementation

Legend:

- Process
- Decision
- Information flow

by the PM or a Cabinet minister. Once a policy is agreed upon, it goes to the executive body, i.e. the ministries. The ministries then recommend the policy plan to the PM and Cabinet. Only the related ministries are involved depending on the issues the policy addresses.

Once the Cabinet approves the policy plan, it is forwarded to the relevant government executives for the formulation and drafting of the policy. Normally, various committees are involved in this process which is coordinated and integrated by EPU of the PMD. The draft policy is analysed with the assistance of senior MPS executives (experts) from different ministries. Finally, the policies are implemented by all the employees of MPS. Whatever feedback information that is received from the people will go to the Parliament, through the political process, and the ministries, via MPS feedback mechanisms. "Political process" refers to the democratic mechanism where the people can put their views across to their local Members of Parliament. MPS feedback mechanisms are various formal structures at national, state, district and village levels. Examples are the Information Department and District Offices.

5.4 THE ROLE OF EXECUTIVE IN MPS

5.4.1 THE EXECUTIVE

The executive, according to Chambers dictionary, is one who performs, administers or manages. Drucker (1967) defines executives as those "knowledge workers", managers, or individual professionals, who are expected, by virtue of their position or their knowledge, to make decisions in the normal course of their work that have significant impact

on the performance and results of the whole. From these definitions, the term executive is synonymous with manager. They will be used interchangeably in this research.

Executives or managers exist at each level of the organisation. This recursivity is important to our study where discussion centres around the MPS which reflects management at the top level. At this high level, for instance, executives hold the power or authority in government to carry the law into effect. At lower corporate, divisional, unit or subunit levels, respective executives perform the same nature of executive tasks, although the tasks are within specific functions depending on the functional breakdown of the sub-organisations managed.

At the highest level, the Constitution provides the following definition of the Executive of the MPS:

"The executive authority vests in the Ruler (Yang di Pertuan Agong) on the advice of the Cabinet or Minister responsible, with the exception of certain discretionary matters." (Malaysian Federal Constitution 1986)

The Cabinet is a council of ministers consisting of the Prime Minister (as chairman) and an unspecified number of Members of Parliament. The Chief Secretary to the Nation (CSN) acts as the secretary to the Cabinet. Since the PM is the head of the Cabinet, he is considered as having executive power. The Prime Minister (PM), who is appointed by the Yang di Pertuan Agong (Ruler), is a member of the House of Representatives who is likely to command the confidence of the majority of the members of that House (Malaysian Federal Constitution 1986).

The executive bodies that carry out government activities are the ministries and departments, the constituents of MPS. An individual ministry has a minister as its chief executive. A Minister, who is appointed by the Ruler on the advice of the PM, comes from the members of either the House of Representative or the Senate. Deputy Ministers are also appointed in the same way. The PM may also appoint Parliamentary Secretaries from among the members of either House of Parliament. Both deputies and secretaries assist the ministers in their management of each ministry.

Administratively, the chief executive of the public sector is the CSN, while for individual ministries and departments their respective Secretary-generals (SGs) and Director-generals (DGs) are the chief executives. The PMD however has the CSN as its non-political chief executive. The executives carrying out the government activities are the officers of various ministries, departments and statutory bodies.

The task of a manager includes planning, organising, actuating, coordinating, directing and controlling. In the research context, included in management are the functions of policy-making, intelligence, controlling, coordinating and monitoring. In performing his managerial task, an executive has to depend on others within the organisation. He gets things done through others and cannot achieve effectiveness by his own actions alone. This almost proverbial definition of the role of the manager clearly illustrates the processes through which organisational effectiveness materialises. It also suggests the critical importance of management support, either by individuals or formal system structures.

5.4.2 EXECUTIVE DECISION-MAKING

The importance of decision-making in management is generally recognised. The making of decisions involves the tasks of innovation, dynamic management, policy-making and problem-solving. The aspect of problem-solving holds the key to effective decision-making. In the final analysis, an executive makes decisions in order to efficiently carry out organisational activities that benefit its client in the most effective manner while consistent with organisational goals. More effective decision-making implies better management by executives and better overall performance. In the context of the research, aspects of organisational decision-making (as discussed in Chapter Two) are high in priority for discussing organisational effectiveness.

In MPS, the decision of the chief executive of a ministry or department is the overall cumulative effect of various interactions, lower-level decisions, communications and actions within divisions, units and individuals in order to achieve the overall goal of MPS.

5.5 PRIME MINISTER'S OFFICE AND THE MALAYSIAN PUBLIC SECTOR

5.5.1 ROLE OF THE PMO IN MPS

The Prime Minister's Office (PMO) is the personal office for the PM providing him with managerial and informational support. From Figure 5-3, it can be seen that PMO is directly answerable and responsible to the PM. The chief executive is the Confidential Secretary General (CSG) who is

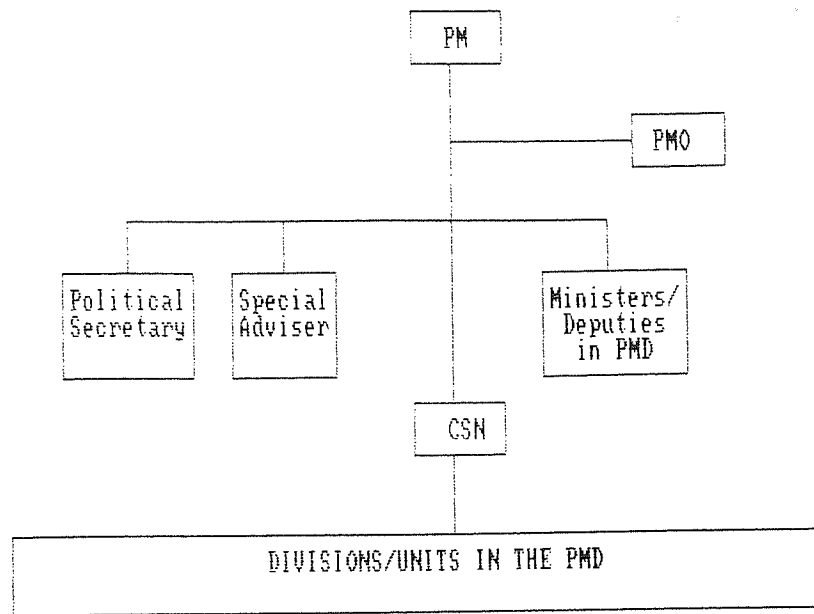


Figure 5-3: Organisation Chart of Prime Minister's Department

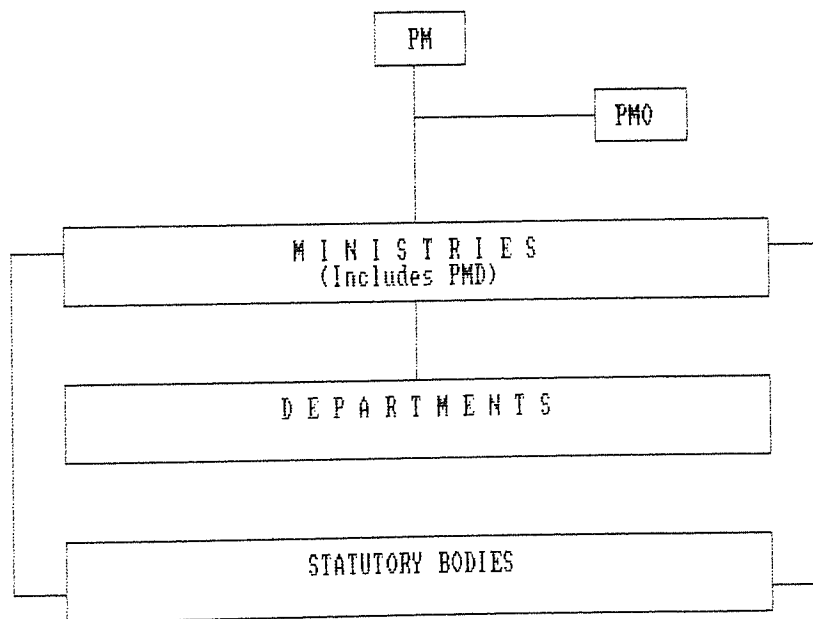


Figure 5-4: The Malaysian Public Sector - Federal Government

Legend:

PM Prime Minister
 PMO Prime Minister's Office
 CSN Chief Secretary to the Nation
 PMD Prime Minister's Department

(PMD has 18 Divisions headed by Director-Generals or Directors. The Administration Division is, however, headed by PMD's Deputy Secretary-General. Chief executive of PMD is CSN who is also the head for all Secretary of Ministries).

responsible for the overall administration and management of the Office.

In the context of the MPS (Figure 5-4), PMO is not an organisation belonging to a particular ministry. As far as its relationship with the Prime Minister's Department (PMD) goes, it is answerable to PMD's Administrative Division on financial and administrative matters. Otherwise, its function is primarily to support the PM and not any other formally structured organisation such as PMD. The role of PMO as an office system will be the main point of discussion in Chapter Seven.

5.5.2 LINKING THE PMO WITH MPS

The PM, by virtue of being the chief executive of MPS, needs to have a supportive system, in the shape of informal and formal structures, to enable him manage MPS. PMO, which provides him with office management and information support, therefore provides such a link. All communications and links the PMO has with the MPS are on behalf of the PM. These links are performed by the various executives of PMO. Normally, the CSG is the person who liaises with his peers and other higher level executives (including ministers) at the ministries, departments, and states. He is supported by the senior executives of PMO.

The role of PMO ranges from a simple information transfer to making decisions on behalf of the PM. It includes making appointments for the PM, communicating on behalf of the PM, conducting research for the PM, monitoring the MPS situation, advising MPS and the PM, and many more. Due to the the constant requirement for such links, the PM is not himself able to handle them all. The executives of PMO filter to the PM only the

perceived relevant matters, with or without the prior consent or knowledge
of the PM.

CHAPTER SIX

THE IDENTITY OF THE MALAYSIAN PUBLIC SECTOR

6.1 INTRODUCTION

Having identified and structured problems appertaining to MPS and PMO, the next step is to do an organisational study of MPS, i.e. to establish MPS identity by applying basic cybernetic concepts. This chapter introduces a methodology to enable a cybernetic study of MPS, with the purpose of understanding MPS operations and to derive various diagnostic points by means of various relevant illustrations.

The study is therefore an approach towards working out the design and meaning of PMO. The stages of the study include modelling MPS structure, identifying MPS, determining activities and units, developing intelligence and control functions, modelling MPS activities, and diagnosing MPS. Underlying the diagnostic process is the conceptual support provided by the viable system model (VSM), which helps to structure the identity of MPS in a form that is accessible for analysis. This study, made with selected illustrations, serves as the pre-requisite to design "office and information systems" for supporting top executive management needs.

6.2 MALAYSIAN PUBLIC SECTOR - A CYBERNETIC STUDY

6.2.1 STRUCTURAL LEVELS OF MPS

We can model the structural levels for MPS based on its existing

formalised structure. Earlier discussions on MPS (5.1 of Chapter Five), the Federal Government organisation structure (Figure 5-1) and the structural recursion theory (Figure 2-4) form the basis for modelling the structural levels of MPS. These levels (Figure 6-2) illustrate the existence of MPS, as a viable system, within its own specified environment and as an embedded part of another system (Figure 6-1). Modelled as a viable system, it exists with some autonomy but cannot survive in a vacuum. It depends upon the notion of higher level viable systems, and in turn, a lower level systems which produce it. Its own identity is what the PM perceives MPS to be.

At the highest level of recursion (Recursion 0), MPS belongs to the nation, while at the next level (Recursion 1), a ministry belongs to MPS. Visualising from a different angle, a ministry is a producer of MPS, while MPS produces the nation. We are interested in Recursion 1, which shows how a ministry is embedded in the higher recursion of MPS, and in turn the embedding of departments and statutory bodies within it.

6.2.2 IDENTIFYING MPS

6.2.2.1 CONCEPTUAL MODELLING

Having modelled the related structural levels, the next phase is to build conceptual models of MPS. Such modelling requires an understanding of the global relationships involving individuals and organisations which link the PM with the nation's population. The requirement in this direction is to cater for the explicit mission of MPS. This is stated as: "providing public services". In Figure 6-3, the boxed area is the system related to

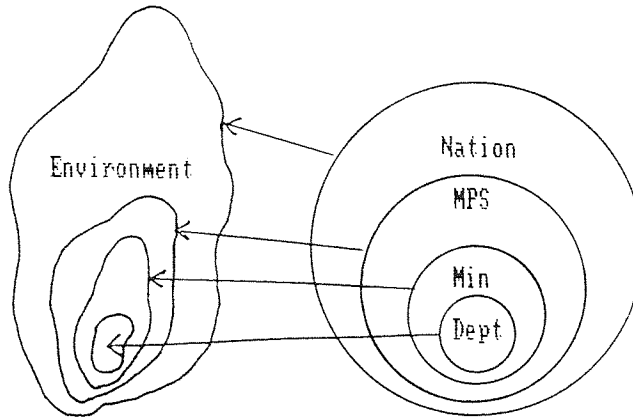


Figure 6-1 Embedding of Viable Systems

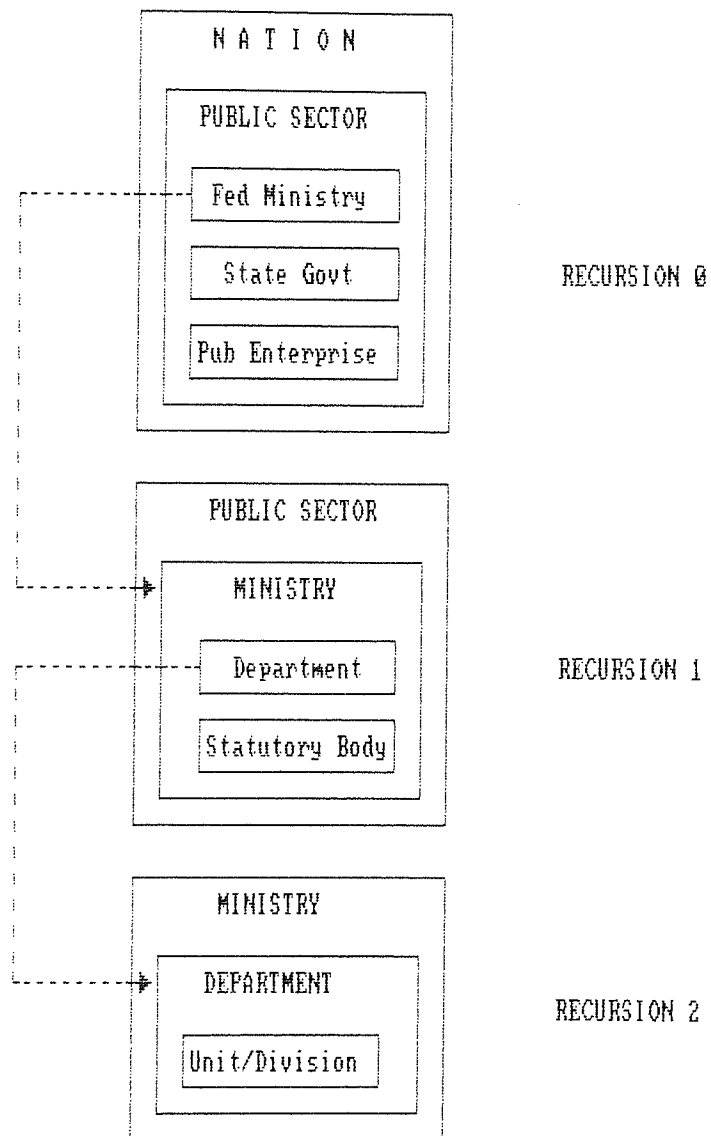


Figure 6-2: Structural Recursion of MPS

(Adapted from Beer 1985)

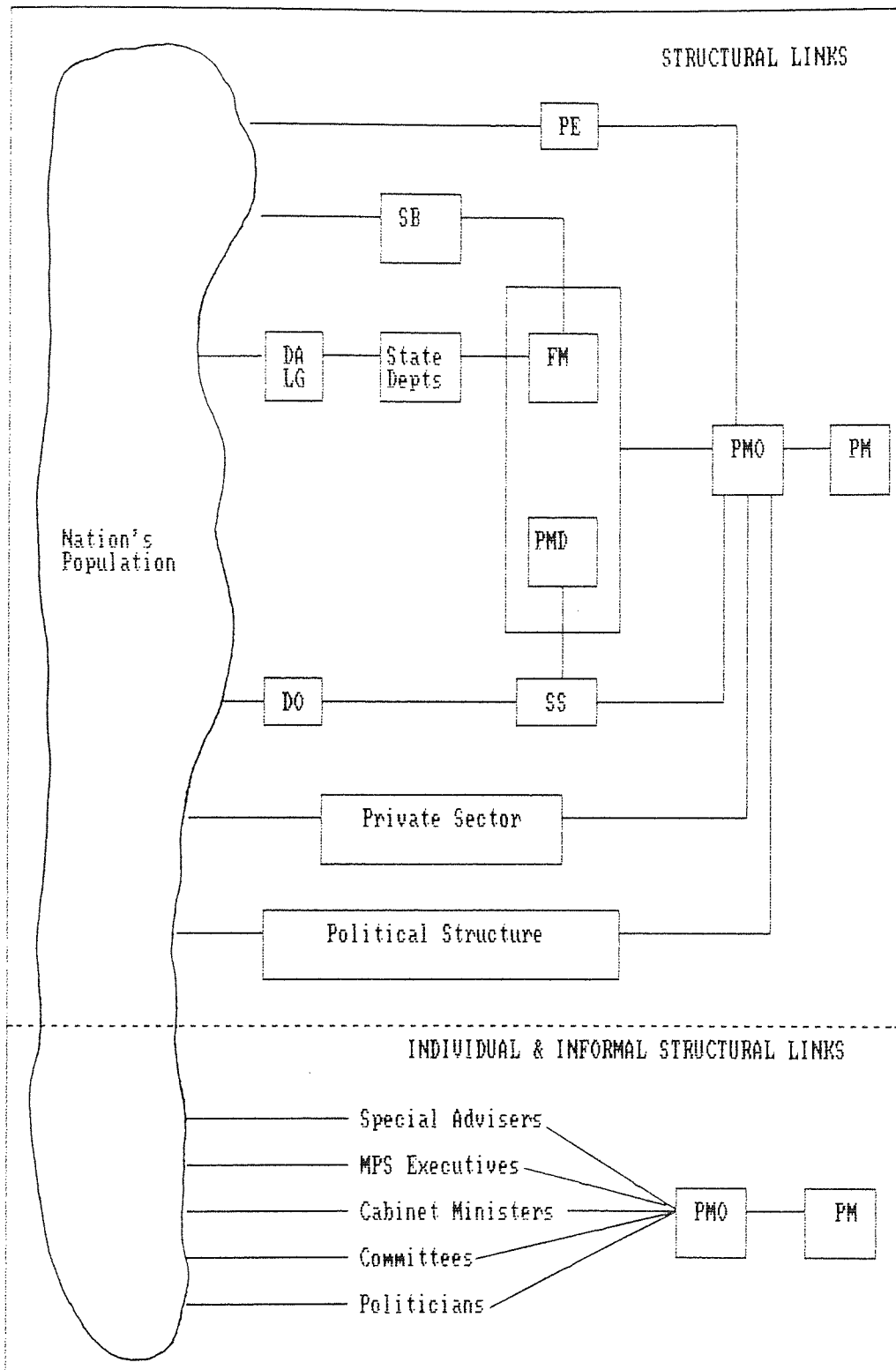


Figure 6-3 Overall Relationship: PM and the People

Abbreviations:

- | | | | |
|----|----------------------|-----|----------------------------------|
| DA | District Authorities | PM | Prime Minister |
| DO | District Offices | PMO | Prime Minister's Office |
| FM | Federal Ministries | PMD | Prime Minister Department |
| LG | Local Governments | SB | Statutory Bodies |
| PE | Public Enterprises | SS | State Secretariats (State Govts) |

the research. We can narrow this general picture to more specific models of immediate relevance to the research. These are conveyed in Figures 6-4, 6-5 and 6-6. Figure 6-4 is the exposition of the PM's relationship with MPS and the population (where MPS implements nation's policies for the benefit of the people). Figure 6-5, somewhat akin to Figure 6-4, illustrates the relationships between the PM and MPS. The PM, in this instance, is the manager of MPS with PMO as a formal structural link.

To realise the relationships described in the diagram in Figure 6-4, the following links are required:

- a. the PM must be linked with MPS, in a manner that allows him to effectively manage MPS. In this way MPS is able to implement the policies which in the final analysis are what affects the people;
- b. MPS must have the capacity to be able to interpret the PM's changing perception of MPS identity and national socio-economic policies among other things; and
- c. the PM needs to be kept well informed of MPS performance levels (in relation with the role of MPS as ascribed by the PM - in other words, his expectations).

The three aspects are therefore a matter of linking, interpretation and information accessibility - in other words, FILTERS/ATTENUATORS and AMPLIFIERS which are jointly termed VARIETY OPERATORS (VO). As is made clear by Figure 6-5, linking the PM with MPS is the role of PMO. However, PMO is one of the many organisations of MPS that performs the variety operation function. Insofar as we are concerned, it is the primary role of PMO to provide the above links which may be carried out by:

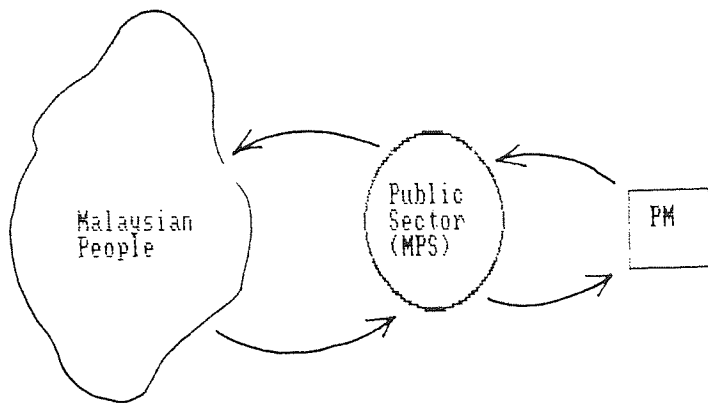


Figure 6-4 Regulatory Model: PM managing MPS
(PM-MPS-People Relationships)

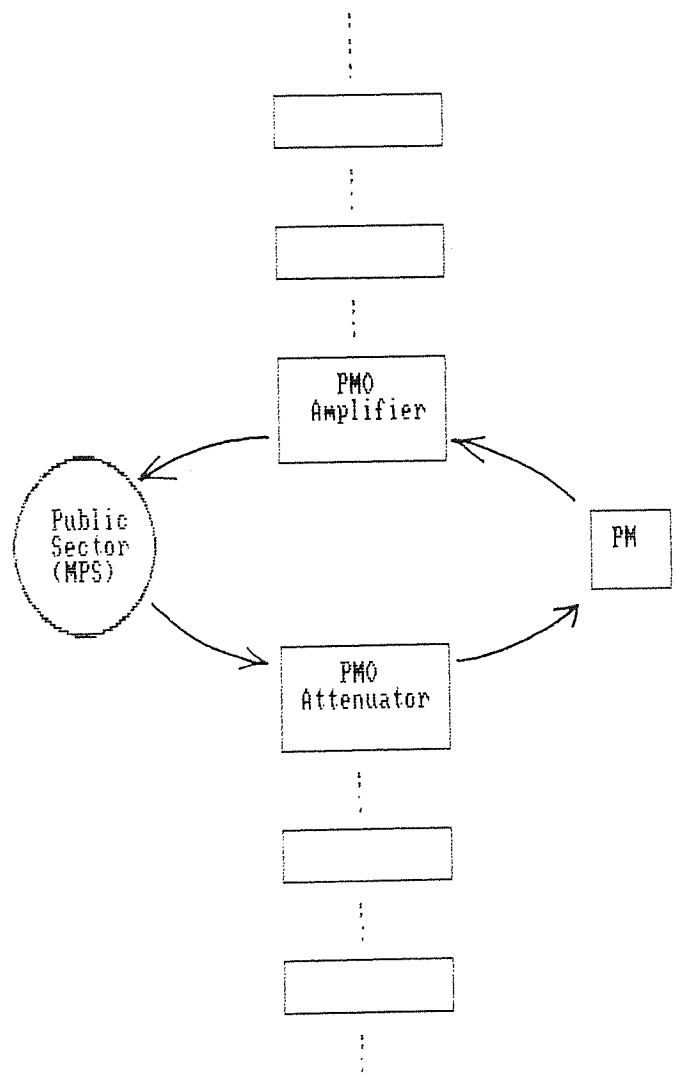


Figure 6-5 Regulatory Model: PM managing MPS
(PMO as Variety Operator)

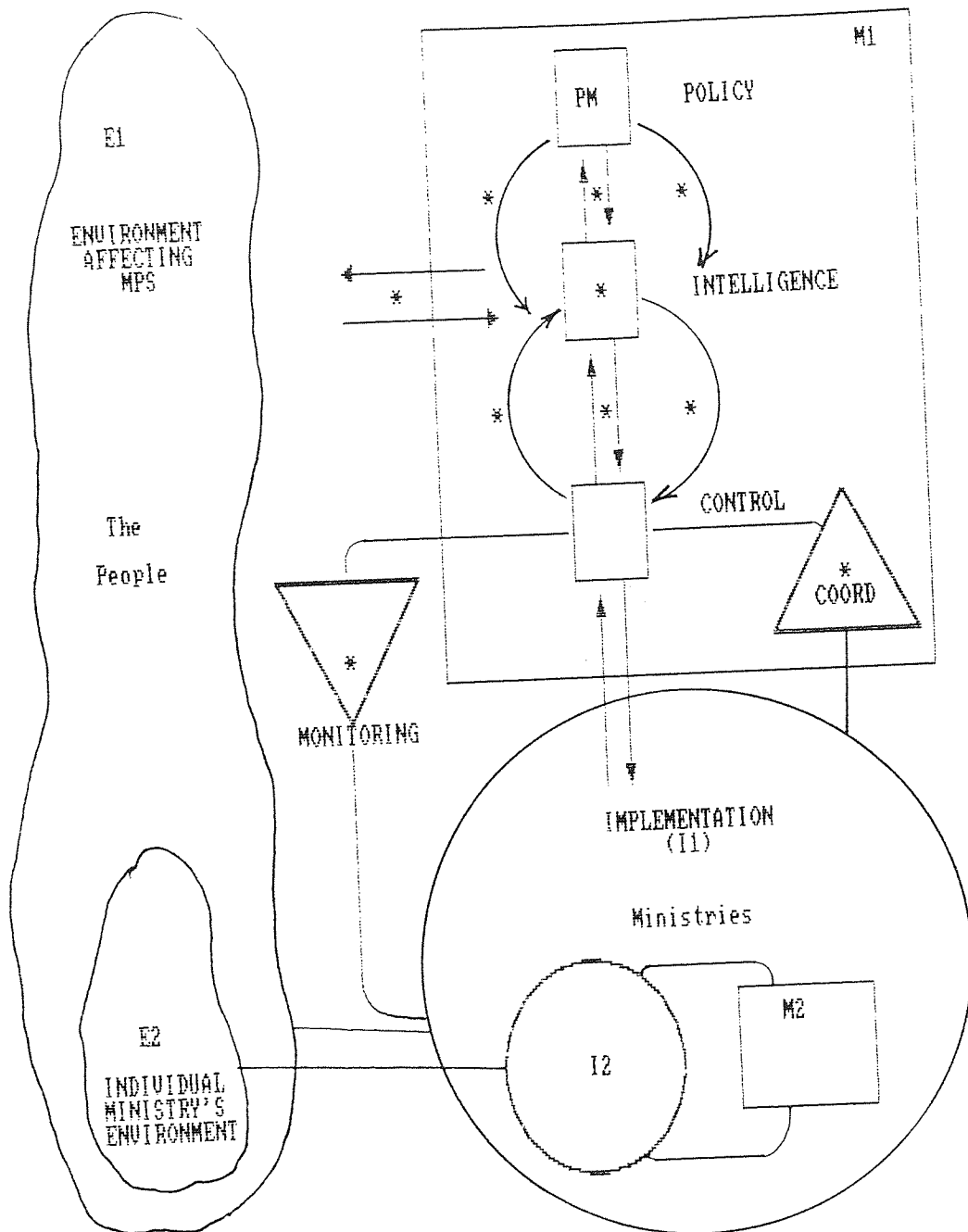


Figure 6-6: USM of MPS (Role of PMO)

(Interpretation of Beer's USM)

Legend:

* PMO

→ Variety Operation Channels

- a. facilitating the PM's link with MPS (and vice versa) through a better communication system;
- b. providing necessary/appropriate filtration and amplification of information transmitted between the PM and MPS - i.e. to ensure the PM is able to transmit policy directives as he perceives them; to ensure MPS receives a true picture of his intention on policies and is able to interpret them accurately. In ensuring proper feedback, regulatory loops/mechanisms with PMO as VO need to be designed; and
- c. devising performance measurement that is understood by the PM; or interpreting performance measurement provided by MPS into an acceptable form - i.e to ensure uniformity of the metric of performance provided to the PM.

The critical relevance of these points becomes apparent when we deal with systems design in Chapter Seven. We can make use of these elemental models to produce more systemic models with the aid of Beer's VSM. Thus, the diagram in Figure 6-6 is an enhancement of Figures 6-4 and 6-5. The VSM elucidates the overall connection between the PM, PMO, MPS and the people. Note that the proper link between the PM and the people, which is one of the many components of MPS wider environment, is through the intelligence function of MPS. The PM's link with MPS through PMO is shown by the * sign along the variety operation channels and in the intelligence function itself.

The VSM here represents MPS at Recursion 1 (see the equivalent relationship with Figure 6-2), where M1 is MPS's management, I1 is MPS's implementation (performed by all related ministries) and E1 is MPS's environment. At Recursion 2, which is the ministerial level, we have M2

(ministry's management), I2 (ministry's implementation comprising of departments) and the relevant environment (E2).

6.2.2.2 "NAMES" OF MPS

Based on the following list of MPS "names", a "name" at a global level and of general importance to the actors will be selected:

- a. A national management/administrative system to formulate and implement government policies, with the purpose of improving the overall situation of the nation and its people.
- b. A system to accelerate the implementation of the national socio-economic development programme concerning poverty eradication and social restructuring with the goal of achieving national unity and integration.
- c. A system that implements overall government policies in a way that enhances the effectiveness of the national socio-economic policy, in order to speed the achievement of national unity and integration.
- d. A system that facilitates economic and social change (development), in a way that leads towards increasing the nation's prosperity and standard of living.
- e. A system to facilitate a change in society's attitude, with the purpose of creating an enhanced quality of national life, one which is progressive and respected.
- f. A system to increase national productivity through improved efficiency/effectiveness, with a view to achieve healthy economic, social and administrative growth.

The first three names all refer to MPS at a global level and tend to overlap with one another, while the last three are at lower levels of recursion. The second and third names, although at the same level of recursion, are less global than the name assigned. Of the first three names, (b) considers specific issues on poverty, while (c) relates to specifically socio-economic policies, and hence not global in nature. For the research, the first name will be considered:

"A national management/administrative system to formulate and implement government policies with the purpose of improving the overall situation of the nation and its people."

By undertaking the study at the highest level of resolution based on a global identity of MPS, a meaningful and comprehensive cybernetic study can be carried out. By working at a global level, less details need be accounted for, thereby making the research more manageable. The following explains the "named" system for MPS:

- a. Transformation is from "people's needs and government policies" to "executable services of projects and plans" implying an "improved condition of the people". Internal MPS transformation is from "existing resources" into "a stable government administrative machinery".

The input is from both internal and external sources. Internal inputs are MPS personnel, available resources (technology, finance, information) and allocated resources from MPS management. External inputs are controlled variables (such as government policies which are the primary input), and uncontrolled variables of the environment consisting of resources (technology, private sector

resources) and issues (political, economic and social factors, national disasters, etc.).

The output produced by the transformation is the service provided by the MPS. To determine whether the transformation is successful, the output is matched with the defined criteria for stability which is done through an evaluation mechanism based on performance evaluation.

- b. Stability criteria may be expressed from two standpoints: Successful transformation is recognised by both internal stability and cliental happiness or satisfaction. Internal stability implies **EFFICIENCY** of MPS while cliental happiness (related to external or environmental stability) means **EFFECTIVENESS** in terms of MPS service to the people. Efficiency is needed to improve effectiveness.

Measurement of efficiency may be: smooth government machinery; increased MPS productivity; better executive performance; inter-ministerial relationship; better utilisation and effective use of information technology and other resources.

Effectiveness can be measured by: comparing or matching actual happiness or satisfaction of the people against targeted level of people's satisfaction; comparing the actual gain by the people against the projected value; comparing actual service provided against anticipated or projected level of service to be provided. Of these effectiveness criteria, happiness and satisfaction are

highly subjective, qualitative and therefore have unmeasurable values, while the other two are mixtures of both qualitative and quantitative values and are easier to measure.

- c. Actors performing the transformation are the executives and staff of MPS.
- d. Client or beneficiary is the entire population of Malaysia.
- e. Owner of the transformation is the PM.

6.2.3 ACTIVITIES OF MPS

Having established a "name" for MPS, the next step is to identify the involved activities and units, based on the named transformation. Apart from the overall MPS, it is relevant to determine the activities and units of the intelligence and control functions.

6.2.3.1 DETERMINING ACTIVITIES AND UNITS IN THE MPS

The transformation based on the "named" MPS system has provided us with a basis for determining activities and units of MPS as shown by Table 6-1. Table 6-2 describes the types of ministries performing the transformation in MPS based on their purposes and activities, i.e. development and support ministries.

6.2.3.2 DEVELOPING THE INTELLIGENCE FUNCTION

The role of PMO in intelligence is crucial for the research, both in terms of the present study, and also for the following design. This phase is about determining and modelling MPS intelligence activities. This process is necessary as the intelligence function is a formal structural link between the PM and MPS environment with PMO playing a key role. An important criteria in building intelligence model, is the requirement that MPS is able to adapt to changing environmental situations.

ACTIVITIES	UNIT/ORG
a. <u>Define implementation plan</u> to carry out government policies	EPU
b. <u>Undertake research</u> to enable acceleration of implementation	EPU; SERU
c. <u>Develop overall implementation plan</u> (include schedules/targets)	EPU
d. <u>Allocate resources</u> to ministries	Treasury
e. <u>Integration</u> among ministries/agencies responsible for implementation	EPU
f. <u>Inform</u> people of government plan to accelerate implementation	DI
g. <u>Implement policies</u>	Ministries
h. <u>Monitor implementation</u> of policies	ICU
i. <u>Study implementation feedback</u>	MI/DI
j. <u>Review implementation plan</u>	EPU(EP)
k. <u>Develop better techniques</u> to implement policies and plan (information system, communication channels, etc)	EPU; ICU; Ministries

Table 6-1 Activities and Units in MPS

Note: "List of Abbreviations" elaborates the abbreviated organisations. Appendix 2 describes these organisations.

MINISTRIES	AIMS	ACTIVITIES
a. Development Ministries	Serve the population	Implement government policies
b. Support Ministries	Support Dev Ministries	Develop plans; Carry out research; Manage resources; Monitor progress; Schedule implementation; Administer national security, justice, etc.

Table 6-2 Types of Ministries in MPS

(1). ACTIVITIES AND UNITS OF INTELLIGENCE FUNCTIONS

Table 6-3 is a list of activities and units for intelligence function in MPS. The nature of intelligence activities may be illustrated in a time analysis model as shown in Figure 6-7. The extra focus on the future is vital for MPS learning process.

PLANNING is carried out by the Economic Planning Unit (EPU), and involves defining and developing overall implementation plans based on government policies. Implementation plans of the MPS has been carried out in five phases over the period 1970 to 1990 (Fifth Malaysia Plan 1986).

RESEARCH is carried out to enable an understanding of the issues faced by the nation. Research is in the form of socio-economic assessment, performance appraisal, past/present research and future studies. Socio-economic assessment appraises the effect of implemented programmes on socio-economic condition. It involves both the past, which entails processing data describing an already existing situation, and the future,

ACTIVITIES/ISSUES	UNIT/ORG
1. <u>PLANNING</u> for implementation of government policies 2. <u>RESEARCH</u> : a. <u>SOCIO-ECONOMIC ASSESSMENT</u> b. <u>SOCIO-ECONOMIC INDICATOR RESEARCH</u> c. <u>PAST/PRESENT RESEARCH</u> d. <u>FUTURE STUDIES</u> - Socio-economic forecasting - Development of better implementation technique	EPU SERU;EPU;PMO DS PMD;Ministries SERU Ministries

Table 6-3 Activities and Units in Intelligence Function

Note: PMO's role in intelligence covers more than just research. While in research, it provides ad hoc and proactive information to the PM, its role in filtering ministerial and departmental intelligence information is crucial.

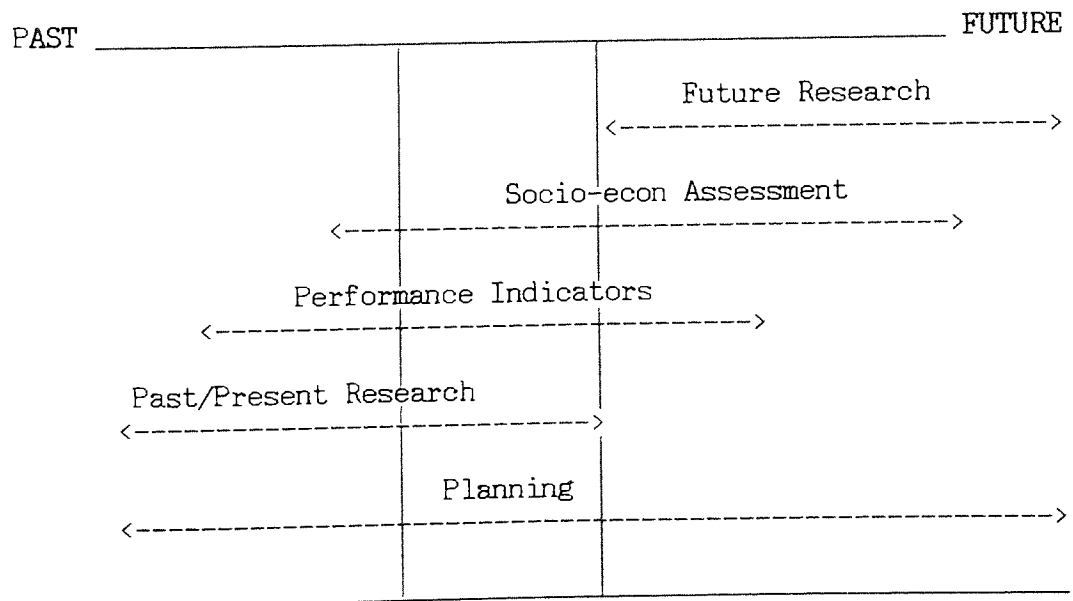


Figure 6-7 Time Dimension Analysis: MPS Intelligence Function

which is developing the means to describe and forecast changes relating to both quantitative and qualitative aspects.

The implemented plans have multiple effects, with different people affected in different ways. Impacts can be demographic (involving labour force, population shift, employment and unemployment); socio-economic (changes in income, employment rates and patterns) and psychological (changes in intangible aspects of life which affect social integrity and unity).

Such research, requiring specialist knowledge (as opposed to evaluation research), is undertaken by EPU, Socio-Economic Research Unit (SERU), and occasionally PMO. A type of socio-economic assessment is the impact research which is the process of assessing the value of programmes in two ways: impact of programme output (impact evaluation), and process of implementing the programme (implementation evaluation). It enables planning for new programmes and refining government policies.

Impact evaluation is used to assess the extent the programme effects social change in a desired direction. It implies specified operationally defined objectives. Productivity measurement or performance appraisal for example should show the effect of the programme on the population. Evaluation work in MPS is carried out by the Implementation and Coordination Unit (ICU).

Implementation evaluation is not our main concern at this stage, as it is very much an internal auditing or monitoring system within MPS, and therefore a part of the control function.

In MPS, the EPU examines the progress of the five-year socio-economic programme. Performance appraisal supports socio-economic appraisal and is a form of socio-economic indicator research which measures economic performance and socio-economic well-being (e.g. quality of life). The Ministry of Finance has compiled Key Economic Indicators, such as growth in Gross Domestic Product (GDP) and Main GDP sectors; and Socio-economic Statistics, such as Health, Education, Demography most of which are collected by the Statistics Department (DS). Past/present research includes the study of past and current states of the environment and the effect of MPS programmes on the environment (socio-economic assessment and performance appraisal).

Finally future studies, which builds upon past/present research, use tools to support other forms of research and attempts to generate a set of possible alternatives for changes in technologies, politics and the social condition. They make use of quantitative techniques for prediction (social forecasting) and qualitative techniques to facilitate exploration of possible network of critical events. Such research is almost exclusively project oriented. SERU for instance undertakes such research on socio-economic problem of the nation, by assessing the potential in the population given changes in environment. Development of better technique is normally carried out by agencies in individual ministries.

(2). BUILDING MODEL(S) OF INTELLIGENCE FUNCTION

Using the VSM (Figure 6-6) helps to enhance our understanding of MPS in comprehending various connections involving the PM, MPS (system-in-focus), and its environment. Intelligence, together with policy and control, is a

significant management function of the VSM. Based on the agreed identity of MPS, its environment includes government policies and issues affecting MPS. These might be social (social needs, participation in society, values, culture), political, educational, economic (availability of human, information, technology, organisational, managerial and financial resources; programmes for implementation; cost-benefit of each programme), to do with communication (exchange of views, mutual respect), or information. All these issues are inherent to the function of MPS and have to be systemically considered by MPS organisations in implementing government policies in order to provide the necessary service to the people.

The ACCEPTED environment of MPS (Figure 6-8) is a combination of:

(a). input to MPS and issues influencing the implementation ministries in MPS (i.e. M1, M2, M3); and (b). the expanding environment peculiar to MPS. The first concerns the environment of individual ministries. An environment of a ministry is specified by the ministry's responsibility, but includes all aspect of social, economic and other variables. For example, in handling agricultural issues, the Ministry of Agriculture encounters its own social, economic, political and other environmental issues within and associated with agriculture. The second, the expanding environment peculiar to MPS, is the sum effect of some of these issues, and is more complex in nature.

As an example, an issue on poverty cannot be associated with a single organisation. In Malaysia, the Agricultural, National/Rural Development and Land/Regional Development Ministries are all responsible to contain and improve the problem. On other issues, the responsibility may be

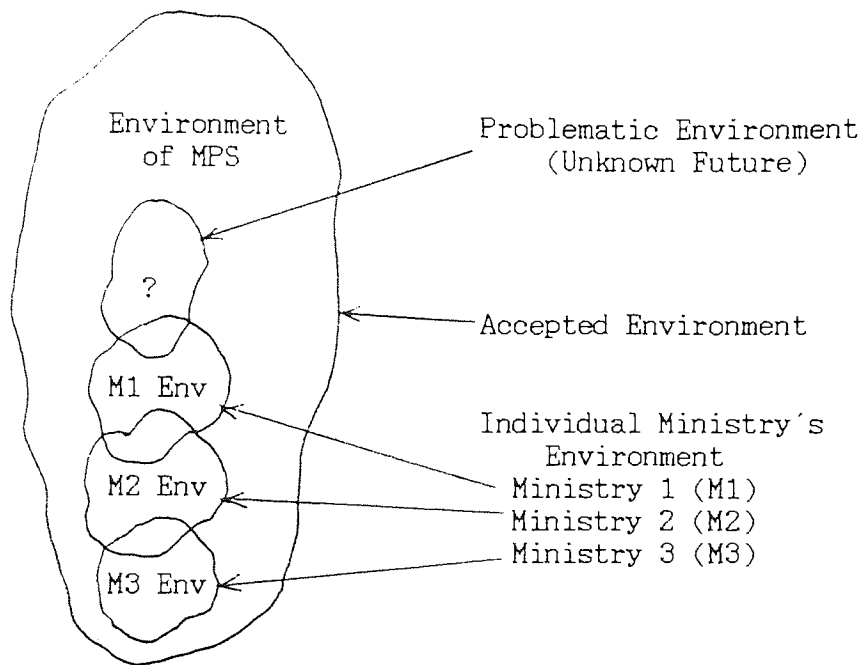


Figure 6-8 The Environment of MPS

assigned to a single ministry. A poverty issue may be viewed as having wider implications than just being a social issue for MPS to handle. It may have social, political, security or economic repercussions and, therefore, have an expanding environment of its own. All these new environmental variables are beyond the control and capability of a ministry and cannot be solved by an individual organisation tackling its own portion of the problem. The problem has to be handled multidimensionally, in a group environment involving debates, exchange of views, and group decisions.

For instance, on the poverty issue, it cannot be left to the Ministry of Agriculture to handle the growth of food crops, the Ministry of National and Rural Development to develop rural areas, and the Ministry of Land and Regional Development to develop new land and regions. These ministries need to work as a team to cooperatively delve into the poverty issue. In other words, the sum of the environments of ministries put together is

less than the whole environment of MPS.

The PROBLEMATIC environment of MPS consists of the unknown possibilities which may be due to the inability to cope with external social influence or expanding drug markets. For economic issues, natural disasters, such as drought or flood, highlight the unpredictability of situations.

Attributed to the intelligence function are two crucial aspects that determine the success of VSM as a whole. They are the integration of intelligence and the modelling of MPS. By and large, activities to do with intelligence are disparate, disseminated throughout MPS because of, firstly, an enormous increase in complexity in the environment and, secondly, delegation of power in MPS. Obviously the PM is not expected to know everything, and many of his tasks must be delegated to organisations, individuals and committees in MPS, including PMO. Therefore, there is a requirement to spread these activities in a coherent manner. The intelligence function will house a MPS corporate model, a way of presenting to the PM the whole public sector system. These points will be elaborated later on in this chapter (VSM study).

The PMO could fulfil the above exigency. The tasks it performs are variously located along the filters or channels (Figure 6-6), i.e. along the arrowed lines marked by * and, to a lesser degree, within the intelligence box. PMO, therefore, can be the provider of the total MPS modelling due to its proximity to the PM, its strong inherent link with other organisations in MPS and its intermediary role linking the PM with MPS.

Integrating the intelligence function is a crucial requirement since activities such as planning and research are performed by different ministries and departments. A possible option is to have this function physically located in PMO and regulated by PMO. Beer's model on "Key components of System Four" and "Interrogation of Problematic Environment" (Figures 6-9 and 6-10) illustrate the components of intelligence. The relevance of these figures is in illustrating the relationships involving intelligence units. Figure 6-9 explains the necessary links between: intelligence organisations and MPS environment; different models in MPS which are maintained within and by the intelligence function; the intelligence elements itself. The links are provided by the variety operators through the amplification and attenuation channels which consist of organisations, individuals, processes and other mechanisms.

Organisations such as EPU, ICU, SERU and others in PMD, and even ministries, perform the intelligence functions of MPS by carrying out activities (also referred to as elements) mainly of planning and research. They use various mechanisms to communicate with the environment - mainly amplification and attenuation channels and transducers. Amplifiers are required to improve the balance of intelligence while attenuators are for reducing complexity in the environment. For instance, a planning process needs information distribution channels to amplify the intention of MPS while a research report attenuates the environmental complexity. Various sub-units and individuals also provide the necessary channels to carry out these processes.

The environment we are referring to (as already discussed earlier), is the relevant environment affecting MPS whether belonging to the nation

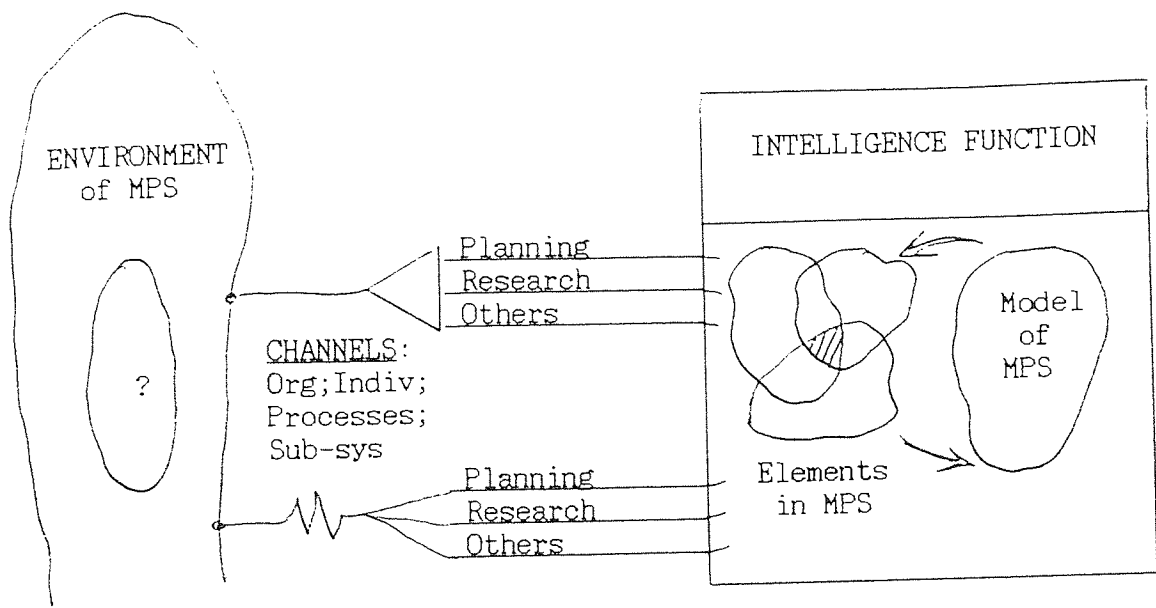


Figure 6-9 Key components of Intelligence Function of MPS

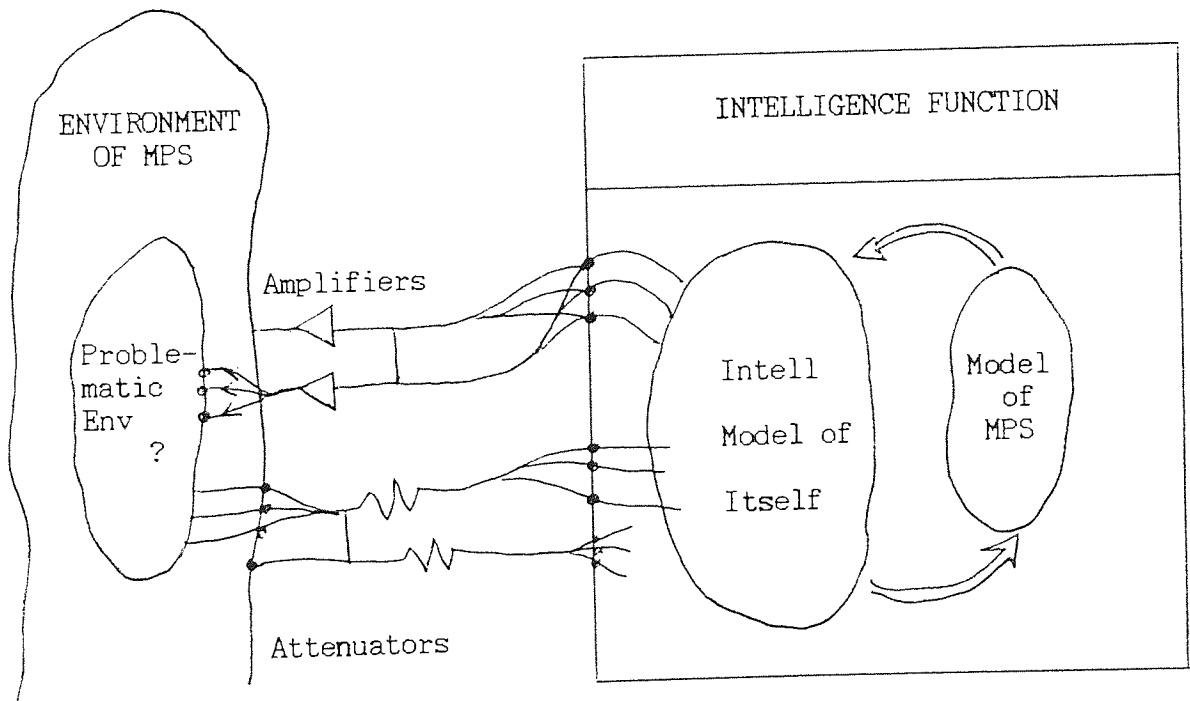


Figure 6-10 Intelligence Function to interrogate the Problematic Environment of MPS

(Diagrams adapted from Beer 1979)

(consisting of the people, organisations outside MPS, and situations on economics, social, political, and so on) beyond the boundaries of the nation. As such, this is a situation of extreme complexity. Variety proliferation is an on-going process as peoples' needs, techniques of production, state of technology, economic climate and other physical environments, such as land utilisation, change with time. As explained earlier, intelligence organisations maintain regulation over the environment with the aid of VO for attenuation and amplification.

Relationships between models are also relevant to understand MPS. There are two main models - intelligence model and model of MPS. The intelligence model, which consists of various intelligence elements and activities, is actually a subset of the VSM. The MPS models may include various types of models, and may be cybernetic or non-cybernetic in nature. There are many possible MPS models, most of which may include diagrams, statistics, graphs, etc. However, the use of VSM reflects a cybernetic relationship in MPS (discussed in 6.2.6). Requisite variety for regulation does exist between elements of the intelligence function and the MPS model. The intelligence organisations of MPS initiate changes in the MPS model through its interaction with MPS environment and provides mechanisms such as communication tools (forum for debates) and information systems to enable the regular maintenance and updating of the MPS model.

There are inherent relationships within the intelligence elements (as shown in Figure 6-11), which embrace planning for implementing programmes based on policies, socio-economic assessment on existing issue of the nation, performance appraisal for measuring socio-economic well-being, past/present research and future studies on possible

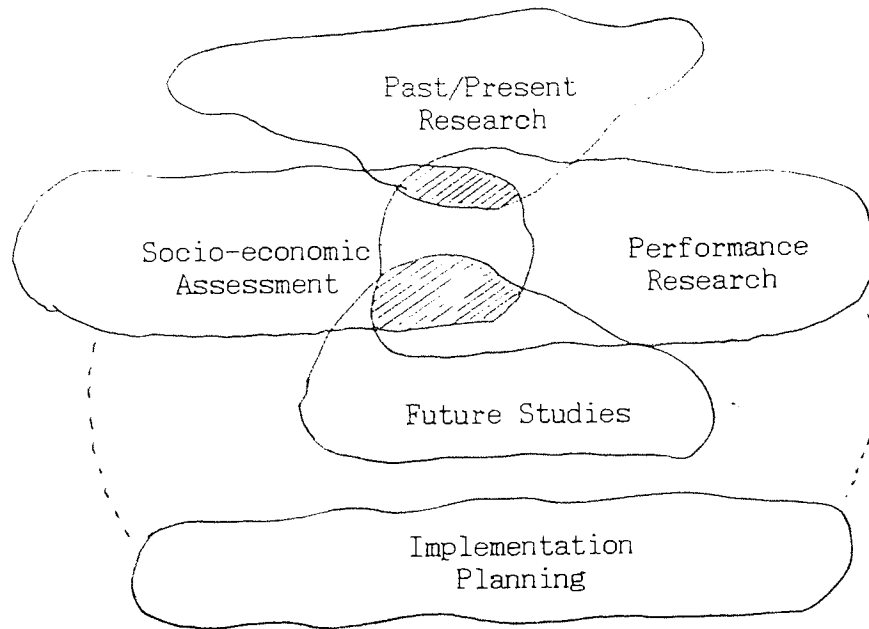


Figure 6-11 Intelligence Elements in the MPS

issues that may affect the nation. In practice, they overlap with each other. The shaded portion is the unknown future (i.e. defines the centre of the MPS real concern about its future), where innovative skills in carrying out the above activities and management are required. The rest of the overlapping activities need both innovative and reactive management action by policy makers.

6.2.3.3 DEVELOPING THE CONTROL FUNCTION

The purpose of this section is to permit the study and development of monitoring-control and adaptation mechanisms for MPS with the use of control, coordination and monitoring functions. It is agreed that the control function, in controlling MPS operations i.e. implementing government policies, provides an effective filter of MPS's internal variety. Monitoring-control mechanism involves the design of internal control activities (in collaboration with the units involved), making use

of the control channels as well as both the monitoring and coordination channels. Figure 6-12 is the mechanism for monitoring-control for implementation of government policies.

Monitoring systems (such as internal study group, progress monitoring, training and auditing), provide the filtered operational information necessary for the control function to assess the implementation of policy. This acts as a facilitator enabling the control function to bring about change if necessary. Together with the intelligence function which handles external situations, it contributes to the policy debates as it has a full understanding of the internal operation of MPS. Coordination provides anti-oscillatory systems such as information systems, schedules and procedures. There are also direct control functions where rules are imposed by the control function and programmes are fed by the implementation ministries. Further illustrations and elaborations of this mechanism can be seen in the VSM discussion later in this chapter. The relationship of this model with the overall working of MPS is as illustrated in the VSM of MPS in Figure 6-27.

6.2.3.4 ADAPTATION MECHANISM

The design of an adaptation mechanism for MPS is important, as it is necessary for the policy function (i.e. System Five) to balance the two structural filters of MPS - intelligence and control functions, both of which have been developed earlier. In MPS, the PM and his Cabinet ministers as decision-makers are too heavily involved in the ongoing debates between these two functions to be able to take decisions. It is important to maintain balance between these two functions, i.e. ensuring

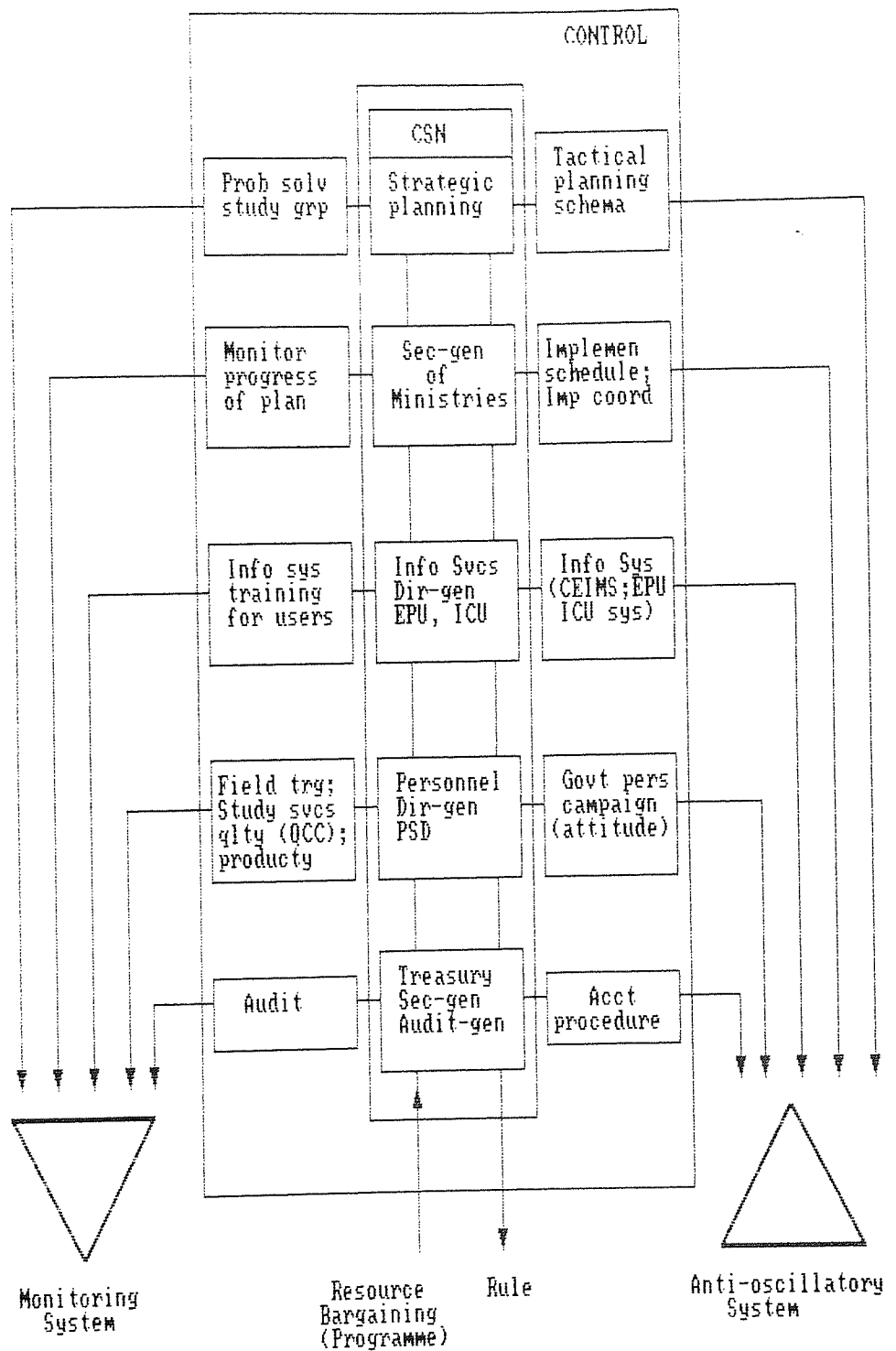


Figure 6-12 Monitoring-Control Mechanism for MPS

an all round adaptability to external changes while maintaining internal stability. This mechanism will be elaborated further in the VSM discussion.

6.2.4 TECHNOLOGICAL AND PRIMARY ACTIVITIES

6.2.4.1 MPS BOUNDARIES

Having established the basic identity of MPS, the next three phases concern the development of MPS activity models. They are relevant to our design in that they provide the models necessary to enable the PM to understand the working of MPS.

In order to develop activities modelling it is necessary to define the boundaries of MPS. In recapitulation, the transformation model implied by our named MPS is made apparent by the definition of MPS boundaries as shown in Figure 6-13. The actual transformation (which is MPS) is treated as the "black box" in this model.

To enable the MPS transformation process, the input needs to produce the required output. However, alongside the controlled variables (input), there are the disturbances (i.e. the uncontrolled variables which may affect the transformation process). The figure illustrates the use of feedback adjuster and model adjuster to control and regulate the transformation process. Here, we make use of the VSM to diagnose and adjust MPS, i.e. as a feedback adjuster. At the same time, another model, a model adjuster (or adjuster organiser) is required to update the VSM. Since the VSM in itself is both self-adjusting and self-organising, it

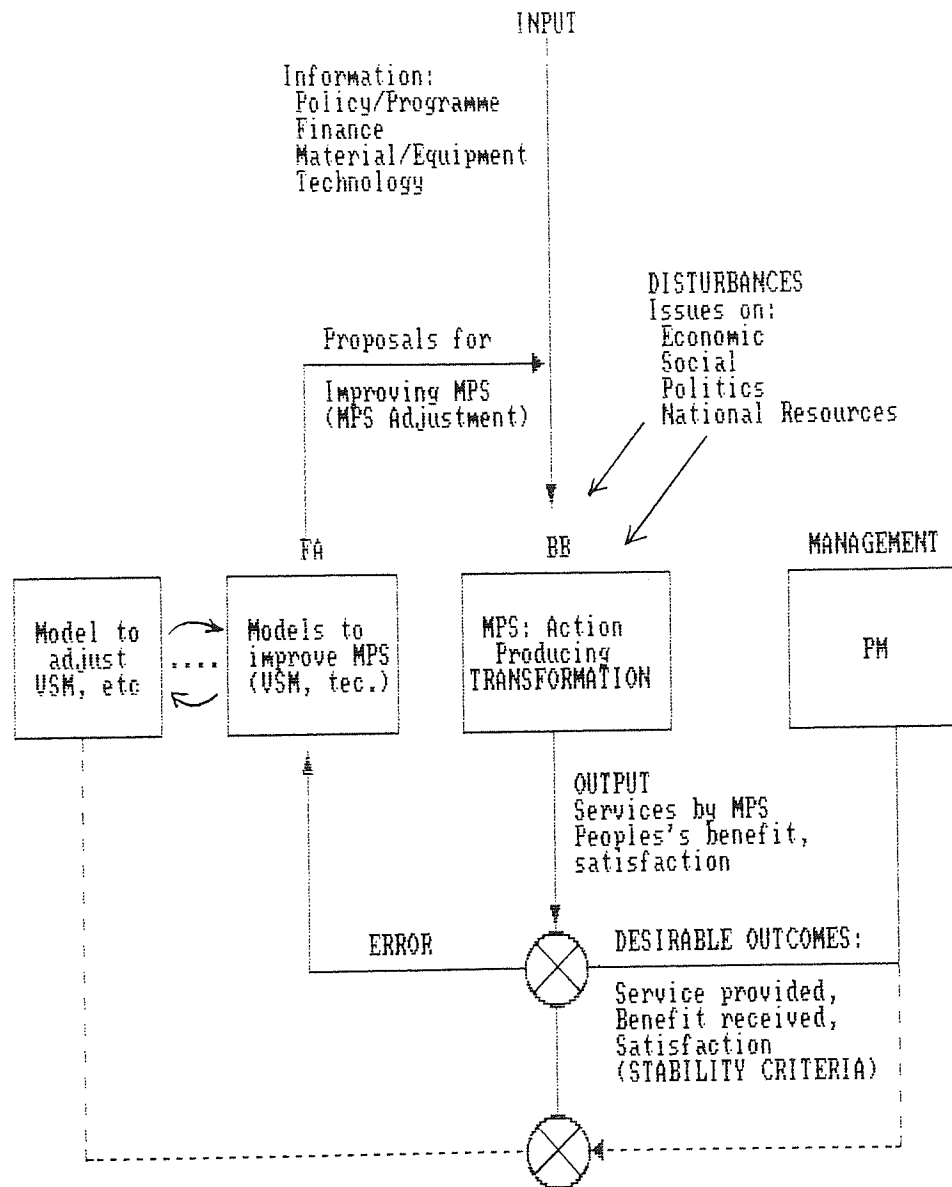



Figure 6-13 Model of MPS Boundaries

Legend:

 Comparator (matching "actual" and "anticipated" outputs with "desirable/targeted" outcomes i.e. the criteria of stability)

BB Black Box

FA Feedback Adjuster

MA Model Adjuster

inherits both the functions of the above models.

6.2.4.2 MODELLING TECHNOLOGICAL AND PRIMARY ACTIVITIES

Basically, the three categories of activities we focus on, are technological, primary and regulatory activities. In the case of MPS, the primary activities are the services it offers to the people with respect to implementing government policies. Technological activities are activities required for the transformation, but carried out by organisation outside MPS.

The following are primary activities of MPS derived from Table 6-1:

- a). Preparation of policy plans - Defining plans for implementation by various agencies;
- b). Implementation of plans - Conversion of policies into programmes;
- c). Development of implementation schedules - Conversion of programmes into executable projects, services or actions; and
- d). Implementation of projects - Execution of services (actions) and resources.

Basically, three types of activities are recognised: development (the first three), integration, and execution.

In defining the boundary of MPS activities (Figure 6-14), technological activities are used. The activities carried out are almost entirely by the ministries. The exception is services execution which is carried out both by the public and private sectors. In this latter case, clustering

the primary and technological activities is possible. For the research, this will be ignored.

As the ministries of MPS are involved in all the activities, no differentiation is made between technological and primary activities. All the activities are therefore regarded as primary activities. Figures 6-15, 6-16 and 6-17 are the flowcharts of these activities. They show MPS activities at three different levels of resolution. Figure 6-17, classified by nature of services, is the actual actions taken by the departments of respective ministries.

Regulatory activities are outside the domain of technological and primary activities, but they are required to support implementation of government policies and may be carried out by MPS ministries, private sectors or both. They include:

- a). Allocation of resources to the implementing ministries - financial, personnel, machine, and equipment;
- b). Evaluation of plans/programmes - Plans and programmes are reviewed and improved whenever a negative effect is picked up by the monitoring process. For instance in a long term plan (e.g. Five Year Plan), there is a short term review (Budget Report) carried out to improve the original plan;
- c). Integration of plans among ministries - This is relevant to reach a consensus regarding actions to be taken when deciding schedules and implementation methods;
- d). Evaluation of projects - Studies are made to evaluate the progress made by implementing ministries, normally carried out by

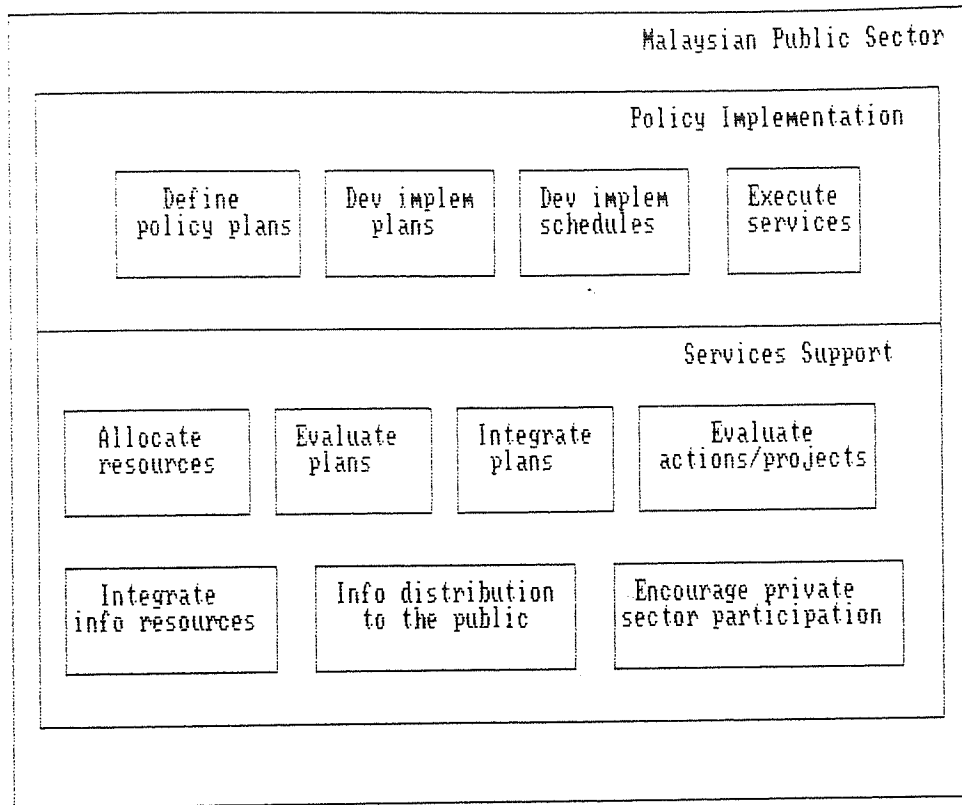


Figure 6-14: Technological Activities of the MPS
Organisational Boundaries Definition

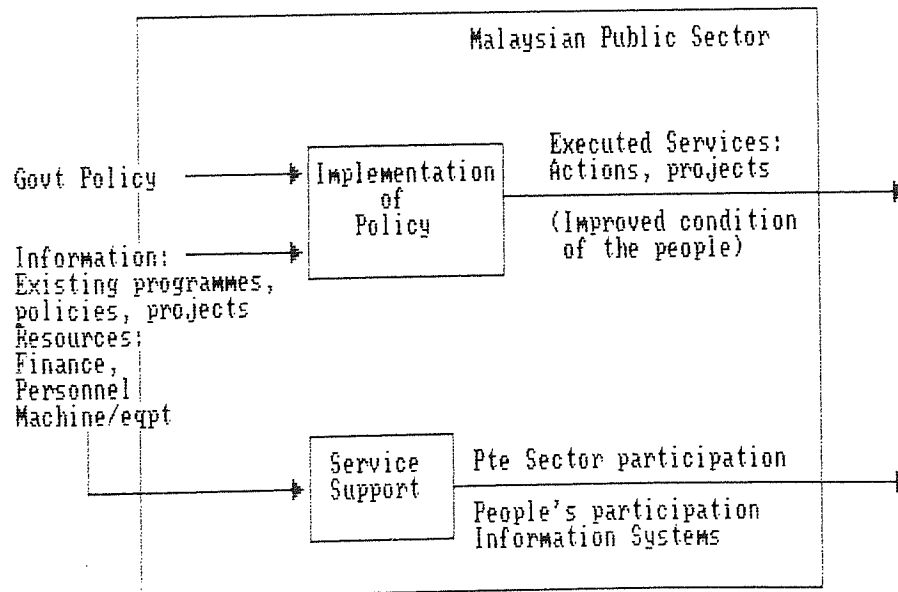


Figure 6-15 MPS Flowchart: Level 1

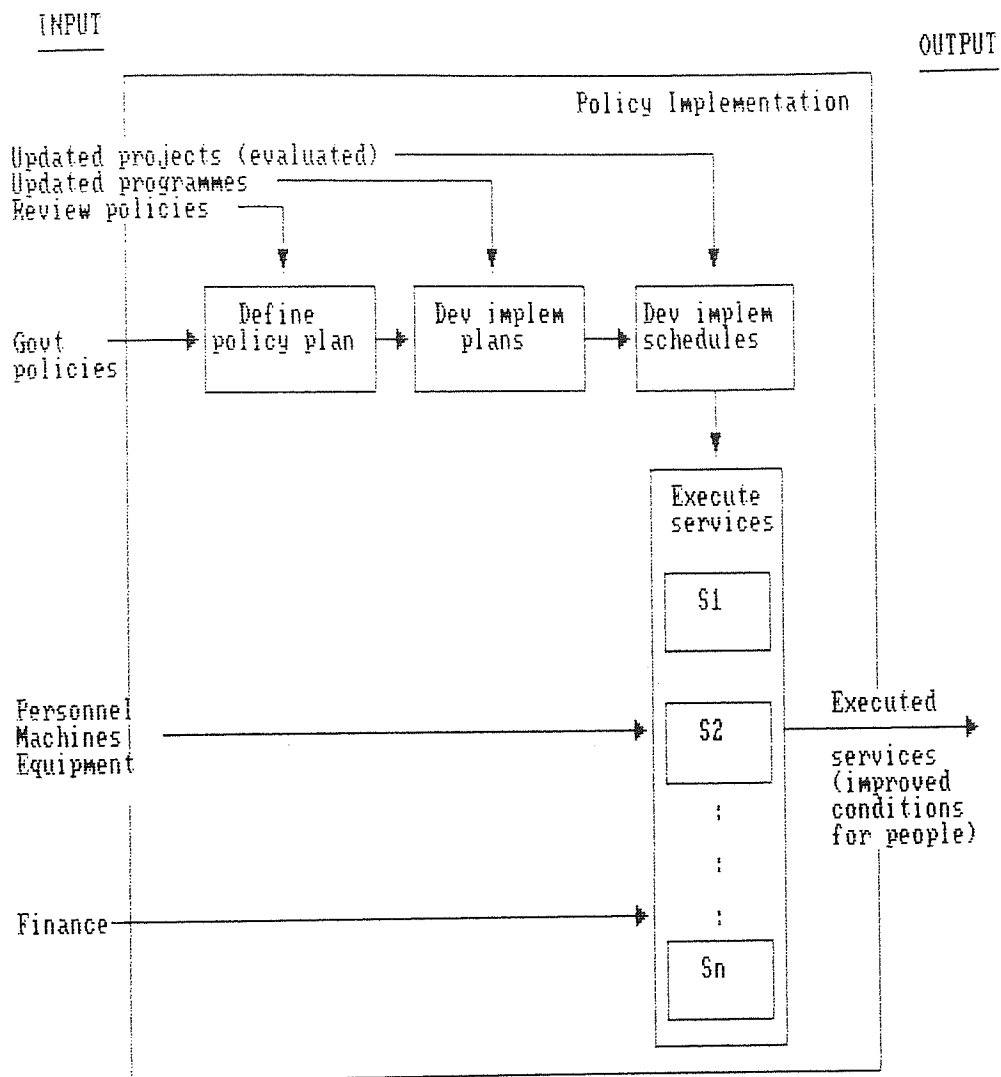


Figure 6-16 MPS Policy Implementation Flowchart: Level 2

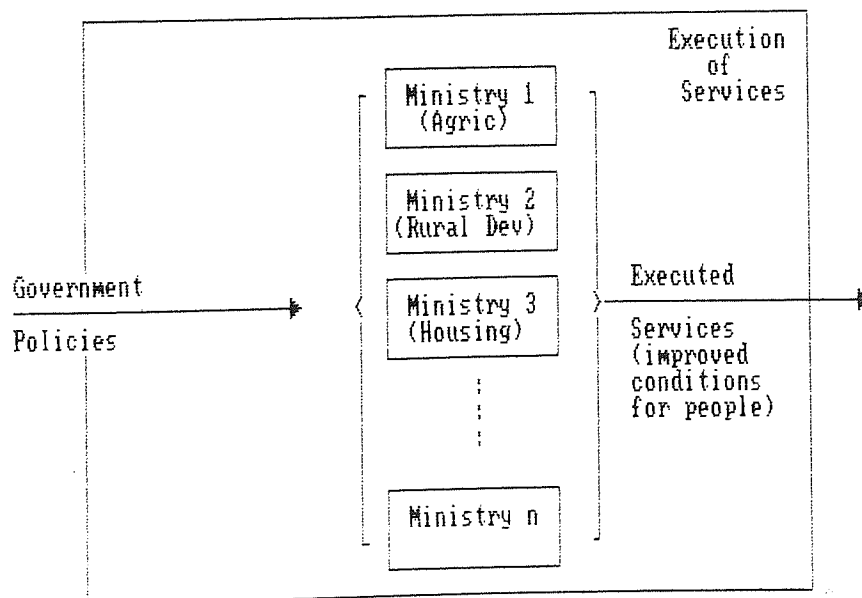


Figure 6-17 Services Execution by Ministries

non-implementing ministries. Expenditure is monitored by the auditing system. The reports produced will support the process of replanning and reprogramming;

- e). Informing the people of policy plans - The requirement by MPS is to encourage public participation, by improving channels for information/communication, improving skills and expertise through training/education, providing more assistance/aid (finance, advice, equipment, incentives), improving the people's attitude by providing moral support, and government campaign;
- f). Facilitating participation by the private sector - Utilising private sector resources (financial, expertise, facilities/equipment);
Initiating the privatisation of government departments;
- g). Integration of inter-ministerial information resources:
Coordinating the execution of project.

Associated with modelling primary activities is the conceptual modelling of structural (regulatory) levels (Figure 6-18) which implies the separating out by break-down of primary activities in the formulation and implementation of national policy by MPS. At the global MPS level (Recursion 1), activities are based on the MPS flowchart in Figure 6-15. As an illustration, the "policy implementation" activities for a ministry (Recursion 2) are derived from Figure 6-16. Each of the primary activities of the ministry (say, "execute service") can be further decomposed at departmental level (Recursion 3).

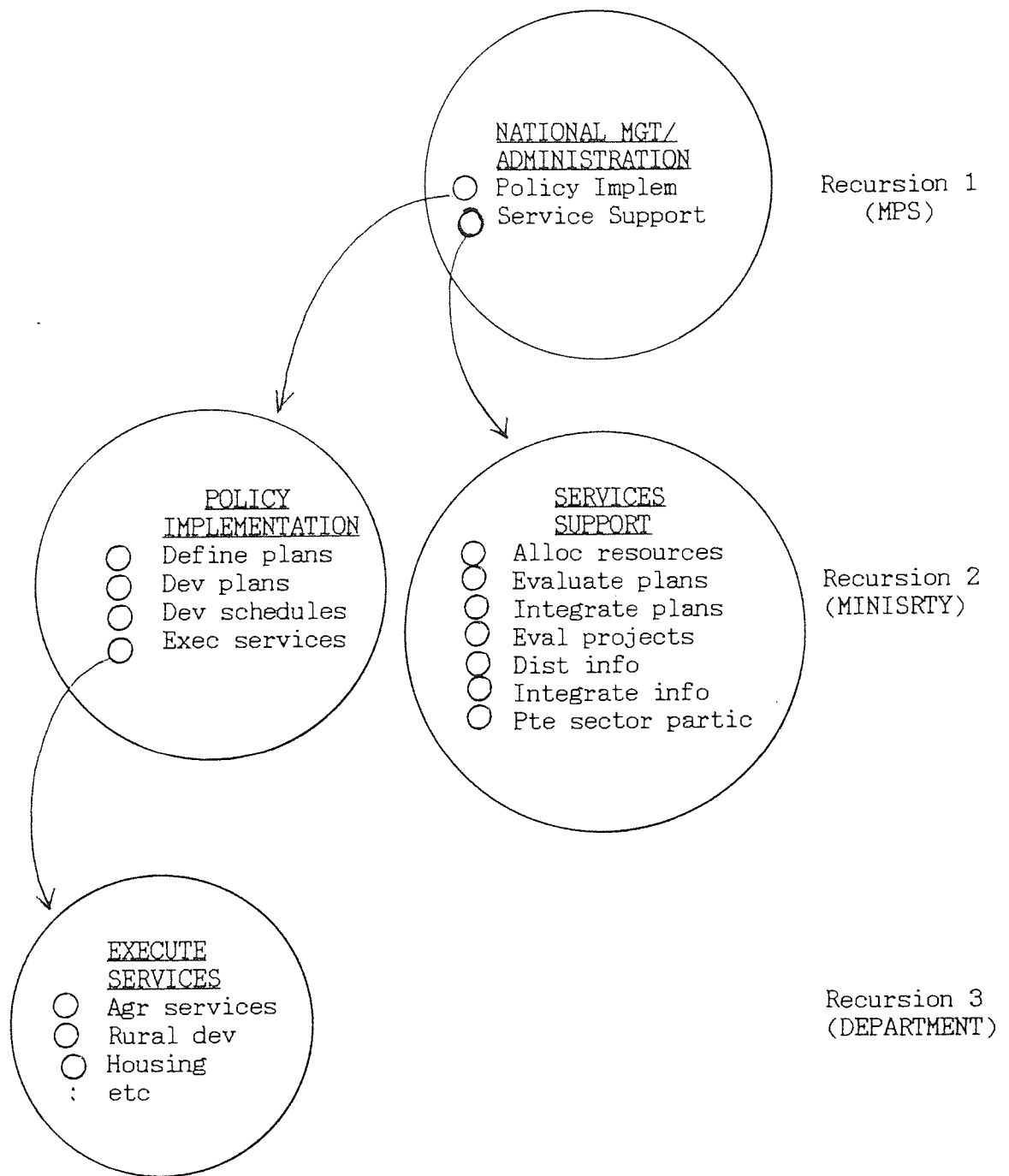


Figure 6-18 Conceptual Model: Complexity Unfolding of MPS

6.2.4.3 STUDYING THE RECURSIVE DISTRIBUTION OF DISCRETION

The study of the distribution of autonomy and discretion will make use of the modelling of structural levels in the previous sub-section. The purpose is to provide a model of recursivity in relation to roles, functions, activities and units for the PM. This is one of the essential models in the design of our system. While autonomy relates to power allocated to the ministries in order to manipulate policies defined by the government, discretion gives ministries the power to administer the already defined policies.

With the unfolding of complexity and the use of the analysis, understanding of the distribution of power becomes clear. Functions and roles become visible at the different levels of recursion, and the means is provided to analyse the situation for further improvement. There are many ways of representing this analysis, from a simple units-activities table to a more complex "Maltese cross" (Wilson 1984). For our purpose, a "recursive discretion distribution matrix" (RDDM) will be used. It is a modified version of the Maltese cross and the "structural levels functions table" (Espejo 1984). This table is developed for the MPS with already ascribed identity. It is included as one of the models in the overall design in the next chapter.

Table 6-4 shows the units, roles and functions as data collection aspects; recursions and functions are cybernetic data aspects. Recursions are actually activities at different levels of recursion, shown in the table as 1 (for Recursion One) and 2 (for Recursion Two).

Activities are transformations performed by MPS, its ministries and departments. They reflect the respective names or identities of MPS and its organisational units at different levels of recursion. The matrix in this case presents activities at two levels of recursion. Basically, for MPS, the primary function is public administration, with two main sub-functions - service and enforcement (action). Units are MPS organisations at different levels of recursion, performing different activities and functions. They are MPS (at the global level), ministries, departments or offices. We are concerned with the first three levels. Finally, roles describe the people in both management and services who are responsible for their units.

To illustrate the relationships in the matrix: for "developing plans", an activity at the second level of recursion, the responsibility is with EPU headed by its Director-General, who is in charge of the overall activity. Here, EPU is performing both the planning and advisory function. On the other hand, for the same activity, the Treasury is performing a different function which is funding (or budgeting) besides planning and advisory. The activity "execute services" is carrying out enforcement and service functions. The differences between these two are the financial or non-financial returns that are attached to the latter function.

6.2.5 VIABLE SYSTEM MODELS

6.2.5.1 INTRODUCTION

The pre-requisites for an in-depth VSM study are a description of the information management (IM) problem of the PM (Section 4.3), and the basic VSM concepts (Chapter Two). PM's IM problem necessitates a design of processes (amplifiers, attenuators, channels) to support him in matching his information-processing capacity against his information requirements. This signifies two crucial aspects directly reflecting the aims of the research: to develop a methodology for diagnosing the MPS problem which is the PM's IM; and to design a system to support the PM's management of MPS. Diagnosing requires the understanding of relationships involving PM, PMO and MPS which entails the use of regulatory mechanisms (to show attenuation, amplification, channels and performance criteria), and the VSM (to display all possible functional/global links). Design involves office and information systems design and will not be discussed at this point of the thesis.

We can look at the relationships between PM, PMO and MPS at varying levels of resolution. Figures 6-4 and 6-5 display the relationships between MPS and the people, and between the PM and MPS. Figure 6-19, derived from Figures 6-4 and 6-5, are two possible interactions between the PM and MPS organisations. The interaction at the lowest resolution level is with PMO staff. At this level, filtration/amplification requirement is minimal while the level of detail is lowest. Here, the variety operators (VOs), denoted by * (amplifiers) and ** (attenuators)

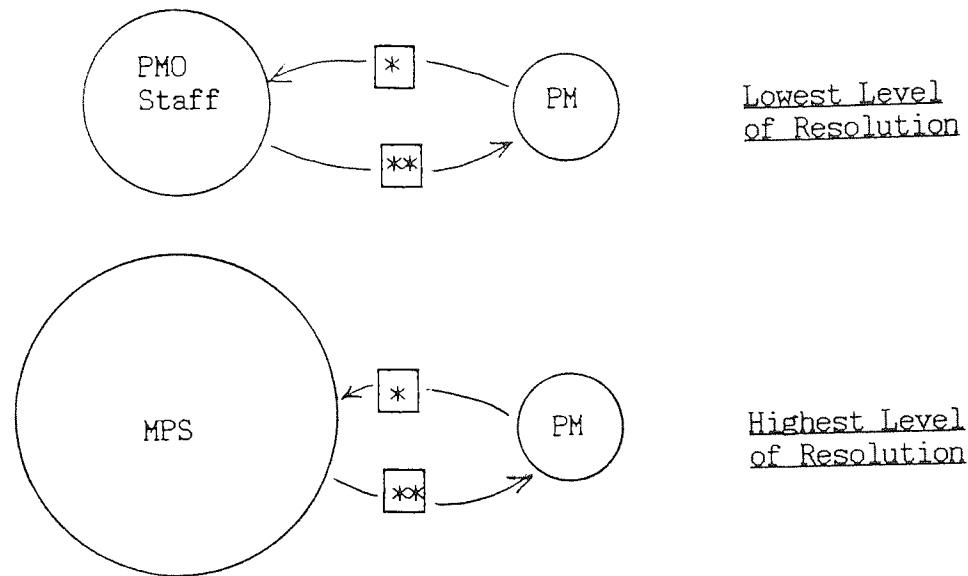


Figure 6-19: PM's Interaction with MPS at Different Levels

are the people in closest contact with the PM providing the PM with the necessary link with PMO.

In the second diagram, more amplification and attenuation, with high level of details, are necessary before the PM is able to communicate with MPS. They include PMO, other organisations and individuals. Within the blocs * and ** we may have complex situations involving regulations at multiple overlapping and intersecting levels, of no interest or relevance to the PM. However, these systems, some of which need to be recognised, may form the components of our main system and therefore be essential for our primary system design. VSM is an enhancement of these earlier diagrams using Beer's modelling language. It elucidates the overall connection between the PM, PMO, MPS and the people. It can be noted that possible links between PM and the people are through VOs located along the channels and the intelligence function of MPS. His link with MPS organisations is through the control function or along the various VOs along the channels.

6.2.5.2 DIAGNOSING MPS USING VSM

(1). VSM AND STRUCTURAL RECURSION

The following is an illustration of how the use of VSM helps to understand the core of MPS problem. The use of VSM is at the global MPS level, which is the first recursion (Figure 6-2) and the lowest resolution (Figure 6-19) levels. It is primarily important to show the manner in which the PM and PMO relates with MPS. At Recursion 1 of Figure 6-20 (a diagram which is an expansion of Figure 6-4), we have a mechanism showing the PM managing MPS. Enclosure A1 is the management box of MPS which includes the PM and others involved in the management processes. Enclosure A2 represents MPS operation where ministries (i.e. Ministries X and Y) implement government policies according to managerial plans. Both A1 and A2 perform within a given set of the environment belonging to MPS. At Recursion 2 (Figure 6-21), each ministerial operation is shown, as the case of Ministry X which has X1 and X2 as its respective management and operational functions. The departments contained in this ministry are P and Q.

Depending on various viewpoints, we can have various possible VSMs at Recursion 1 if the main VSM is dissected. Each slice therefore represents a viewpoint of MPS by the PM which for instance may be "MPS that enables implementation of government policy to improve the poverty situation". However, application of VSM for this research is at a more global level. The discussion on notional systems later on in this chapter will clarify this point.

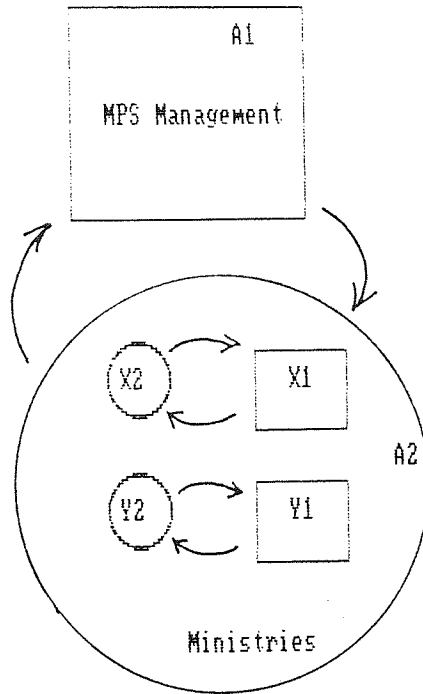


Figure 6-20: VSM of the MPS (Recursion 1)

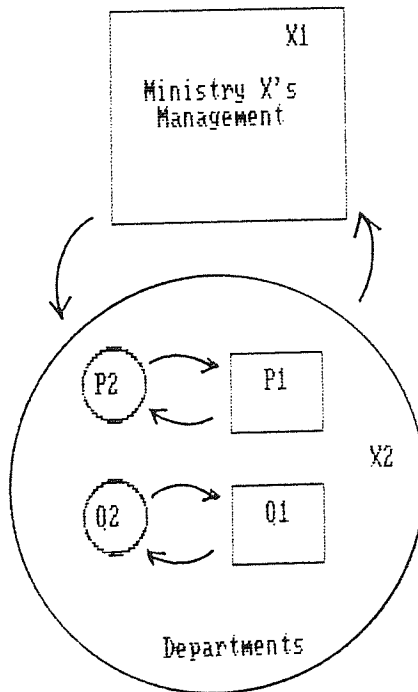


Figure 6-21 VSM of a Ministry (Recursion 2)

(2). FORMALISED STRUCTURE AND NOTIONAL SYSTEMS

Using the cybernetic theory of organisational structure, it is possible to recognise and understand the key problem of MPS. This relates to the concepts of "notional system" and "formalised structure". A main task in this research, is to clarify three concepts in the context of structural rigidity, to show the effect of using IS and IT in handling this issue, and to design a system has the power to cope with this issue. Figure 6-22 is the framework describing the entailed problematic concept. The theme of VSM study of MPS is therefore based on this problem.

Formalised structure refers to the formal set-up in an organisation. This is made up of sub-systems each performing a specified set of tasks towards achieving a set goal of the organisation - functional or non-functional - as defined by set rules and procedures. Notional systems are the informal sub-systems in organisational processes, performing problem-solving concerned with specific issues, but arising at no definite time in no specific manner. The crucial problem concerns the conflict between these two systems, which causes a severe threat to MPS viability. Table 6-5 sums up their key differences.

The comparison indicates how a formalised ministry is constrained in its handling of systemic issues. A ministry will reject the attempt to handle a specific issue which changes in time and overlaps the responsibilities of many ministries. If we use the example of poverty, the first point is that it requires a systemic viewing. Far from being the responsibility of any single ministry, it requires a group of ministries to handle the

FORMALISED SYSTEM	NOTIONAL SYSTEM
<p>1. <u>Structure:</u> Rigid; formal; permanent Formed through evolution based on historical factors - therefore prescriptive</p> <p>2. <u>Problem-solving:</u> Based on pre-defined and ACTUAL ascribed tasks; Non-systemic approach;</p> <p><u>Decision-making behaviour:</u> From individual decision (for highly specialised functional ministry) to group decision-making</p> <p>4. <u>Sub-systems:</u> Ministries; departments</p> <p>5. <u>Formalised Ministries:</u> Functional ministries (PMD, Treasury); service ministries (Agriculture, Trade, Youth, Industry, Health, Education, Defence, etc.)</p>	<p>Flexible; informal; temporary Formed to solve current and future issues - therefore adaptive-anticipatory struc.</p> <p>Based on specific issues and PERCEPTION of issues; Systemic approach;</p> <p>Group decision-making</p> <p>Parts of ministries; depts; committees; study teams; projects; inquiry teams</p> <p><u>Notional grouped issues:</u> Budget and trade deficits; drug abuse and youth; economic recession; poverty; racial harmony; etc.</p>

Table 6-5 MPS: Formalised and Notional Systems

entailed issues, which therefore requires an integrated problem-solving approach. The poverty issue is a "horizontal problem" as it needs a horizontal problem-solving approach cutting across many ministries (therefore inter-ministerial in nature).

The rigid vertical formal organisation structure, creates a situation that is hostile to effective, systemic problem-solving. It might allow a single ministry to take on board the issue, while arrangements are made to

get other ministries' involvement through the loan of their expertise and resources. However, this creates an even greater problem of integration and coordination, and in cybernetics terms, amplifies complexity of an already complex situation.

There exists a parallelism between notional systems and large-scale projects. As with a notional system, a large-scale project (Manancourt 1987) requires a degree of inter-dependencies and is usually the concern of more than one institution. However, while there are similarities between large-scale projects and notional systems there are differences in terms of level of complexity. A project is only one of the possible sub-systems of a notional system. Project organisation breaks down the whole problem into specific product or project groups (Kilmann 1985). It may seem more complex than functional organisation since all the functional areas are represented within each project group. However, since each project has a single identity and is oriented towards one objective or product, each project group as a whole still has the requisite information and expertise to solve the problem.

The framework for diagnosing MPS then is made bearing in mind the mismatch problem in MPS. As a result, mechanisms and tools need to be proposed along with other cybernetic design tools such as loops, channels and filters. Mechanisms such as an anticipatory system, contingency planning, and matrix organisation (a typical horizontal organisation) are some examples.

Figure 6-22, a model to study MPS structure, highlights MPS structural deficiency. It also depicts the use of VSM as a diagnostic tool to

improve MPS by structural adjustment. M_1, M_2, \dots, M_n are ministries which are also formalised systems (FS_1, FS_2, \dots, FS_n).

In forming a notional system for MPS, it is vital to recognise which organisation or individual is responsible for performing the following functions:

- a. Facilitator to initiate and manage the issues, and to whom the ministries involved are answerable;
- b. Identifying the issues which are necessary as a prerequisite for a problem-solving process involving one or more ministries;
- c. Integrating the issues in order to reach a common viewpoint on certain issues and thus making allocating of tasks easier;
- d. Task allocation to enable the determination of ministerial responsibilities;
- e. Coordinating the task of ministries;
- f. Design of problem-solving processes, mechanisms and tools; and
- g. Monitoring and evaluation to ensure that necessary precautions are taken for future purposes.

For instance, the need for integration is critical when it concerns handling problems in large systems. Relating to this, Golovin (1969) points out the role of environments in transforming an organisation into a complex and integrated system. He argues that however trivial an environmental issue seems to be, it will have some effect on MPS globally. Hence the crucial need for a systemic and integrated approach to problem-solving.

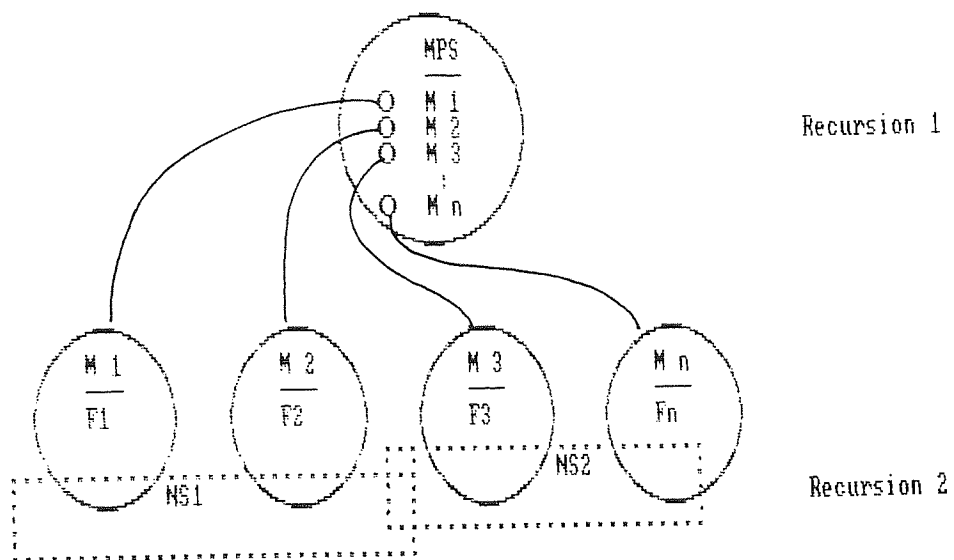


Figure 6-22: MPS Structural Levels and Notional Systems

Legend:

- MPS Malaysian Public Sector
- M Ministry
- NS National System
- F Formalised System

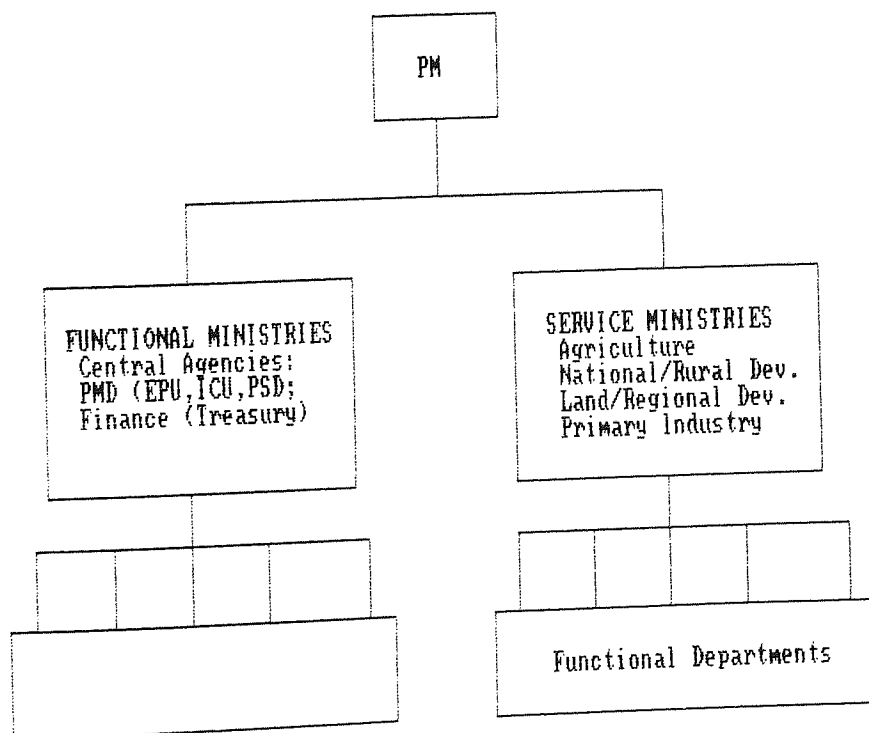


Figure 6-23 Formalised Organisational Structure: MPS

Note: Appendix 2 (Exhibit A2.1) is the complete list of Ministries.

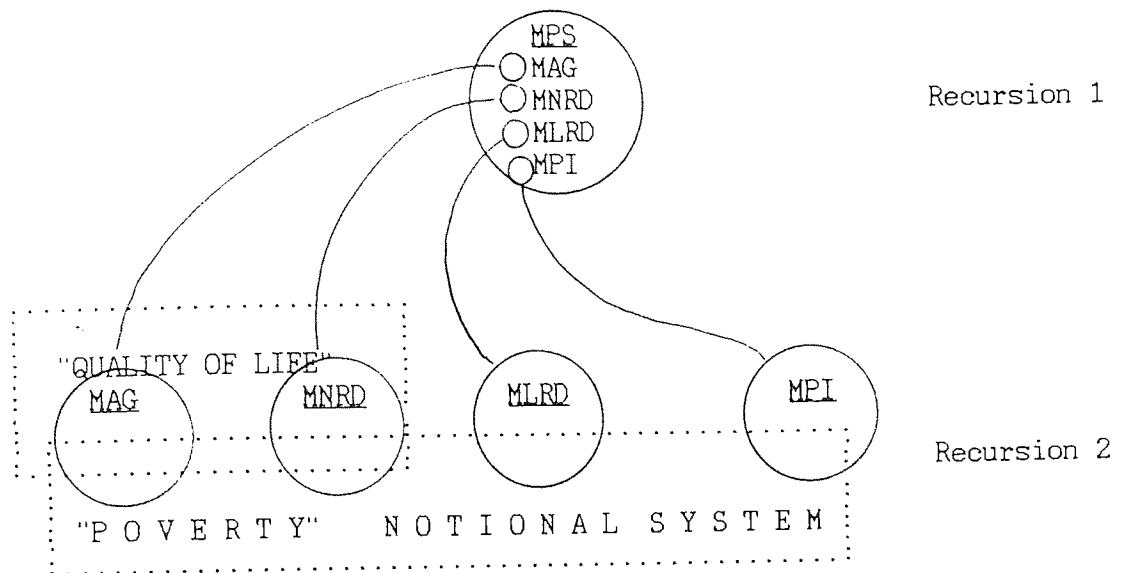


Figure 6-24 MPS Poverty Issue: Structural Levels and Notional Systems

Legend:

- MPS Malaysian Public Sector
 - MAG Ministry of Agriculture
 - MNRD Ministry of National and Rural Development
 - MLRD Ministry of Land and Regional Development
 - MPI Ministry of Primary Industry
- ⋯⋯⋯⋯⋯⋯ Notional System

Let us illustrate the case of formalised and notional systems, once more taking the poverty issue as an example. Figure 6-23 is the organisation structure of MPS in the context of our structural problem and issue (poverty). Structurally, the key ministries responsible for poverty are Agriculture (MAG), Primary Industry (MPI), National/Rural Development (MNRD), and Land/Regional Development (MLRD). We can then represent a model (Figure 6-24) which reflects the structural levels of MPS considering the poverty issue. PMD and Treasury are excluded from the set-up as they are not viable systems. They, however, are involved in the issue as part of the control and intelligence functions. Of these ministries, MAG and MNRD may belong to another notional system, belonging to another issue - improving quality of rural life.

(3) MODES OF VSM STUDY AND OBSERVATIONS MADE

A crucial point reiterated here is that this study does not encompass the actual diagnosis of MPS. It provides a framework or methodology to use the diagnostic mode of study in understanding MPS. The VSM study uses illustrations based on the perceived "existing" MPS. In a diagnostic study, there are two methods of carrying out the study of MPS, i.e. by studying the existing MPS situation (or theory-in-use), or studying the desired MPS based on its current identity (or the espoused theory). Our findings are arrived at from these studies. The final outcome will be a proposed methodology for diagnosis.

(a) VSM: Theory-in-use

Theory-in-use is a description of how MPS works as perceived by the analyst. It is a diagnosis of the actual working mechanism of MPS and is therefore based on MPS formalised structure. Given MPS as a "system to formulate and implement government policies", a number of observations are made.

Figure 6-25 is the model of MPS with PMO's role highlighted, the PMO being the key link between the PM and MPS. As variety operators (VOs), PMO makes an occasional decision on behalf of the PM. Such a decision usually pertains to the relevance of information needing the PM's attention. Information should either reach the PM or be filtered before reaching him. At times, there is some modification of information, before it reaches the PM. In other cases, the VOs are "physical", i.e.

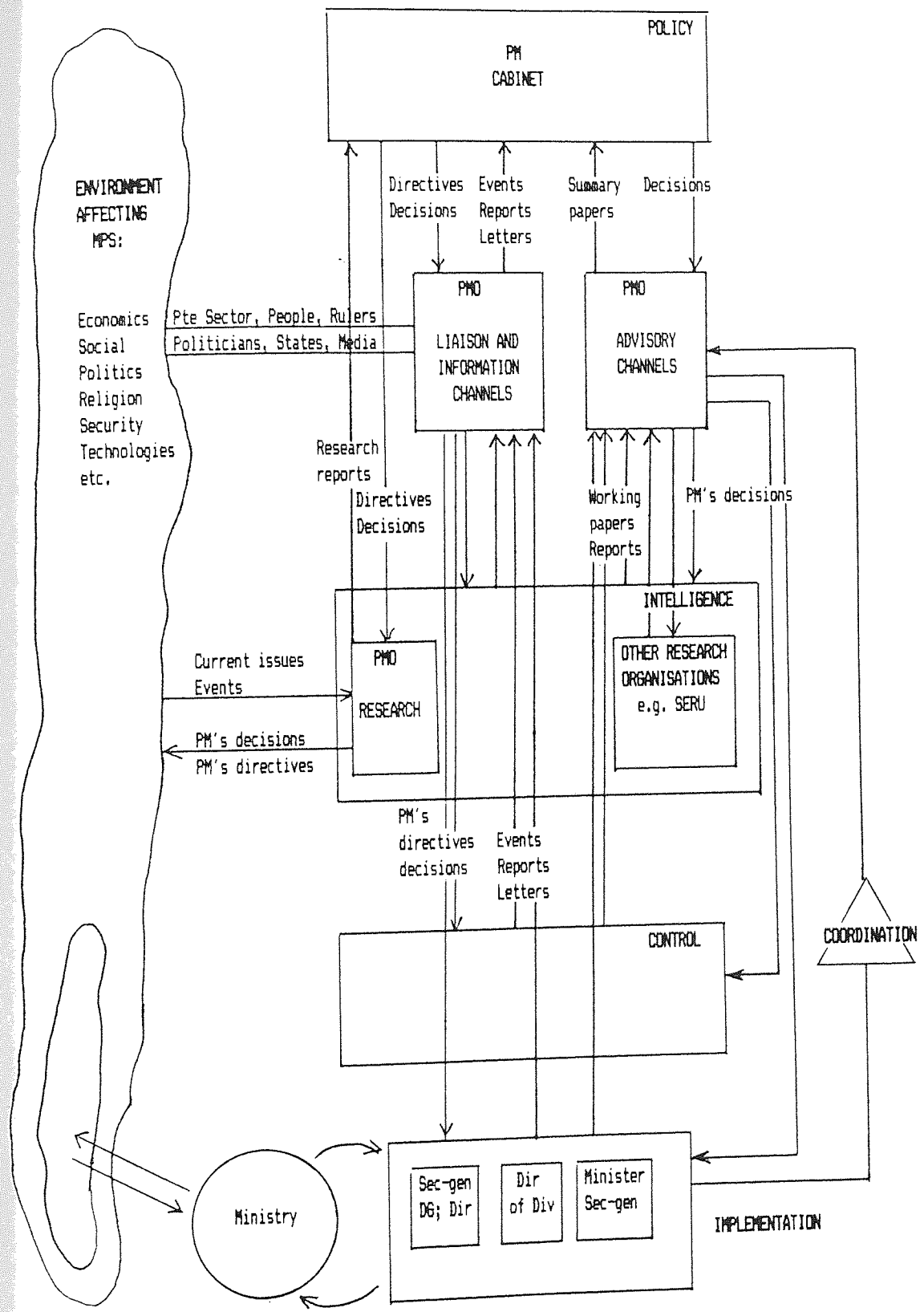


Figure 6-25 The MPS Theory-in-use: Role of PMO

information passed up to the PM or transmitted to ministries is not altered, which is true for most "confidential" information.

The question of security is important when dealing with a sensitive or critical issue. There is a need to identify and classify the people who may access the information. A dilemma is created between the providing of information and the need for its control. While information is an important ingredient for decision-making where channels for its flow should always be opened, its availability has to be restricted to the relevant people. Information in MPS should be wisely used so as not to be detrimental to national security. A possible measure will be to build security mechanism along the VOs in the channels.

Information from the ministries are forwarded to the PM at PMO's discretion. Not all information requires the PM's attention so the PMO forwards information to the PM as and when it perceives it to be relevant. Information can be in the form of research undertaken by PMO. In this case, the PM will make decisions which are again amplified by PMO. Here, PMO converts the decision from, say, a verbal to a written form. Occasionally, PMO transmits PM's decision verbally. Letters, reports, and other forms of documents may also require PMO's approval before being provided as PM's input. Again, replies by the PM are being amplified to MPS through PMO. Research activities carried out by PMO, are part of the intelligence function. The researches undertaken are based on the PM's directives. PMO filters reports and research outcomes from various MPS individuals and organisations by summarising them into reports. When presented to the PM, these summaries may be complemented by verbal briefings by PMO. Again, decisions by the PM are amplified by PMO

before distributed to ministries.

Figure 6-26 illustrates the process of policy implementation which involves several VSM functions. Figure 6-27 shows the control function and related control and monitoring mechanisms. Implementation is a function undertaken by federal ministries of MPS. As discussed earlier, a prevalent problem of MPS here is that issues may cut across many ministries. There is an overlapping of ministerial activities which results in an unavoidable duplication of tasks, as well as excessive collection and storage of data. The commitment of financial resources is huge and is further aggravated with the acquisition of new IT equipments. In most cases, the tackling of these issues is by group decision which involves the setting up of task forces, teams, committees, inquiries, study groups, project groups and so on.

Issues may be either normal or pro-active in nature. Normal issues refer to problems that are able to be anticipated due to their familiarity and expectability. Their occurrence may be seasonal or non-seasonal but with profound regularity. They are procedural types of problem requiring formalised decision, usually based on pre-determined procedures and rules. Issues such as poverty and drug abuse are in most instances controllable, as ways and means to tackle them are detectable and not alien. It is only in implementing them that these issues, due to their huge financial requirements or lack of private sector support or public attitude, still exist. These issues are often soluble by existing committees or teams responsible. For example, the Cabinet Committee on Drugs is responsible on drug issues facing the nation.

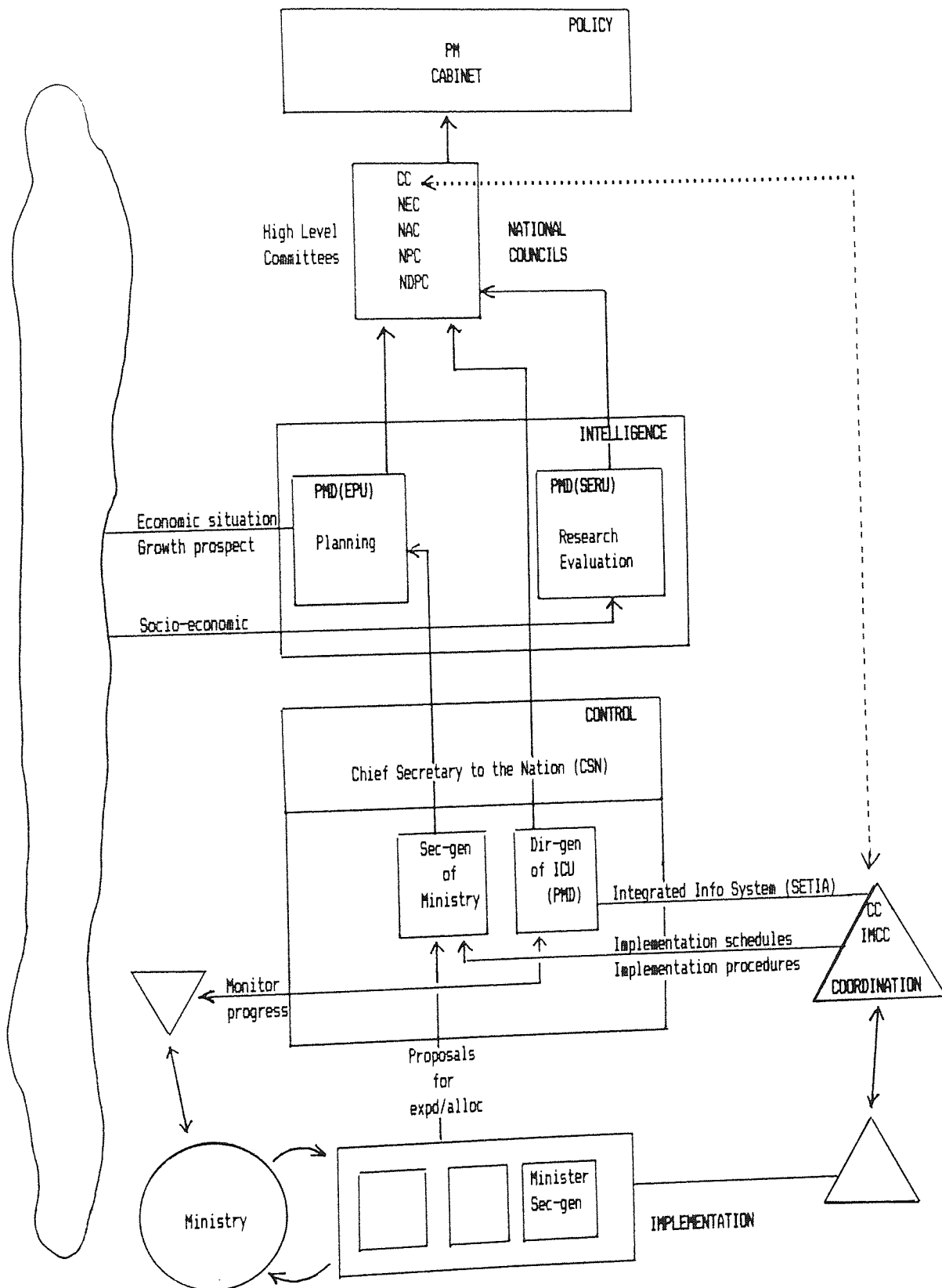


Figure 6-26 The MPS Theory-in-use: Policy Implementation (Integrated Planning, Coordination and Monitoring)

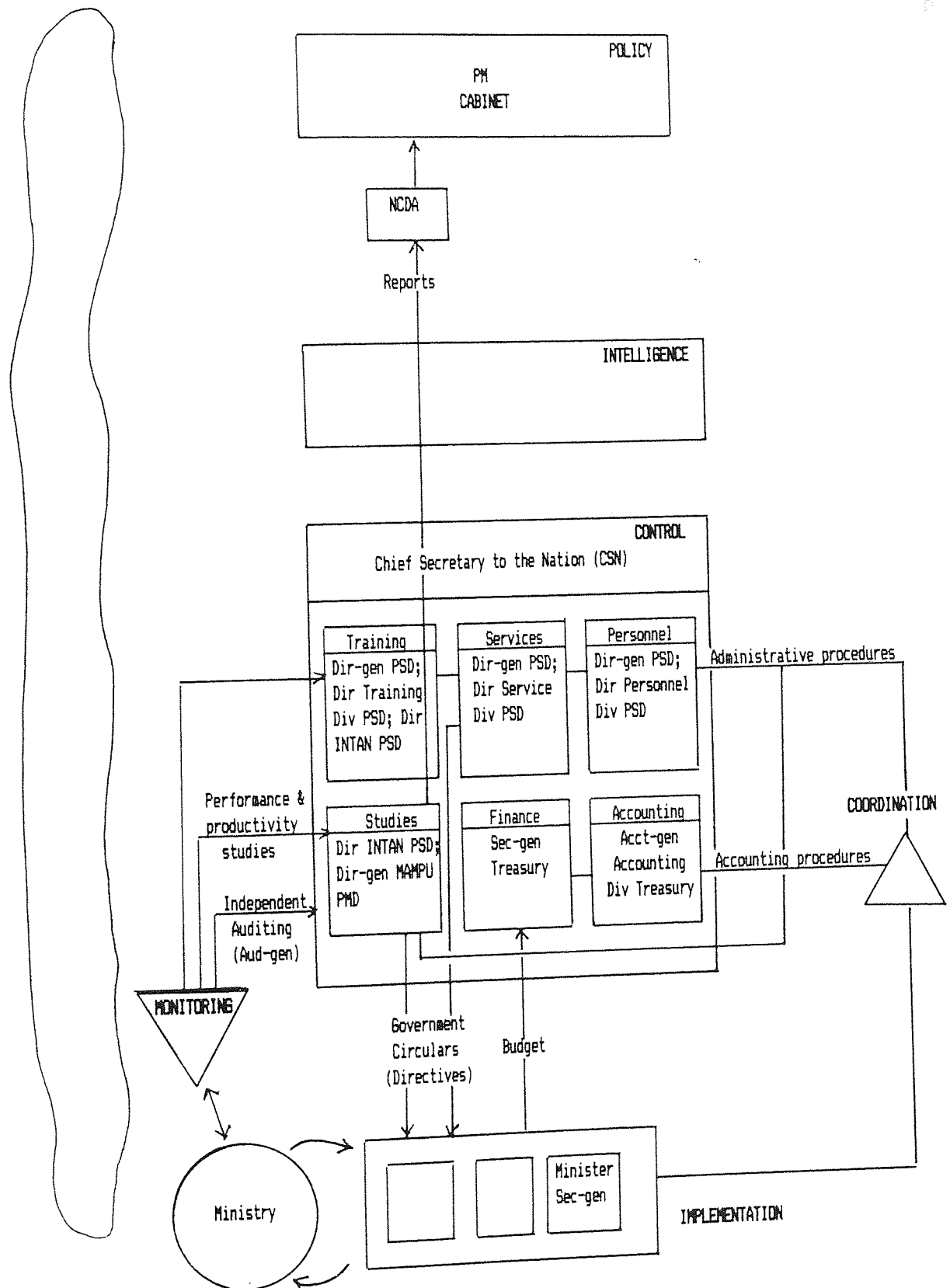


Figure 6-27 The MPS Theory-in-use: Control Function

Proactive issues are, on the contrary, unanticipated problems due to unpredictable events that occur in the environment. Examples of such issues are either man-made (such as world economic recession affecting national economic growth, future growth in the agricultural sector, social unrest, and a fall in the price of natural rubber), or a natural catastrophe (such as floods, fires, and crop failures), usually resulting in national social and economic (including financial) loss. These latter issues need more than initiative on the part of MPS senior executives. They require urgency and effectiveness in the handling of situations. Executives who perform staff functions for the ministers or Director-Generals need to have sense of awareness on how to tackle these issues, and when to bring up these matters to responsible committees of any ministries concerned.

The coordination function in MPS is not well understood. It is assumed that these committees coordinate various ministries' problem-solving activities, while in actuality committees coordinate the policy-making processes at the highest level. An illustration is found in Appendix 2 (Figure A2.1) under the heading "committee". There exists, at the highest level (Figure 6-26), a body that coordinates implementation of government activities in the form of National Action Council (NAC) comprising all ministers and is chaired by the PM. Other coordinating mechanisms are the Cabinet Committee (National Economic Council) chaired by the PM and comprising senior ministers, Public Service Committees (Secretary-general meetings and National Development Planning Council) chaired by the Chief Secretary to the Nation (CSN), Inter-Ministerial Coordinating Committee (IMCC) chaired by senior executives (e.g. EPU executives). Of these, IMCC is more for coordinating implementation and its role is very highly

regarded in MPS. This high dependency has its drawback. Under normal circumstances an executive is involved in a number of committees of different functions and at various levels of recursion. He therefore becomes less effective and has to resort to delegating most of his committee roles to his junior executives. The problem created is that of discontinuity and a drop in capability.

Other coordination systems are the integrated IS, the implementation schedule and procedures, administration and accounting. IT plays a key role in coordination through IS. ICU coordinates and monitors the implementation of government programmes with the aid of a National Development Project Monitoring System called SETIA, an integrated system involving other central agencies such as Treasury, EPU and the Accountant General's Office.

The monitoring functions include auditing for financial utilisation by Auditor-General, progress monitoring for activity implementation by ICU, performance and productivity studies to enable MPS provide better service. The study of MPS productivity is to be carried out by a national level committee called Steering Committee for Programme Implementation on Reducing the Public Services Membership; and a Technical Committee for Measuring Productivity. These committees are in their initial stages of implementation. Committees are also formed at ministerial, departmental and divisional levels.

The monitoring-control mechanism, which is the decision between greater control over or more autonomy to ministries, calls for effective communications via three channels (control, coordination, and

implementation). The lack of balance between control and autonomy, is not due to lack of coordination, but its ineffective mechanisms as depicted in Figure 6-27.

The intelligence function is crucially the role played by EPU. The roles of other organisations, individuals and committees, which the PM also relies on, are more ambiguous. Functionally, EPU is the secretariat of the National Planning Council (NPC), National Development Planning Council (NDPC), Foreign Investment Committee (FIC) and Economic Panel (EP). Among these bodies, NDPC and EP form the hub of the intelligence function. Although these bodies consist of top government executives and other professionals who are expert in their own fields, it is the EPU that does the actual planning. These other planning bodies do not plan, but rather review, monitor and approve plans. Of these, NDPC is all-powerful since it may use its discretion in making decision or reference to the Cabinet or NPC. It therefore becomes both policy-maker and planner. Effectively, EPU performs a major intelligence function while other so-called planning bodies are either policy-maker (as in NPC) or VOs between the policy and intelligence functions (in case of NDPC). Note that EPU is also heavily involved in policy matters, apart from research and advising the government on economic matters.

The policy function is involved either in decision-making or balancing the intelligence and control. Decision-making, which is organizational in nature and affecting the MPS, can be made via information received from various sources in the MPS as well as from the outcome of external information gained through research work. Monitoring both intelligence and control by the policy function enables a proper balance of the

competition of resources between these two. At present, there is no model of MPS to monitor the actual operation of MPS. How well MPS is performing and whether it is developing in a desirable manner remains a question not answered with the existing system. A great deal depends on briefings by ministries (through various coordination meetings). But a forum for interaction between the intelligence and control is lacking, which accounts for the lack of an adaptation mechanism. The PM's role as policy-maker could be enhanced through better balancing. This, however, depends a great deal on existing communication channels linking the PM with both intelligence and control.

It is too complex to show the interactions between the environments in terms of the VSM. In the case of intersecting and overlapping issues, most of the ministries tend to deal with the same environmental components. An important consideration here is the strong influence of religious and cultural values which affect policy-making, planning, coordinating and implementation functions.

(b) VSM: Espoused Theory

Espoused Theory is the description of how MPS would work if its current identity, as defined by its tacit purpose perceived by its client (the PM), were effectively organised according to VSM. As with the theory-in-use, MPS is perceived in exactly the same way (i.e. as "a system to implement government policy"). Once more, the study is in a diagnostic mode. There is no change to MPS identity, although some adjustments are possible in the organisation.

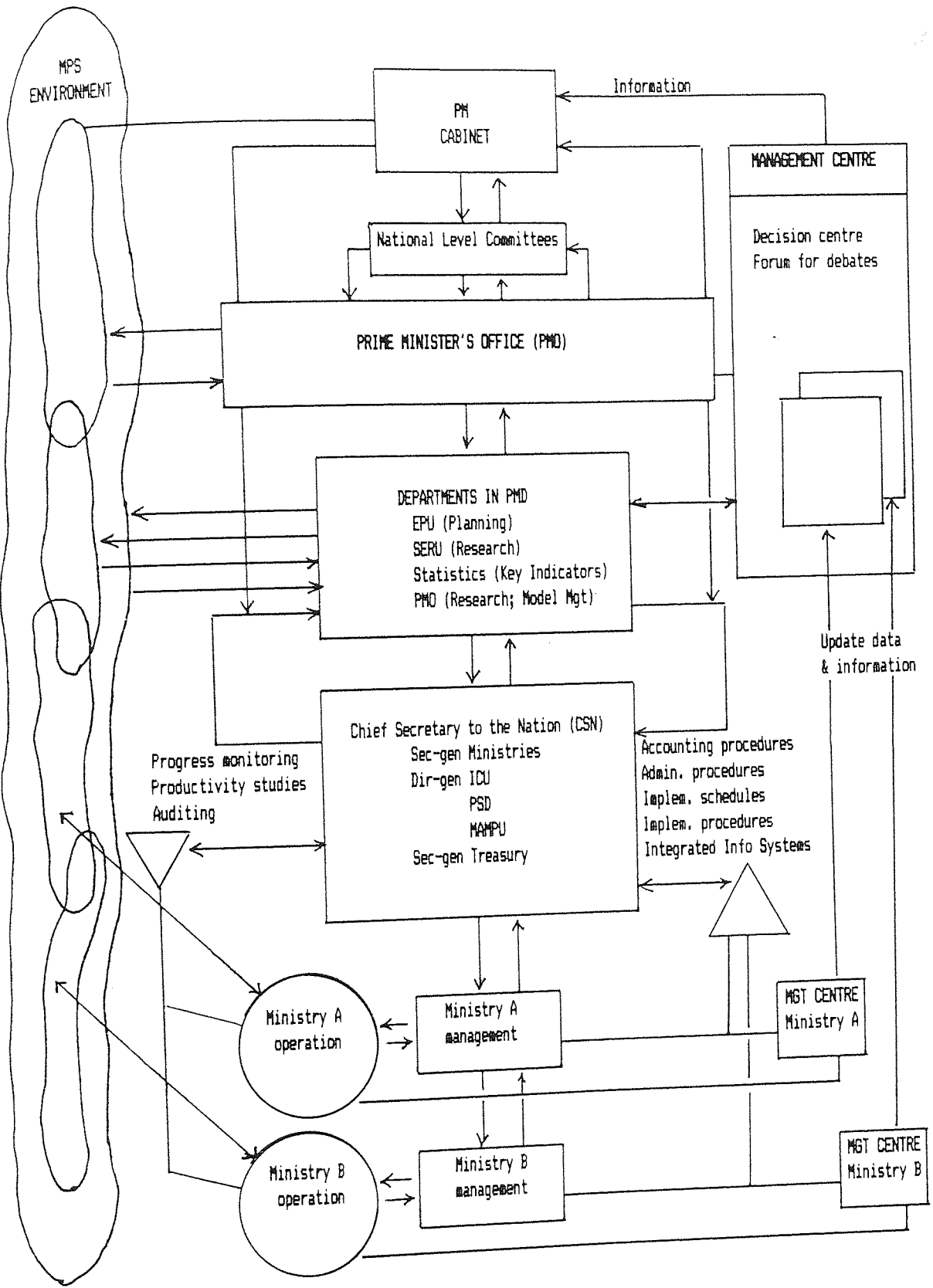


Figure 6-28 The Cybernetics of MPS - Organisational Adjustments

The study is viewed in two modes: organisational adjustments; and handling of issues in notional systems scenario. Figure 6-28 illustrates the cybernetics of MPS showing the various adjustments made as seen in terms of the model. Included are new methods and functions although retaining the basic structure of the five functions of Beer's VSM. The new methods incorporated in the VSM are information flow and VOs. With the creation of the Management Centre (MC), a new method of information retrieval, integration, and coordination is possible. Although it is shown as another physical entity, it will be physically located within PMO. The flow of information to the PM and his Cabinet from MC is without any VO, since there is a direct contact involved during Cabinet sessions. At other times, his access is through PMO's attenuation/amplification.

Information, not to be confused with VOs, are input or output that pass through the variety operation channels. It may be amplified or attenuated depending on the differences in variety situations and as the situation warrants. The role of PMO as VOs are emphasised in the model, hence the additional function box between the PM and the intelligence function. PM, in communicating with individuals or organisations outside MPS, does it through PMO. Another important VO is the top level committees. The inclusion of these VOs means that they are now considered as new functions of MPS's VSM. This is also true in the case of MC. As for the main functions, adequate VOs (along these functions) and effective systems (for coordination and monitoring) are the key criteria. With MC, integration of different activities are made possible. The role of PMO is decisive in ensuring this.

In managing MPS, the PM needs the intelligence function to understand and

anticipate changes in the environment. For instance, he uses EPU to be informed of economic and social changes affecting the implementation of MPS activities. In this case, the effectiveness criteria (external) will be the economic and social improvement of the people and their happiness. The PM also needs the control function to understand the operational problem within MPS. He uses the ministries in order to provide the services, facilities and information to implement MPS activities. The stability criteria (internal) will be MPS productivity and quality of services.

The PM's role in this circumstances is to effect a proper balance between control and intelligence functions. This balance is to enable the PM to handle internal and external issues. Again, PMO provides the filters which enable such a balance. In Figure 6-29, magnified from Figure 6-28, the variety operation line (BC) represents PM's balancer channels, whose functions are to provide the instruments such as a forum (physical or non-physical) to facilitate the interaction between control and intelligence organisations. As a facilitator or catalyst providing an adaptation mechanism for MPS, the following are PMO's tasks:

- (a). initiate and organise discussions;
- (b). coordinate initiatives;
- (c). develop and maintain IS;
- (d). provide physical facilities (i.e. providing technological network infrastructure such as a conference room with all-inclusive information support facilities and the ability to link with remote systems of the participating ministries);
- (e). as agent of change where it may use certain levers such as

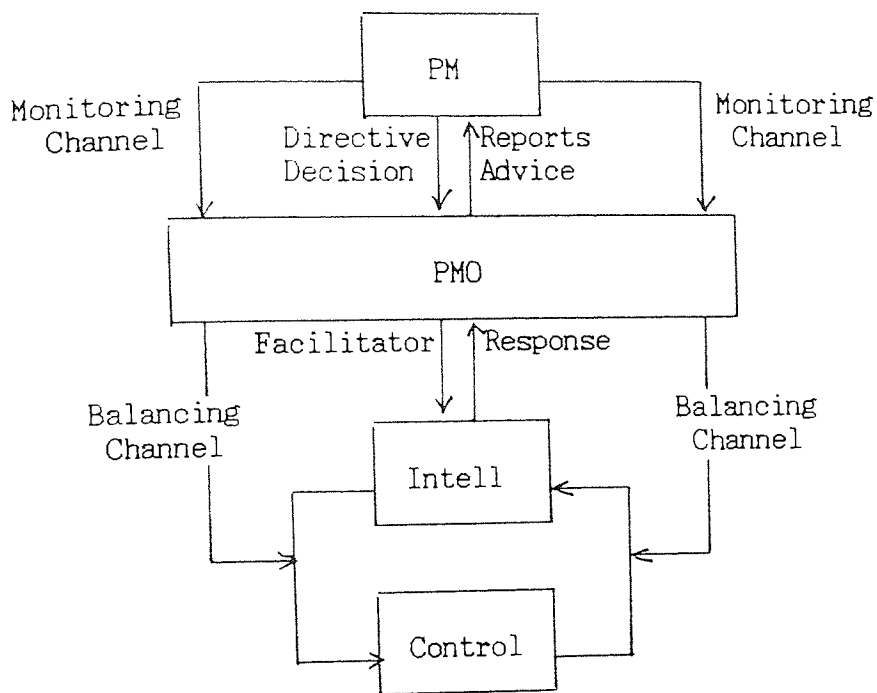


Figure 6-29 PMO's Balancing Mechanism

persuasion, incentive scheme, opportunities for training. PMO may influence organisations and individuals by virtue of the fact that some of its actions are regarded as the PM's own actions. In other cases, the visible involvement of agencies like the Public Services Department (PSD) and Manpower and Administrative Modernisation Planning Unit (MAMPU) is more effective.

In general, apart from PMO, other Central Agencies in MPS may become the facilitator depending on the type of function. Other tasks such as the provision of expertise, consultancy, information dissemination, and documentation may be carried out. These filtrations/amplifications will be more effective if supported by a measurement system that relates to some criteria of stability. The PM can monitor the debate concerning measurement by comparing the criteria of stability. Internal stability is determined by MPS stability, such as inter-ministerial relationship and

productivity. External stability, on the other hand, is measured by the service rendered by MPS which is reflected by the peoples' satisfaction and happiness.

In this way, the flow of the debate can be followed. PMO, here, acts as a "comparator" between the intelligence and control functions. Figure 6-30 illustrates PMO's monitoring debates (on behalf of the PM) using the stability criteria. If there is imbalance through too much control, it means that the PM is ineffective in performing the policy function and losing grasp of MPS. If, on the other hand, there is over-emphasis on intelligence it indicates that MPS is not performing well.

To illustrate, a very powerful Treasury imposing a tight control over spending may create problems in implementation due to a lack of funding. This may differ a great deal with the original plan set by EPU and other related agencies. So, an integrated planning involving EPU, Treasury and other relevant organisations will debate and take a group decision (monitored by the PM) on the amount of allocation for the related plans. In this way, planners are not divorced from practicalities in the preparation of a plan, however wonderful the plan may appear. So, this element of group discussion presided over by the PM more often than not may produce a workable plan. The problem of overspending due to excessive funds, or projects unable to proceed due to diminishing funds, may be curtailed. The way PMO matches "actual" (control) with "plan" (intelligence) is as shown by the regulatory diagram (Figure 6-30). In this diagram, PMO's balancing role, as attenuators and amplifiers, is supported by the stability criteria to ensure effective debates.

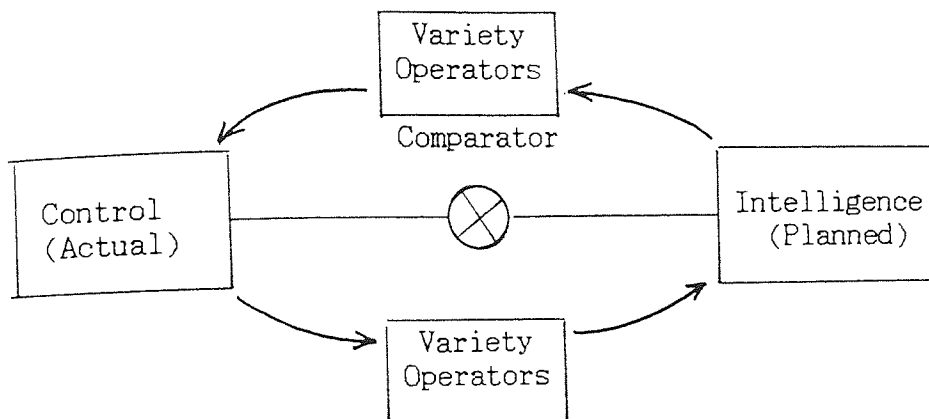


Figure 6-30 PMO's Balancing Function: Criteria of Stability

Another role of PMO is to integrate the various Intelligence activities or elements, such as planning (EPU and various committees), research (SERU, DS, EPU, and ICU) and forecasting (SERU). The process of integration is to make as a "whole" or to amalgamate and have agreed views about specific issues. It is a systemic way of tackling problems. Tools such as inter-ministerial debates, agreement, and common understanding of MPS objective are necessary. PMO's integration role relates to its facilitator's role especially with the provision of physical and management facilities.

The intelligence function is where the models of MPS and other related sub-systems are physically and logically located. The models are for aiding the PM and those involved in policy function in decision-making and balancing (of intelligence and control). In this respect, PMO's contribution will be to perform model management (develop and maintain models in MPS) for the benefit of the PM. The Figures 6-31 and 6-32 help to illustrate PMO's management of models with the use of a Management Centre.

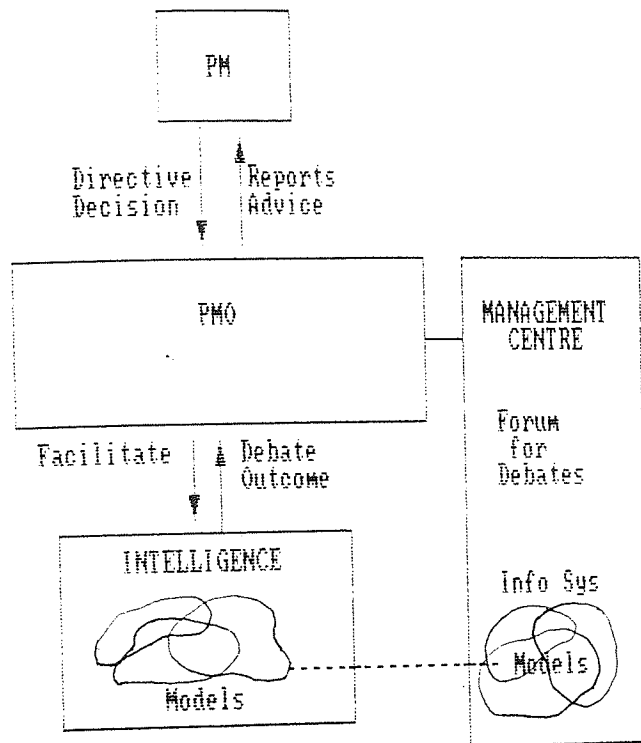


Figure 6-31 PMO'S Integration of Intelligence

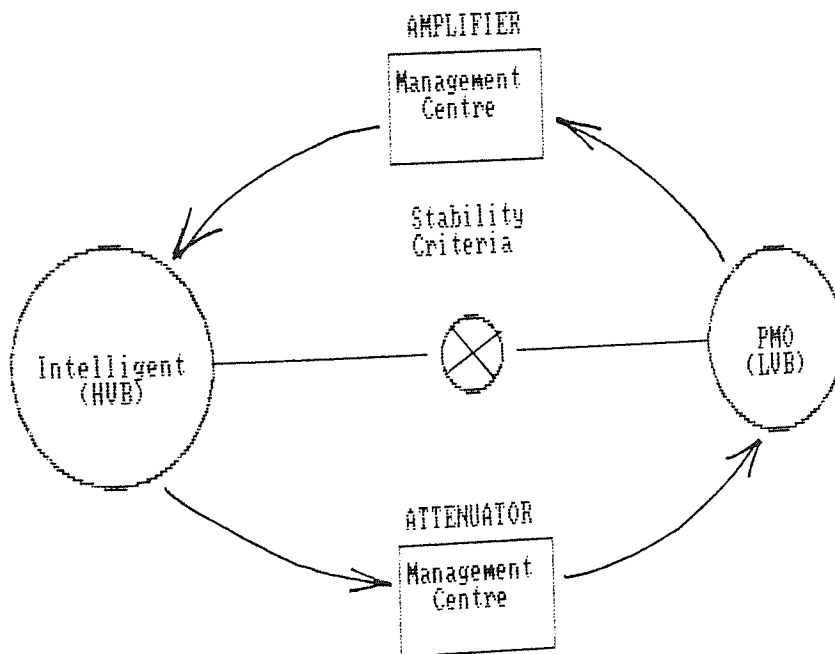


Figure 6-32 PMO's Regulation of Intelligence: Management Centre

Note: HUB High Variety Bloc
 LVB Low Variety Bloc

Coordination is a system to adjust or harmonise relations and flows of information between entities. Unlike integration which is systemic in nature, coordination is systematic. For example, the process whereby information flows between two ministries has to be streamlined through proper tools - work procedures, task scheduling and implementation programmes are some of the examples. Within the coordination function, there exists a number of systems. As mentioned earlier, the coordination issue lies, not in the insufficient quantity of coordination systems, but in the effectiveness of their performance.

There are many IS that support MPS information needs, and very often they overlap in terms of data storage and information processing. A body is therefore needed to integrate these systems. The problem is that of integrating the design of information systems in the coordination function, specifically at lateral levels of MPS. What is vital is the determination of their different recursion levels, which needs an understanding of information needs at different levels. Too often, this need is not addressed. The study of recursive distribution of discretion can help resolve such issues whenever there is a need for IS design at MPS level. PMO can initiate such coordination.

As the roles of PMO mentioned in this part of our discussion are important and varied, the apposite tools need to be devised. An integration of the intelligence function, models management, balancing control and intelligence can be effectively integrated in a centre, usually referred to as an Operation Centre or Board Room. In our case, the technologically-integrated system is the Management Centre (MC), the base for planning, decision and monitoring (to be discussed in Chapter Eight).

Figure 6-33 illustrates MPS as a notional system where problem-solving is based on perception of issues. The status of the issue implies the type of information necessary to support the PM: routine information such as status reports, periodical briefings; and non-routine information, based on preactive requirements, which includes forecast reports, proposals and advice. The second type is crucial to MPS, which, in order to handle it, requires some form of attenuation/amplification methods. To improve the variety operation channels connecting the PM with the relevant parties, tools such as routine monitoring mechanism and anticipatory mechanisms, are built. These are early warning systems to respond to possible internal events (situations in ministries) and external environmental disturbances that require PM's early attention. In the VSM syntax, the PM needs proper VOs to regulate control and intelligence functions. Figure 6-34 illustrates this mechanism in more depth. It is a regulatory loop approach of elucidating PMO's role in regulating MPS environment with the use of variety operation tools (amplifiers and attenuators).

Another additional syntax to MPS model in Figure 6-33 is the notional system (as shown in the figure by the dotted rectangle beside the implementation function). Figure 6-22 serves as the source for its syntax. Notional System 1 in the model is a system whose issues are the responsibility of Ministries A and B. Also observable is the interacting environments of Ministries A and B which is apparently due to both having a common issue. Ministry C, as noticeable, is not part of the notional system, although it is a part of the formalised ministries of MPS.

The integration of issues is another aspect that needs to be addressed, since issues recognised by the intelligence function are initially too

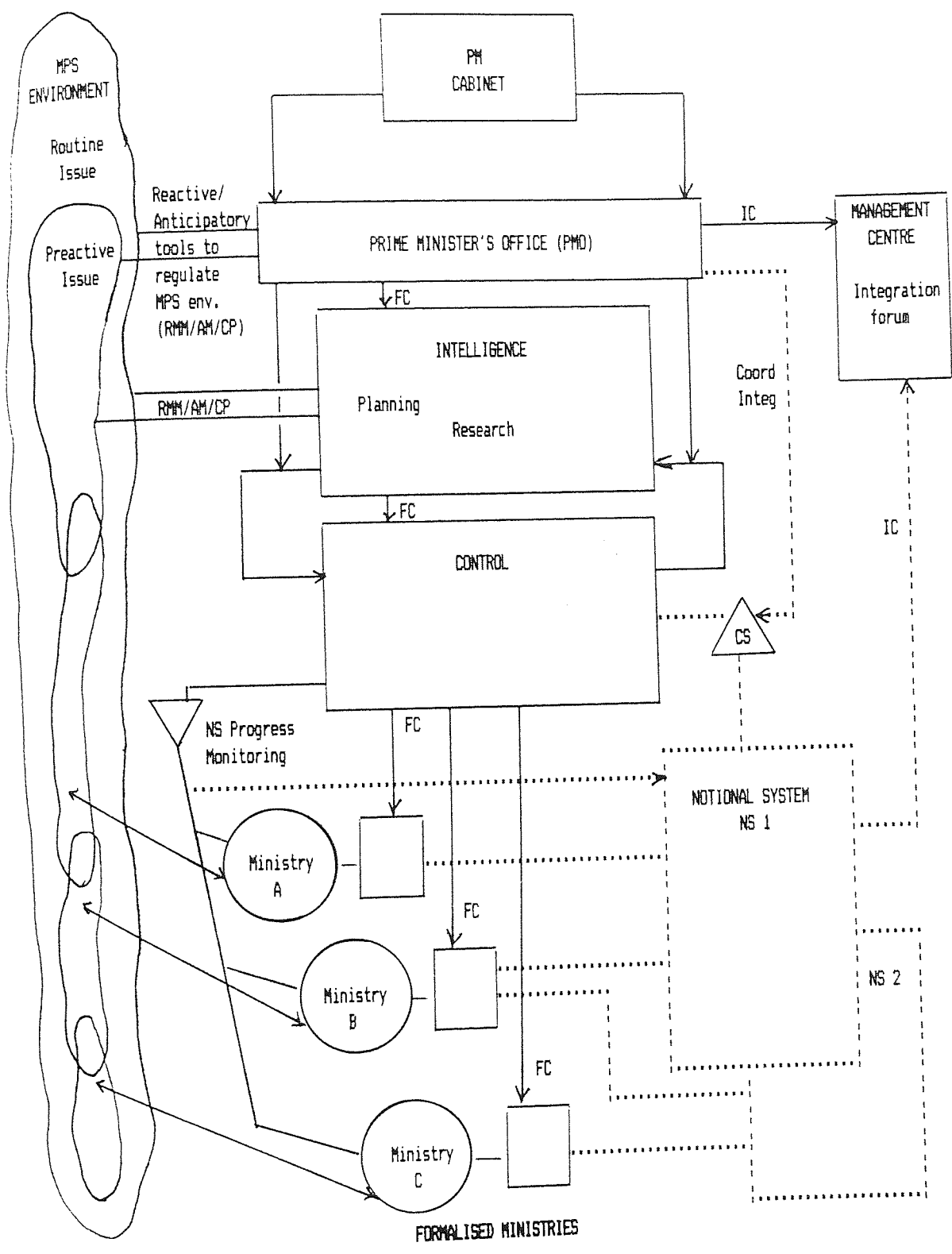


Figure 6-33 The VSM: MPS National System and Issue Handling

- Legend:
- AM Anticipatory Mechanism
 - CP Contingency Plans
 - CS Coordinating Systems
 - Dotted lines are channels connected and related to Notional-systems
 - FC Facilitating Channel
 - IC Integrating Channel
 - RMM Routine Monitor Mechanism

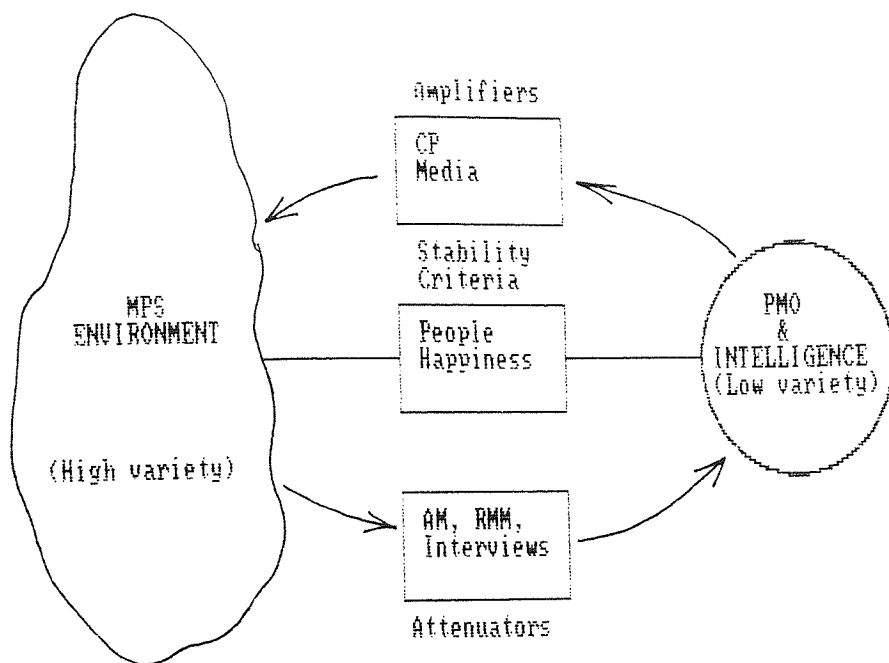


Figure 6-34 Variety Operators to Regulate Environment of MPS

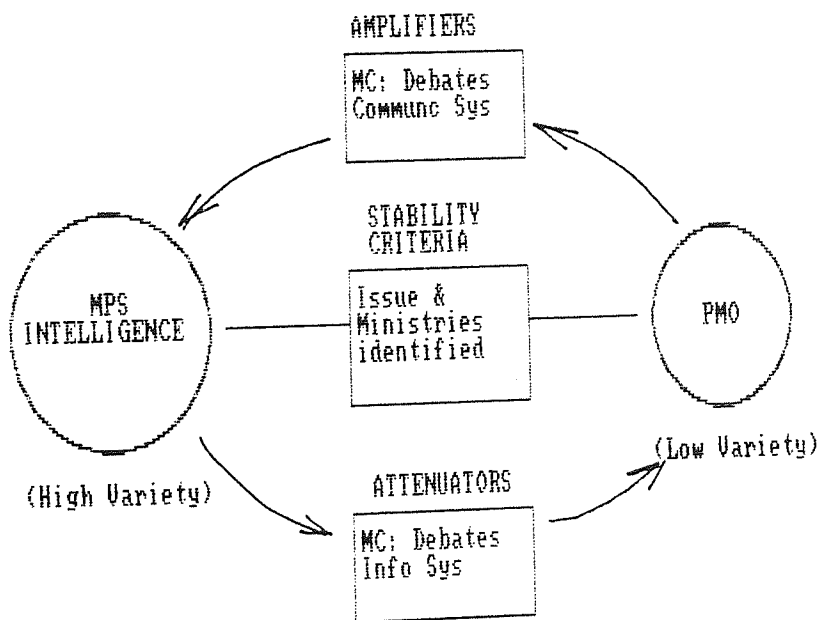


Figure 6-35 PMO's Regulation of Intelligence: Role fo Variety Operators

Note: Abbreviations as in Figure 6-33

complicated. To determine the ministerial involvement, the issues are integrated in a holistic form. PMO, in performing the integration, uses the MC as the forum for integration. The task of integration is made less complex by the availability of filtered information as provided in the MC's information system. Figure 6-35 is a regulatory mechanism which exemplifies PMO's use of variety operators to integrate the intelligence activities. Apart from the use of MC, PMO can act as effector or facilitator, by organising meetings, and getting the involvement of the necessary people.

The integration is followed by the distribution of responsibilities, with PMO also as the facilitator. The use of MC and OS tools makes PMO's task easier.

Finally, in implementing the problem-solving acts, there has to be a certain level of consistency and harmony between the participating ministries. A coordination function with effective coordination systems is needed between the ministries, and not between the notional systems. Combined plans, programmes, schedules for implementation, and reporting procedures are among the coordinating tools needed.

6.3 FINDINGS AND COMMENTS

The methodology undertaken in the cybernetic study of MPS exposes several findings especially those centred around PMO's roles in MPS.

6.3.1. PMO'S CRITICAL ROLE TO THE PM

The first and most critical finding is that the PM, in managing MPS, needs variety operators (i.e. amplifiers and attenuators) as provided notably by PMO, and also by committees, organisations and individuals. As previously mentioned, PMO's role is to provide service and information support to the PM. Service include tasks such as maintaining PM's filing system, scheduling, coordinating and preparation of PM's activities. Information support tackles more complex issues such as providing and enhancing linkage between the PM and MPS. This not only attempts to propagate the PM's thinking of the notion of what a public sector should be, but to retrieve from MPS all relevant responses. To put it plainly, PMO will ensure the right flow of information from both sides, in the form acceptable to both. Thus the need for PMO to function as a VO. Additionally, PMO performs some coordination activities.

But, most important of all, it can be an integrating medium for intelligence, both physically and logically. Physically, it can provide the ideal location for top executives' interaction, while providing proposed technological facilities in the form of computers and management centres. Logically, models of MPS and intelligence may possibly be maintained and updated by PMO given the existing expertise and facilities in PMO.

PMO's information support activities are: feeding information to the PM; linking the PM with MPS; undertaking research and study for the PM on problems and issues as directed by the PM; and advising the PM on

economic, social, and other current issues.

Apart from the above-mentioned activities, PMO's role as an intelligence integrator is equally crucial.

PMO is also perceived as the balancer between intelligence and control functions. It provides an adaptive mechanism by matching the control and intelligence management functions and naming the residual variety. It therefore acts as a comparator, for example, through the physical facilities of "Management Centre" or other logical variety operation processes designed between these functions. PMO also coordinates all meetings involving the PM, heads of the ministries and key MPS executives. A meeting, if well conducted and backed with the necessary information, acts as a useful forum for debates.

In conclusion, the PM needs PMO as his office and information support system.

6.3.2 OTHER FINDINGS

Firstly, changes made are with an assumption that the methodology for studying MPS (Present Chapter) produces organisational adjustments to MPS based on a perceived MPS identity. The adjustments are made to ministerial positions in MPS related to issues, variety operation channels, inclusion of new mechanisms along the VOs, and incorporating new functions. The structure and identity of PMO remain intact.

Secondly, the notional, as opposed to the formalised system, is a result

of uncontrolled environments. As a system, it needs to be flexible. To lessen the rigidity of the MPS structure, better lateral relations are required at the ministerial level. This will diffuse the excessive vertical structure of the MPS organisation. Matrix organisation, as an alternative lateral structure, may create more coordination problems (Manancourt 1987) which is no justification to MPS with its already less effective coordination. However, more effective application of a matrix structure can be made more feasible with improvement in other forms of lateral communications - direct contact between managers, more effective application of task forces, teams, liaisons, better integration of coordination function. These may be done through better cybernetics design.

In handling issues, issue detection mechanisms are required for recognising and identifying proactive and routine issues. This is a characteristic of the notional systems of MPS. To tackle the problem, MPS needs to have: reactive capacity; anticipatory capacity; distributive capacity; integration capacity; and coordinating capacity.

Reactive capacity is the capability of MPS to respond to a turbulent environment. A routine monitoring mechanism helps to identify forthcoming predictable issues in accordance with a recognised past trend, and react to the situation. Anticipatory capacity is for detecting unexpected or preactive issues or events before they actually happen by means of tools such as an anticipatory mechanism and contingency planning. Both these mechanisms are research processes attenuators which are built along the intelligence-environmental channel.

Contingency planning is an attenuation VO for planning, built along the intelligence-environment channel. It is needed when an original plan is no longer adequate in an unpredictable environmental condition. Galbraith (1973) concludes that there exists a need for such based on large-scale empirical studies. He reiterates that there are many ways of organising an enterprise, and they are not equally effective. Cybernetically, this is the case since the VSM is not static. The model adapts to environmental changes and is self-organising if the needs arise. In our VSM, a contingency model is one of the useful planning tools, and a part of the intelligence (as an "element" according to Figure 6-11) which enables the adjustment of VSM (as in Figures 6-9 and 6-10).

The integration capacity is needed to carry out MPS intelligence activities and for identifying a unifying identity of a specific issue for carrying out problem-solving. The processes and tools to tackle the issue are possibly group-planning, debates, and agreements based on common mission and vision of MPS. The integration of intelligence requires having an agreed systemic viewpoint of specific issues, thus making it easy to allocate responsibilities to those concerned. PMO may perform this task, due to its connection with and accessibility to intelligence departments in PMD. As a high level of security is attached to this function (especially in the initial stages of national planning and research), it is only too proper that such a task is the responsibility of PMO.

The distributive capacity is MPS capability to delegate tasks to various responsible ministries. Information channels between the intelligence organisations and managers of implementing ministries (in MPS operation)

will form the initiating mechanism as a stimulus, and expect contributory response from MPS ministerial management. In most cases, the matter is made less complex if the managers of the lower recursion level are involved in this process as a member of the intelligence management group, as it should be.

The coordination capacity occurs during implementation as agreed through integration, which will enable smooth transfer of information between ministries. The coordination mechanism includes programmes and schedules for implementation. In MPS, the mechanism for coordination takes the form of services (or information systems) that support smooth and efficient MPS implementation. Although MPS has many coordination systems, they are less effective. A possible improvement is by having a better integration of coordination. Tools such as information systems, and policy implementation schedules have to be amalgamated into a whole. With an integrated IS design, for instance, information may be shared for the benefit of many organisations.

Fourthly, the significant aspects of environment are social and cultural values unique to Malaysia and not well understood by the west. They are highly influential in much policy formulation and implementation. They are unwritten rules based on strong religious and cultural practices over the decades. Another influential aspect is monarchy, as the religious head of the nation. For instance, Islam is practised as part of everyday life. As a result, a lot of issues are solved through religious means.

A typical example is drug abuse among youth. Apart from using legal means and the government's anti-drug programme, it is commonly accepted that

spiritual help encourages the reduction of this problem. A strong religious awareness will automatically make people shy away from such activities. Cultural ethics and social structure also provide strong support in tackling this problem. Normally, people involved with drugs are not socially accepted, unless they make an effort to solve their drug problem.

Fifthly, policy-making at national level (Figure A5.1 in Appendix 5) is relevant to MPS, where government policies are the primary input of MPS. The nature of policy-making will influence the manner of VSM design. The two types of national policies are: external policy and internal policy. External policies are aimed at improving the people, while internal policies are for improving the performance of MPS. The determination of effectiveness criteria are therefore based on both these factors.

Finally, the role of committees are presently over-emphasized in MPS - in planning, policy, implementation and coordination. Committees are relevant, but their effectiveness can be improved through better information and communication support. Committee members attending a meeting should be at matching levels of complexity, so that the requisite variety in debates can produce the desired decisions. They should, in the process of information reporting and decision-making, serve as amplifiers of situational varieties and as attenuators or filters of their organisational varieties rather than as destroyers of organisational varieties. For the variety of filters tends to be destroyed due to sheer ignorance, not actively participating in meetings or provision of distorted information. For example, Inter-Ministerial Committees should at all times be attended by the Secretary-Generals of ministries or their

deputies, and not by their junior representatives.

By and large, from the standpoint of cybernetics, it is favourable to tackle the problem of structural mismatches and handling of issues (problem-solving) through better design of control and communication mechanism rather than by solving isolated problems as they happen, such as setting up special committees. The latter method is more reactionary and not conducive for handling anticipated issues. With the cybernetic method, the design required is that of regulatory loops (filters, channels, transducers, and comparators) in which tools like anticipatory mechanisms are designed along these communication channels.

To conclude this chapter, the most important revelation is that of the PMO's role. PMO's function as a variety operator (amplifier/attenuator) contributes to the bulk of the necessary groundwork for the next stage of the research - the design of PMO's office communication and information system.

CHAPTER SEVEN

DESIGNING OFFICE COMMUNICATION AND INFORMATION SYSTEM (OCIS)

7.1 INTRODUCTION

In the previous chapter, a methodological approach for diagnosing the MPS has been developed. The diagnosis produces possible viable models of MPS. The diagnostic study exposes a visible lack of effective "variety operators" (VOs) and an ineffectual use of VOs to support PM's managerial capacity, information needs and ability to handle MPS complexity. It is therefore imperative to provide the PM with such VOs, either by improving the capacity of existing VOs or creating new VOs. In a nutshell, what is needed is the design of an office that supports the PM's information management.

Some of the proposals made in the previous study are to: improve channels for information flow; improve use and design of VOs (amplifiers/attenuators); have effective coordination and monitoring; establish a "management centre"; integrate intelligence activities; and open more channels for inter-functional debates. These present us with the basis for an office design. While the VSM is a tool to improve communication and control in MPS, the design of an "office" (to be called OCIS) is to improve the PM's management of MPS. However, a good understanding of the existing office concept as opposed to the cybernetic view of an office is extremely useful in the development of OCIS.

As a product of one of the latest achievements in the field of computing,

an office is often associated with office automation (OA). OA is portrayed as an instrument to make the office more productive and efficient, and not surprisingly the technical side of office development receives considerable attention. As a result, office development tends to be equated with OA, with technology as the dominating factor. There is however another more appropriate view, with the underlying belief that technology complements rather than over-rides the main components of an office (people, tasks and structure). As Hirschheim (1985) points out, an office system (OS), like its more general counterpart - the computer-based IS - is best conceived as a social system. The technological tools it embraces are little more than instruments in the hands of skilled craftsmen, i.e. the office workers.

Automated office design has grown to be more complex, supporting a wide variety of functions. It encompasses the use of various equipments and handles information in many forms (i.e. text, data graphics, image and voice).

7.2 OFFICE CONCEPTS

7.2.1 VARIOUS PERCEPTIONS OF AN OFFICE SYSTEM

One of the most predominant views of OS concerns OA, on the application of new technology (computing and telecommunications) to the office domain. OS viewed as a technological system is alternatively referred to as the electronic office (Price 1979), office of the future (Uhlrig et al 1979), office information system (Ellis and Nutt 1980), the paperless office (Strassman 1985), integrated office systems (Naffah 1980) and the office

support (Panko and Sprague 1982). Some definitions of technology-oriented OS are:

"An automated office information system attempts to perform the functions of the ordinary office by means of a computer system." (Ellis and Nutt 1980)

"...an office in which interactive computer tools are put in the hands of individual knowledge workers, at their desks, in the areas in which they are physically working." (Uhlig, Farber and Bair 1979)

"Office Automation refers to the use of integrated computers and communication systems to support administrative procedures in an office environment." (Olson and Lucas 1982)

Various researchers offer alternative views of an OS. Klein and Hirschheim (1985) treat OS as a social system. Panko (1984) suggests the only way to understand office operation is to look at it in terms of the wider organisational setting. According to Sheil:

"I had approached those offices convinced...that office procedures were, at least in principle, clearly defined methods of processing information. I assumed that they existed, independently of my enquiries. And that is fantasy. The office worker is under no such delusion." (Sheil 1983)

The above presents an OS in a broader perspective, making OA a technological tool and sub-system of OS.

Another viewpoint, very much in the cybernetic mode, considers an office as a complex communication system. Thus we read the following:

"The office of the future, and consequently the organisation of the future, represents an immensely complex communication system". (Uhlig, Farber, Bair 1979)

They proceed to talk about changes in the office of the future, understood and consequently managed as if the office and the organisation (a

collection of offices) are conceptualised as a complex communication system. The communication process, according to them, can be ascribed as a classic control mechanism which, as elucidated by Wiener (1948), accomplishes continuous and adaptive control of processes. This view is similar to that of Beer, who illuminates one of the primary characteristics of the future office when he said:

"The old world was characterised by a need to manage things. The new world is characterised by a need to manage complexity".
(Beer 1979)

Bear in mind that these statements were made more than ten years ago when office systems (meaning, office automation) were yet to get off the starting blocks. Beer's implication was that both the role of a manager and views about a system (OS included) were changing due to the inclusion of the notion of "complexity".

7.2.2 OFFICE FUNCTIONS AND ACTIVITIES

Functions are particular independent operations which have predetermined and specific inputs and outputs (Tapscott 1982). Examples of such functions are accounting, marketing, personnel, and administrative services. They are synonymous with processes, which are on-going transformations that convert inputs into outputs. Activities are groups of operations needed to perform certain processes or functions. Studies have shown that the most frequent thing that office workers do is to communicate information (Mintzberg 1973). Processes (planning, programming, budgeting, coordinating, monitoring, policy formulation, decision making and directing) and activities (communicate, gather, retrieve, analyse, organise, transform, generate, modify and file) are

PROCESSES	ACTIVITIES INVOLVED IN PROCESSES
Planning	Communication Information: gathering and analysis; summarising; writing; filing; revising
Decision-Making	Information: gathering and analysis; filing "Deduction" or "inference"
Advising	Communication Communication Information: gathering and analysis; organising; "transformation" (e.g. to produce in typed report); generation

Table 7-1 Office Work - Classification of Activities and Processes

viewed and arrayed against each other (Uhlig et al 1979). Wainwright and Francis (1984) extend this classification and sum up their relationships in Table 7-1.

7.2.3 OFFICE MODELS AND METHODOLOGIES

Office models are tools that provide a basis for representing office activities. Newman (1980) ascribes five types of OS models: information flow, procedural, decision-making, database and behavioural models. Tapscott (1982) stresses that an office model needs to conceptualise what takes place in the office and organisation. His model depicts an office as a system which receives inputs, processes them, and turn them into outputs along five dimensions: organisational communication, functional information resource management, decision support systems and quality of working life models. Other office models are Ellis' (1979) information control nets (ICN)-based model, SCOOP which is the system for

computerisation of office processing (Zisman 1977, 1978), form flow model (FFM) which is a network of stations through which forms flow (Ladd and Tschritzis 1980) and OMEGA which is an outgrowth from the field of artificial intelligence (Barber 1982).

OS methodologies are approaches needed for the design of OS. Schafer (1988) cites the FAOR methodology as a comprehensive approach which embodies a number of mechanisms or components which allow it to perform the necessary functions required of an OS methodology - namely, soft system methodology, Benefit Analysis Framework, Generic Office Frame of Reference (GOFOR) and FAOR instruments. Other well-known methodologies mentioned by Hirschheim (1985) are Checkland's soft systems (SSM), Tapscott's user-driven design (TUDD), Mumford's effective technical and human implementation of computer systems (ETHICS), Pava's sociotechnical design, and Sutherland's office analysis and diagnosis (OADM).

In his study of 14 office models and methodologies, Hirschheim cites the use of SSM as one of the three methodologies he recommends to form the basis of OS development. He reiterates that while there exists a number of models and methodologies, their relationships in practice are not expressed very clearly. He concludes that it is not enough to produce good OS designs. Methodologies need to be considered to realise the potential of a design.

7.2.4 THE CONCEPT OF OFFICE IN CYBERNETIC TERMS

Office in cybernetic terms is a human activity providing communication channels, attenuators, amplifiers and transducers between the manager and

the organisation he manages. In simple terms, an office is viewed as a "variety operator" (VO) that supports a manager with information as the key office product.

An office process is indicated by information flows and relationships among entities within and associated with the system (such as roles, functions, activities, committees, services and products). According to Wainwright and Francis (1984), the functions of the office are concerned with meeting organisations' information needs. These include: gathering information concerning the organisation's environment; and gathering and processing information and coordinating its flow internally. This is akin to the cybernetic idea as portrayed in a VSM, where the intelligence function deals with a system's environment and the control function deals with the internal part of the system.

The activities of an OS, viewed cybernetically, are:

- a. manipulating information between a manager and his organisation either through amplification, attenuation or transduction;
- b. providing channels for information flow;
- c. initiating and facilitating debate between entities in the organisation, such as between intelligence and control functions of a viable system; and
- d. integrating activities of organisations or units undertaking intelligence and control for the organisation.

The above are consequently derived, and benefitted from the findings of the VSM study.

7.3 OFFICE SYSTEMS PRACTICES IN MPS AND PMO

The impact of IT creates a favourable climate for OS development in MPS. In general, OS applications in MPS are still a novelty, the development of which still lags behind, say, MIS. With its present predominantly mainframe focus, most OS applications are designed and implemented based on large-scale systems, making them an unattractive prospect for executive users. With the arrival of PCs, some managers begin to use office technologies, although the impact is not yet as great as it might be. Most applications are designed with some support from computer suppliers, a market presently held by a few large companies - IBM, ICL, and Data General (DG). A source from MAMPU (1986) indicates that 25% of the mainframes in MPS are IBM's. The roles of the other suppliers like Burroughs, DEC, Univac, HP, Wang, and NEC are less emphatic.

The support provided to MPS organisations by most of the vendors lacks thrust and direction mainly due to their lack of know-how and to conservatism. They are over-dependent on the expertise of their parent or regional organisation, usually located overseas, at the expense of home-grown experts. The success of OS depends on many aspects; technical support, services, availability and maintenance of hardware/software, networking facilities, and above all, expertise and manpower availability. IBM, to a certain degree, has such local expertise, and is a long way ahead of the rest in providing technical support and services. However, the monopoly by these computer giants, particularly IBM, creates an unhealthy climate for OS progress. For OS to be nurtured into useful management tools, competition among its vendors is much needed. Stiff

competition may force vendors to provide better support for product development and expertise by the suppliers.

The consideration of MPS OS applications, is best done with reference to the PMO due to its initiative in OS development in MPS. With the establishment of the Chief Executive Information and Management System (CEIMS) supporting the PMO in 1984, a network of MIS and OS applications for MPS executive users was introduced, where initial link in MPS was in the form of online services to users. Figure 7-1 shows the present and planned network, which is approved for completion during the Fifth Malaysia Plan (1986 to 1990). It depicts PMO's system (i.e. CEIMS) linked to computers in other ministries and departments primarily to enable top executives to communicate through this integrated office system. Remote inter-computer connection (computer-to-computer link), apart from PMO-ICU local mainframe links, is still unavailable. The link with ICU is advantageous as CEIMS users are capable of communicating with ICU's users at various ministries, states and districts. In this respect, data and information may be shared. At all the different levels of MPS, three groups of users accessing CEIMS are the executives, application development users, and technical/analyst group.

As an OS, the PMO is a personal and confidential office of the PM providing him with management and information support. Figure 7-2 illustrates PMO's OS role. The overall objective of PMO is to provide efficient, systematic and speedy office management services in running the affairs of the PM. PMO's functions are basically: work plan and office management; administrative and financial support; service and personnel; security; text preparation and coordination (i.e. speeches, messages, and

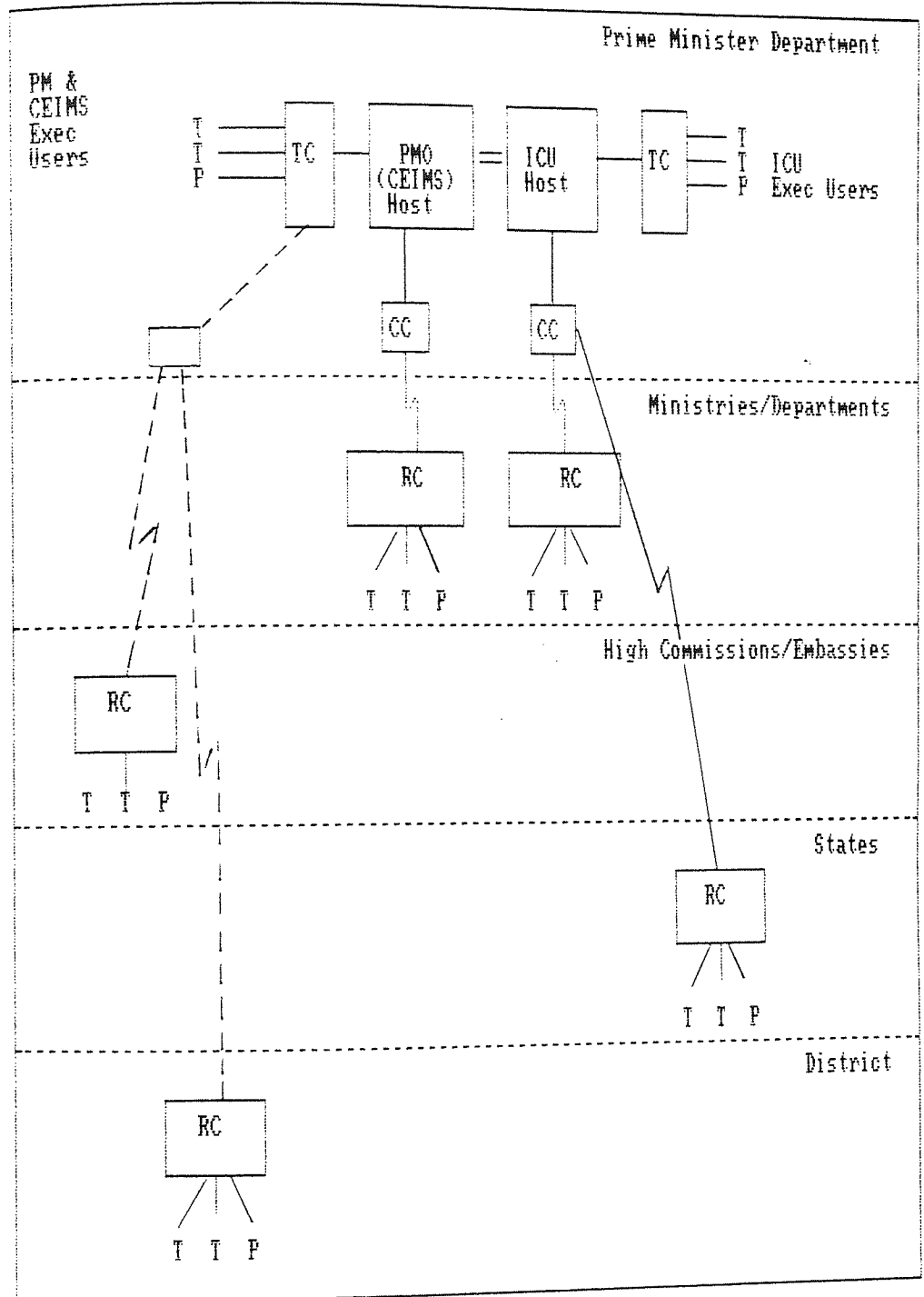


Figure 7-1 MPS Computer Systems Network

Legend:

- CC Communications Controller (Front End Processor for remote link)
- ICU Implementation Coordination Unit
- P PC (Emulated as a terminal for the purpose of linking with mainframe)
- RC Remote Terminal Controller (to multiplex more than one terminal using a single data line)
- TC Local Terminal Controller (same as TRC, but used for local connections)
- == Local Mainframe-to-mainframe link
- Local Link
- - - Remote (existing) Link
- - - Remote (planned) Link

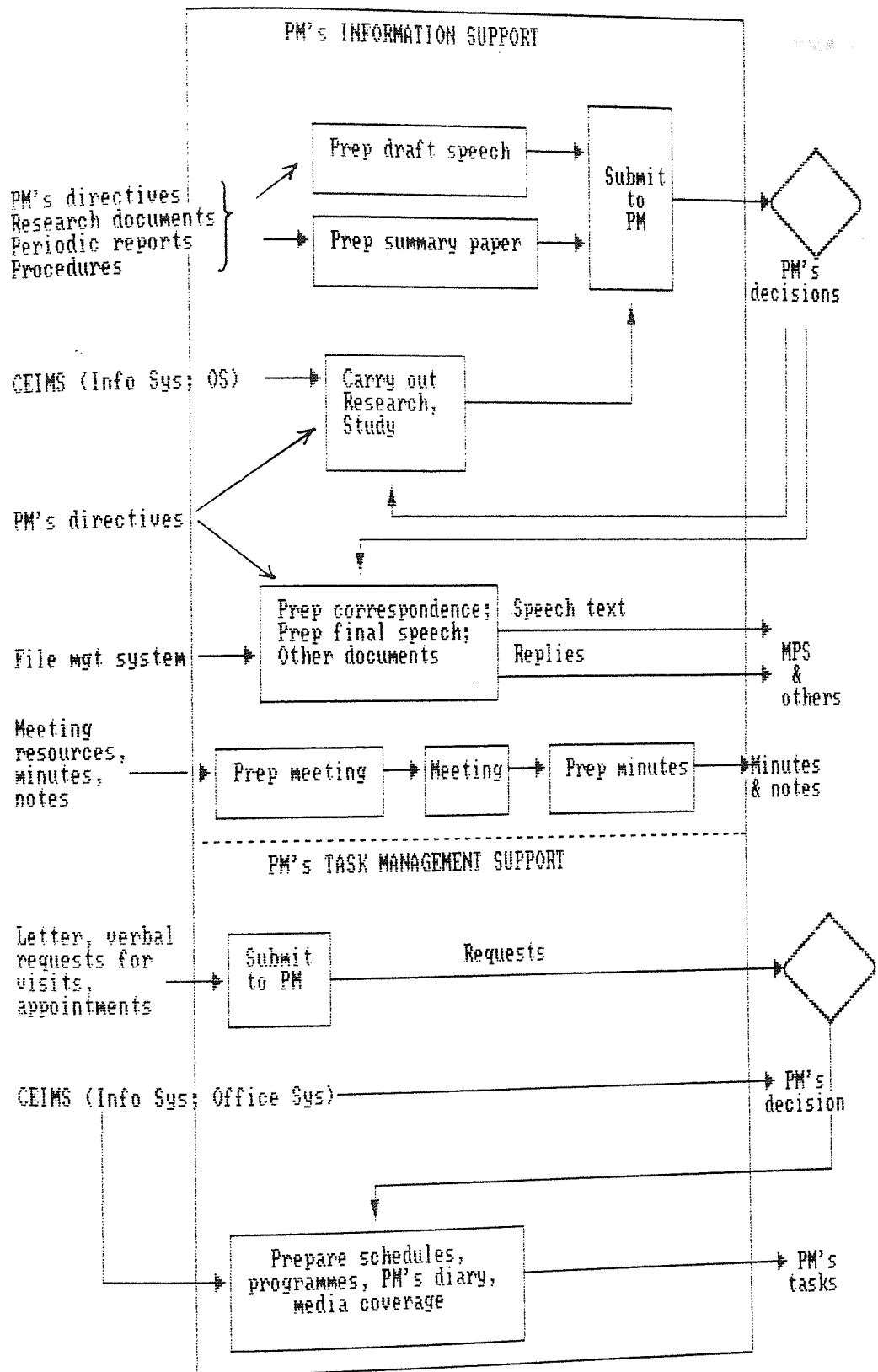


Figure 7-2 Existing Logical Office Model of PMO

Legend:



Decision



Process



Information

other statements); media coverage support; information support; research and development; and liaison.

The activities in PMO, defined formally, are: to coordinate officers performing "staff functions" duties; to arrange and coordinate the PM's programmes which includes visits, officiating ceremonies, meetings and other functions; to make preparations enabling the PM to hold meetings, discussions and presentations, as well as organising participants; to manage service and personnel affairs, run and organise the office, procure stock and attend to financial matters; and to maintain office cleanliness and security.

For this research, the question of information and office cannot be treated in isolation due to the problem structure based on the perception by the client (PM). With respect to information support, I view the activities of PMO (related to the identity of MPS) as:

- a. feeding information to the PM on: crucial events especially those requiring decision;
- b. as liaison linking the PM to the MPS;
- c. undertaking research and study for the PM on problems and issues as directed by the PM, among the issues being: national economy; government policies such as privatization; response of the people to government policies; national disaster affecting policy implementation.
- d. advising the PM on economic, social, and other current issues by: preparing summary papers with decision criteria, comments and declarations.

Both task management and information support are held to be PMO's primary functions, although other services are performed to maintain routine tasks. Various means of information support are prevalent, although the role of CEIMS is becoming more recognised and established as the use of computers by executives spreads across the public sector. CEIMS, with its emphatic technology-based system, houses OS and MIS tools to help PMO support the PM and top executives in MPS. Figure 7-3 indicates the components of the OS with CEIMS playing a prominent supporting role to PMO.

OS application by PMO is envisaged as a model "modern office" in MPS, which is technologically-driven, where traditionally manual office procedures and sub-systems (such as filing, information distribution, staff communication, scheduling, reporting, messaging and mailing) are reinstated by new automated systems. PMO's physical office layout, which is open-spaced, departs from the traditional office in most organisations of MPS. The purpose is to encourage communications among staff.

7.4 CYBERNETIC FRAMEWORK AND OS DESIGN

The purpose here is to establish the role of the cybernetic concepts, specifically the information management framework (Figure 2-13), firstly in conceptualising OS in a useful way and, secondly, in the design of an OS.

THE PRIME MINISTER'S OFFICE SYSTEM

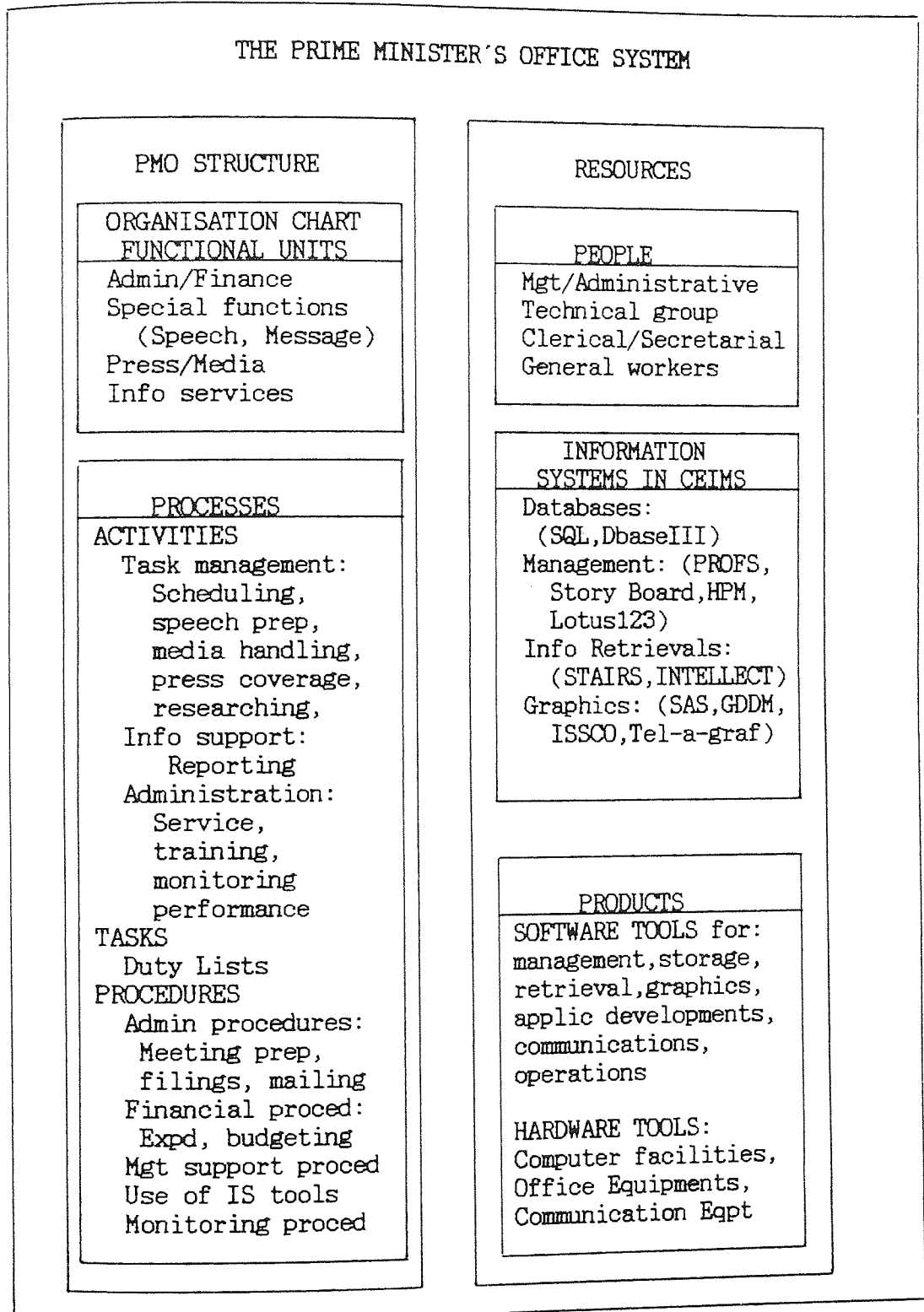


Figure 7-3 Components of PMO

7.4.1 USING CYBERNETIC FRAMEWORK IN CONCEPTUALISING OS

Earlier (in 7.2.3) I have mentioned the concepts, processes and functions of an office in cybernetic terms. The information management framework is an approach that enables the design of processes that support the individual in matching his information processing capacity to his information needs. The cybernetic matching of complexities is the basis supporting the use of the framework. The most obvious implication of the framework is that it enables one to view OS as a variety operator (VO) - amplifier and attenuator. This is emphasised in the system to be designed, which is viewed as a tool for PMO's executives to support the PM's information need in managing MPS. Viewed in this way, the PMO's office functions are:

- (a) information support to the PM; and
- (b) action amplification of PM's task.

In both cases, PMO acts as a VO; "information support" to amplify/attenuate the PM's information management, and "action amplification" to amplify the PM's execution/management of his task. For information support, the OS functions of the PMO, as supported by cybernetic viewpoint on OS in 7.2.3 and conceptual modelling in Chapter Six (6.2.2.1), are to:

- (a) amplify action such as transmitting information from the PM to enable MPS interpret PM's perception of the national issues (PMO may interpret whenever required the PM's intention to MPS);

- (b) filter/attenuate MPS information such as in informing MPS performance to the PM and advising measures for improvement (PMO interprets the action of MPS into meaningful or measureable performance fully understood by the PM, e.g. adequacy and quality of services);
- (c) provide communication channels (technological channels) to link the PM with MPS;
- (d) provide the PM with structural VOs (organisational-based or non-technology based channels) in the form of sub-systems (processes, activities, tasks, and procedures), and non-structural VOs (information systems, communications, etc.);
- (e) initiate and provide means for active participation in debates through meetings, conferences, etc. by key ministries and departments involved in intelligence and control activities thereby providing the PM with effective information support; and
- (f) integrate intelligence activities (such as planning, research and forecasting) and organisations involved.

The PM's requirement to manage MPS is based on his:

- (a) need to interact with MPS through communication channels at his disposal; and
- (b) decision-making, as it affects MPS. Decision-making implies organisational decision-making in which PM and other executives provide the closure between the MPS intelligence and control functions.

7.4.2 CYBERNETICS AND DESIGN

With respect to the relationship between OCIS design and the cybernetic study, the former follows the latter. The design of OCIS is only possible after the problems of MPS have been identified, diagnosed, and weaknesses recognised. Only after improvements are made can the VOs used be beneficial to our designed system. The basis of OCIS design is three design strategies: organisation structure (organisation based), organisational conversation (relationship oriented), and manager-to-task fit (management focused). All the component models (VOs) designed are classified according to these strategies.

7.5 "OCIS" DESIGN PROCESS

7.5.1 DESIGN ASSUMPTIONS

The system to be designed will be referred to as "Office Communication and Information System" or OCIS. The system is a combination of management, applications and tools which respectively use information management, information system and information technology strategies. It is, in simple terms, an office which primarily processes information and supports action using IT as the main tool to support management. The communication process is used as it relates to the cybernetic need for a continuous and adaptive control process.

The output of the design, (i.e. OCIS), will not replace the existing PMO. The study is made with reference to the PMO situation in order to have a

means for testing the outcome of OCIS design and methodology. OCIS will later be tested against PMO to determine the differences between the existing practice in OS and an alternative cybernetics views on OS as later found in OCIS.

The tools and products used in the design are by no means accepted as complete and neither are they assumed to be the best possible alternative. Other, more suitable alternatives may evolve. The present task is illustrative. The intention is to pinpoint distinct logical processes, and the type of products or equipments needed to fulfil the design.

7.5.2 "OCIS" DESIGN METHODOLOGY

OCIS design methodology is developed from soft systems and cybernetic methodologies. The design methodology (Figure 7-4) is a sub-set of the overall methodology (Figure 3-3) and involves the phases: modelling and design of "OCIS" based on cybernetics framework; studying information requirement; and designing management centre. Input to the design phase is the analysis phase which is made up of problem definition and problem structuring. The output is a system evaluation - testing "OCIS" against existing PMO. I will however briefly mention the input and output as part of the present study.

7.5.3 ANALYSIS

7.5.3.1 PROBLEM DEFINITION

This phase has been discussed in Chapter Four. To emphasise, I will focus on the PMO, specifically in its role as an office system to support the PM. Technology plays a major role in a modern office, especially in PMO. However, a number of issues related to PMO's information-support role will be discussed here, some of which are problematic in nature.

In the first place, the nature of the task to support the PM requires the executives and staff to deal with highly classified data and information. This is due to the confidential nature of the tasks performed, where PMO has to ensure a minimal number of personnel involved. Most of them have served the PM for a period of time, performing specific tasks while attaining a high degree of expertise and specialization. As a result, there is an element of indispensibility. These people unfortunately have to cope with both introduction of new technology and the discarding of some traditional tools and methods. The question of attitude towards new ideas has always been a major setback in any pursuit for change. While in some cases there is acceptance, there is no assurance of successful transition due to the complexity involved in adopting new ways.

The PM's understanding of an office is a modern and efficient system making effective use of technology, the result of which is the creation of CEIMS. But, a lot of problems are encountered in trying to instil

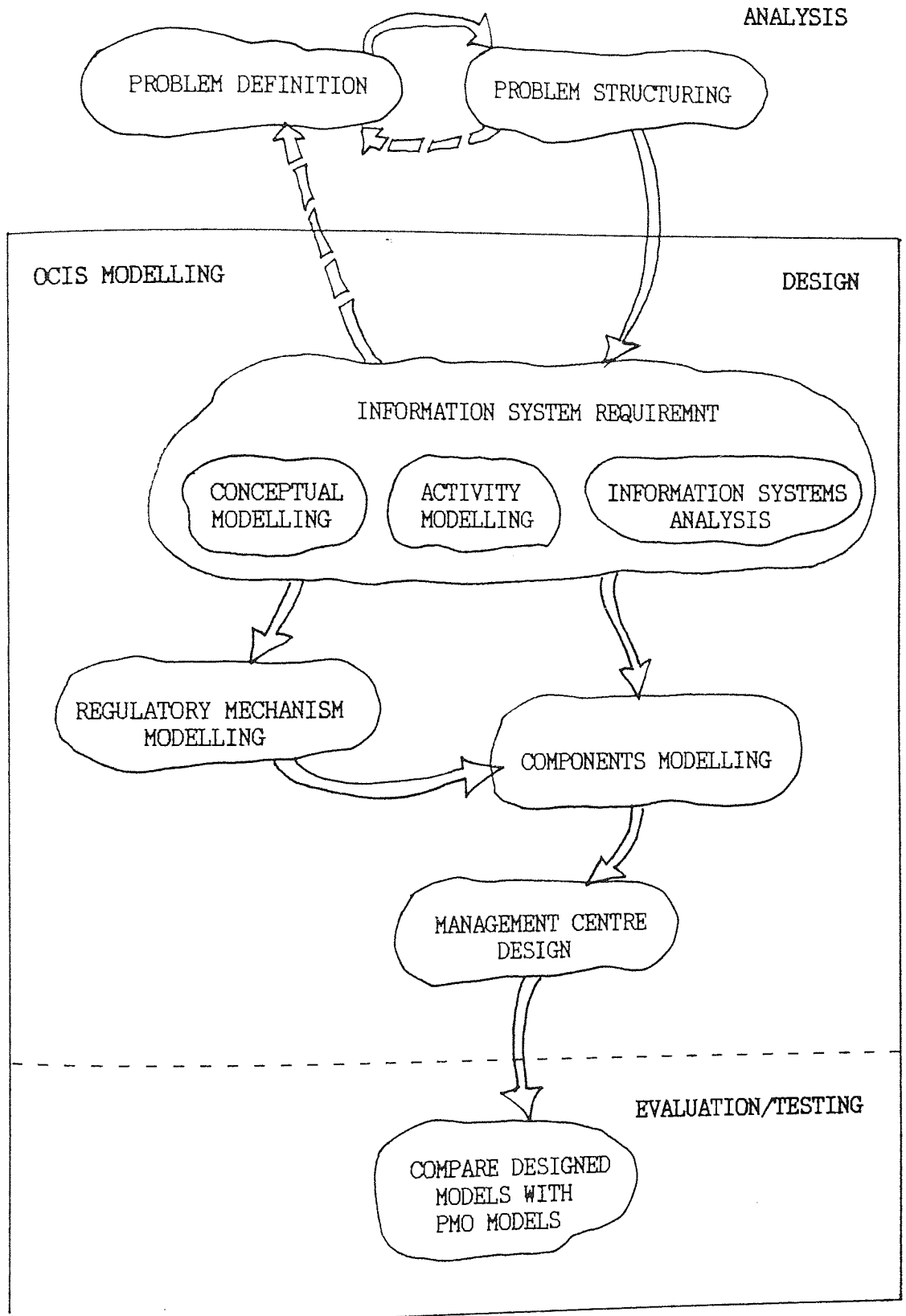


Figure 7-4 "OCIS" Design Methodology

interest among the executives to use latest office technology in everyday management. The design and application of OA in PMO today is basically to cater for the present PM's managerial style. It is extremely difficult to anticipate the management style of different PMs. Thus, a design based on an individual style may pose problems later as the needs of different PMs differ.

Finally, there is a recurring problem regarding MPS data. Generally, most of the nation's data (kept in the Statistics Department) are not up-to-date, are too voluminous and too complex. The question of data reliability and meaningfulness is frequently debated, but never definitively proven as successful. The daunting task involved in this issue means that it cannot be solved in the near future. Mammoth long-term coordinated and integrated efforts are needed before improvements take place.

With the exception of data, the problems mentioned may be improved through better overall information flow and communication. This suggests a cybernetic solution to the design of an office information system (OIS). Information channels, VOs (amplifiers and attenuators) and transducers need to be designed. This might include tools such as electronic mail and IS, or entail procedures, channels (physical or logical) and facilities. Another possible solution is the setting up of an "intelligence" function, a role for which the PMO is most suited. There is the need to encourage the process of debates, especially as means to identify management needs.

A model such as VSM, and associated models, such as the technological, primary and intelligence models for MPS and related organisations, are

essential for the design of the OS. Although there is an element of technological bias, emphasis will be on design of human and machine interface systems and procedures. This is to encourage participation by executives in decisions using the concept of management centre, and might concern a stress upon graphic and statistical applications. In terms of data, a long-term solution is needed. There need to be decisions to determine means of collection, the types of data to be collected, and the organisations responsible. This implies coordination work among responsible agencies.

7.5.3.2 PROBLEM STRUCTURING

We have already affirmed the use of the IM framework (Figure 4-4) and agreed that the problem is PM's management of MPS and the need for OCIS, a system to provide the necessary VOs. This phase is concerned with identifying "names" for OCIS. The relevant system is:

"an office that enables executives of the PMO to make effective use of existing resources (information, machine and people) with the purpose of supporting the PM's management of the Public Sector".

The TRANSFORMATION implied by the above name is from "PMO's resources" into "an effective office system environment" (which refers to a set of complexity making up the designed office environment consisting of: processes; products; organization structure; information system and people). The ACTORS performing the transformation are the executives of the existing PMO (the CSG and senior officers of PMO), information analysts, technical support groups, secretarial and clerical staff. The CLIENTS benefitting from the transformation is the PM (primary user), the Cabinet ministers, senior MPS managers and PMO executives (all

secondary users). The OWNER of the transformation is the CSG.

The desirable OUTPUT of the perceived transformation are: better use of resources by PMO executives (with respect to internal system efficiency); and improved quality of services to the PM (which reflects the system's effectiveness with respect to its user) resulting in improved PM's management of MPS. Resources emphasised here are information and technology, the use of which is aimed at improving the PM's managerial performance. Resources available are information, machines and people. Information relates to IS (applications), IM (managerial problems and issues), and IT (tools). Machines constitute hardware implements and equipment which also includes IT products.

People, as the main components of any human-activity system, are allocated tasks to perform OS activities and, in cybernetics term, are the VOs between the PM and MPS operations. The executives of PMO in their capacity as PM-MPS VOs provide timely, accurate, relevant and meaningful information to both the PM (e.g. through reports, summary papers, briefings, etc) and ministries (e.g. decisions, instructions, opinions, messages, etc). The PM, therefore, is able to handle the complexity of the information that is filtered through PMO. On the other side, the information to the ministries are made more meaningful through the amplification process.

Effectively, the way forward concerns integrating people, machines and information. The combinations of all their possible states and interactions are cybernetically referred to as complexity.

Supporting the PM's management of MPS implies improving his information processing capacity with better OS support. This is through improved PMO's executive performance. In cybernetic language, PM's better management means his ability to handle and use information with better communication and control processes in MPS. A better balance between stability and adaptability of both internal organisation and external environment is required. This can be achieved through structural VOs of intelligence and control functions. This is possible with the support of PMO. The transformation can be summed up in Figure 7-5.

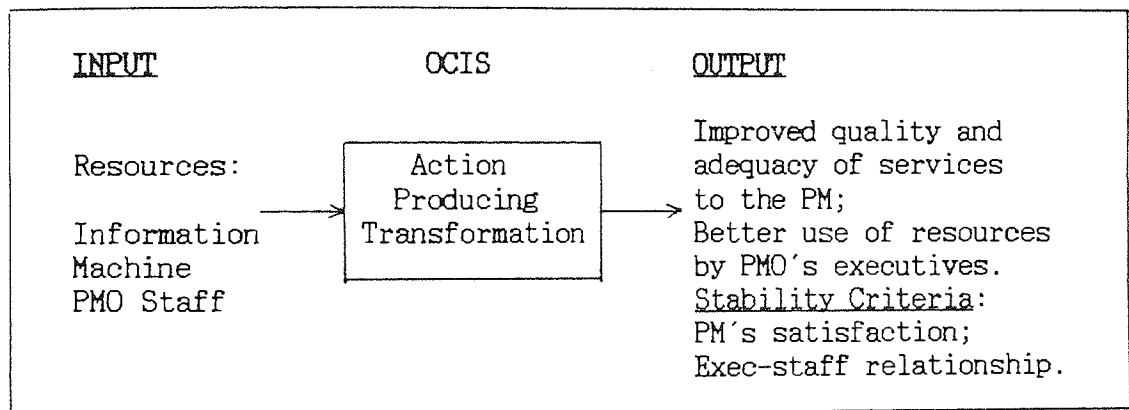


Figure 7-5 Initial Transformation Model of OCIS

7.5.4 "OCIS" MODELLING

OCIS modelling is based on the following: information management (IM) strategies (as in 4.4); PMO's office functions (7.4.1); VSM findings (6.3); and OCIS transformation model (Figure 7-5). This new office environment "OCIS" comprises a whole set of complexity consisting of numerous processes, products, organisation structure, information systems and people which are systemically related. The totality is too complex to deal with. For simplification, model design will be discussed under the

following categories: IS requirement; regulatory mechanism modelling; components modelling; and management centre design.

7.5.4.1 INFORMATION SYSTEM REQUIREMENT

(1). CONCEPTUAL MODELLING

Conceptual modelling provides both overall and detailed portrayal of OCIS. The global model is shown in Figure 7-6, which illustrates OCIS's relationship with other OS in three structural recursive levels. The office models in MPS occur at different recursions supporting executives at different levels. At the highest logical level, Recursion 1, the PM needs OS1 (which is OCIS) as VOs to manage MPS. At the ministry level, a minister needs OS2 as VO to manage a ministry. Lower down the recursion, OS3 is the VO supporting the Director-General of a department. The

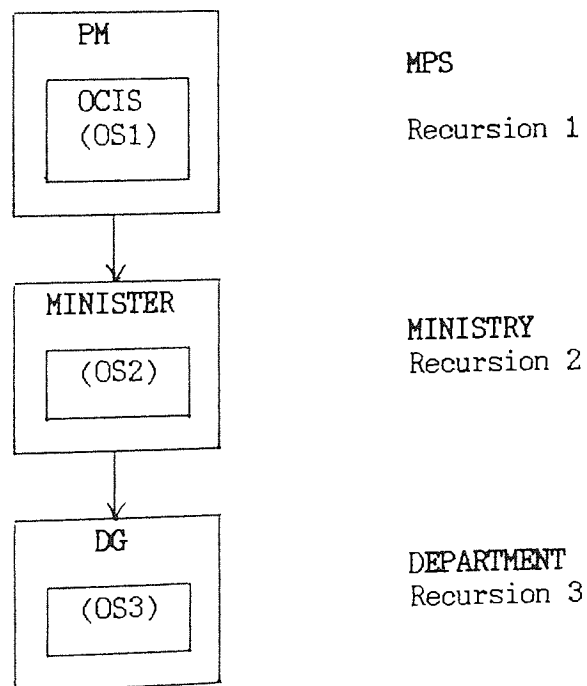


Figure 7-6 Conceptual Modelling: OS Structural Recursion

relevance of studying these relationship is because of the need to share resources, especially information which is frequently transferred along the levels. However, information at the departmental level may have a higher level of detail compared to the ministry's and MPS information. Data and information are modified as they move upwards or downwards the recursions to suit user need.

For the MPS (Recursion 1), I will elaborate the model to illustrate OS1 (i.e. OCIS). Two models are used to describe the role of OCIS as VOs. Figure 7-7 is the model of the PM's task management based on the IM strategies (Figure 4-4). The variety operation component, as shown in Figure 7-8, conforms with Figure 7-7 concerning strategic applications and Figure 6-4 concerning PM's management of MPS. With organisational structure, the requirements are adjustments to MPS (already discussed in Chapter Six) and PMO, design of activities based on the OCIS transformation (Figure 7-5), and design of tasks and procedures to carry out the activities. Organisational conversations are systems (VOs) that are used to facilitate better interactions within MPS. Finally, to improve manager-to-task fit, tools and models such as VSM, intelligence models and information systems are used to enhance the PM's cognitive capacities. At this juncture, it can be concluded that the role of OCIS is in providing variety operations - amplification/attenuation. With respect to MPS structures, models (as already designed in the previous chapter) such as the VSMs, are used as part of the OCIS logical components. With the categorisation of the principal composition of OCIS, we can begin to delve into the components proper.

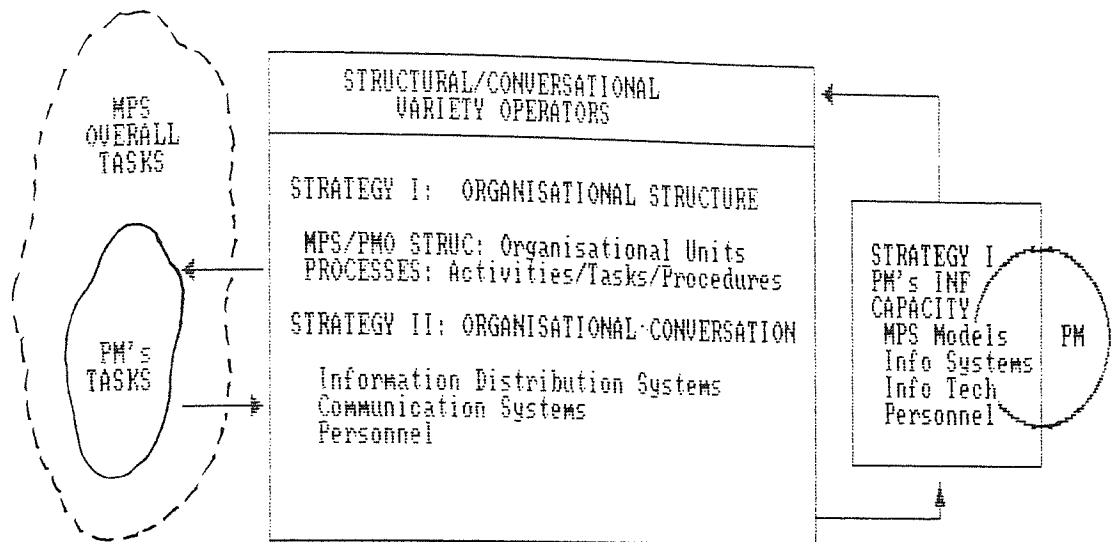


Figure 7-7 CONCEPTUAL MODELLING: OCIS Design Strategies in PM's Task Management

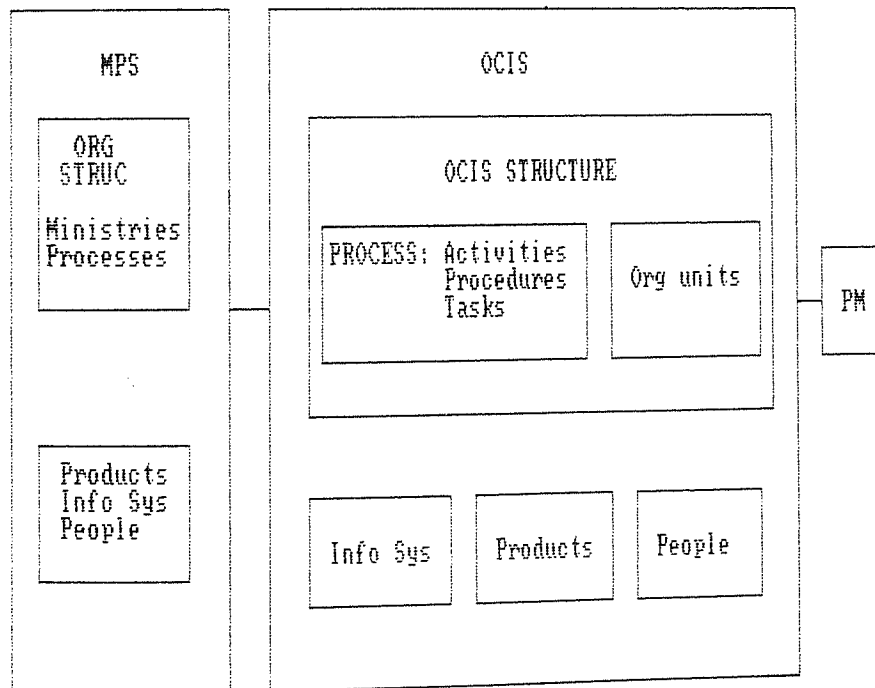


Figure 7-8 Conceptual Modelling: OCIS Component Variety Operators in PM's Management of MPS

(2). ACTIVITIES MODELLING

Of the components of OCIS, "process" assumes the major role of transforming input into desired output based on the effectiveness criteria of OCIS. The generic components of process are activities and procedures. Depending in which level of resolution they are in, activities are also processes at a lower level. In avoiding misconception, "process" is perceived as producing OCIS main transformation, performed by a group of "activities" which are carried out by units or individuals (called tasks). "Procedures" are ways of carrying out individual activities or tasks.

By ascribing to the initial transformation model (Figure 7-5), OCIS activities may be developed. The idea of this modelling is to identify the relevant activities that will carry out the OCIS transformation process. These activities are developed with reference to primary/technological activities modelling technique. The activities of OCIS are based on the output of VSM findings in the previous chapter. Figure 7-9 is the activities model at Level 1. The primary activities are related to OCIS's variety operation role, which is information processing/action amplification. This is supported by other activities, namely information management, resources handling, and communication facilitating. The following are the information processing activities of OCIS, which explains the model in Figure 7-10.

a). Analysis of Information Requirement

This analysis phase involves establishing the information required

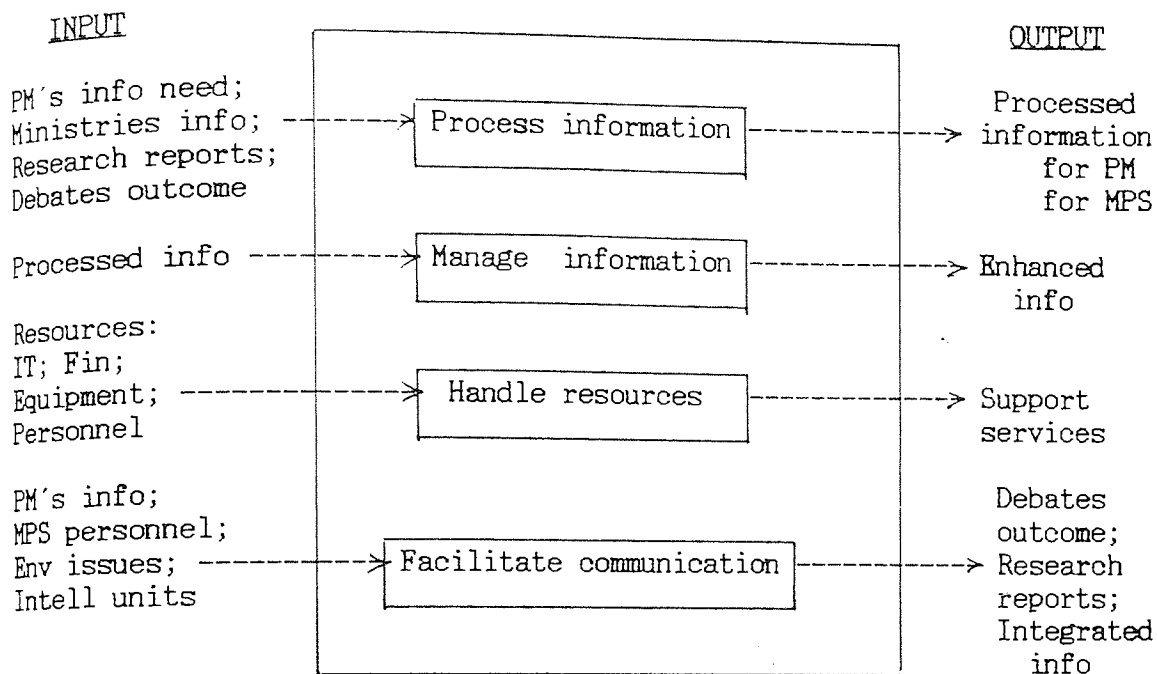


Figure 7-9 "OCIS" Activities Model: Level 1

Note: These activities are carried out integratedly and systematically where output of one activity may be the input to another.

by the PM as the system's user. Having established the PM's needs, the specification of the requirement has to be established. The need for an analysis is to be able to aggregate the wealth of data into useful information to the PM. At the same time, the analysis is also on the feedback information to MPS.

b). Developing Information

Developing here implies variety operation and transduction processes. Information is attenuated from a complex form (as supplied by MPS) to a form understood by the PM. On the other hand, the PM's directives, decisions, and other actions, which are normally in an attenuated form, are amplified to include more relevant and meaningful details before being disseminated to the

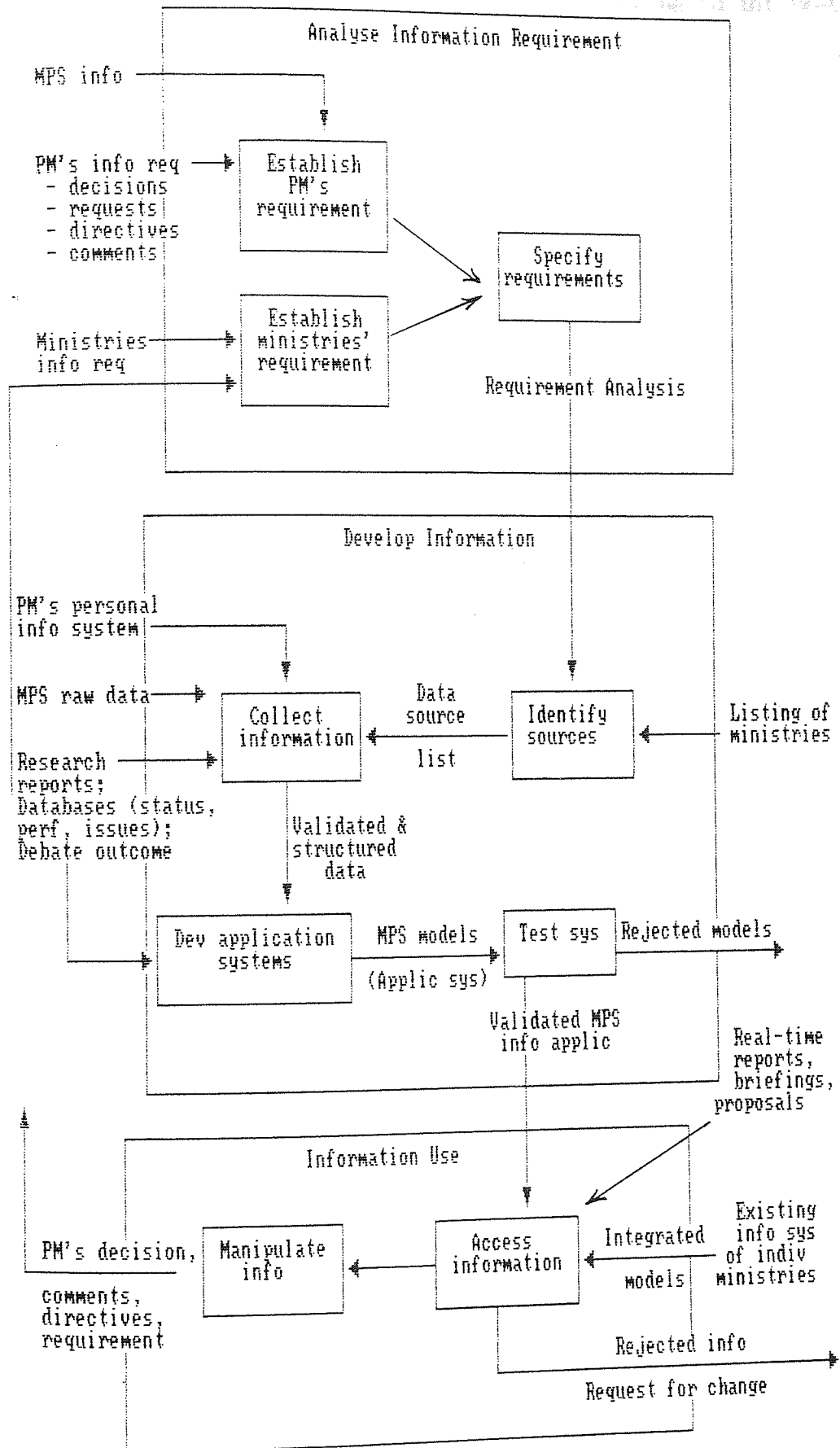


Figure 7-10 OCIS Activities Models: "Processing Information" (Level 2)

ministries. This phase concerns a design pertaining to information acquisition and systems development, the basis of OCIS transformation. This process requires the identification of information sources; gathering of information; transforming information into information system applications useful to the PM, such as by developing specific applications; aggregations; and reports. The information system will be subjected to tests to ensure it conforms to the specifications. Only when there is acceptance will the system be made accessible for the PM and other executives.

c). Information Use

This refers to the PM's as well as MPS executives' access to the information using tools such as databases for retrieving texts, graphs, charts, and maps by means of some query applications. In accessing, the PM is effectively comparing MPS models with his mental (expectation) model. Applications will be at the user's disposal whenever required. Information may be manipulated by the PM and other executives through the use of simulation tools. This allows for effective discussions relevant to the role of OCIS in facilitating debates.

The next activity, management of information is necessary to support the following primary activities:

- a). Integration of systems is necessary to produce IS utilising the necessary communication and office applications. An integrated system will then be ready for use by the PM.
- b). Monitoring the Applications is to ensure that the system is

implemented according to the criteria of stability determined.

- c). Updating/improving system is upgrading or enhancing the system in response to changing conditions. Maintenance is necessary in case the information needs amending. It is associated with the management of models and IS. Once the PM is no longer happy with the system (say, information is less useful), the system needs updating and improving accordingly. Additionally, changes are made due to other factors, such as communication deterioration among personnel.

For resource handling (of manpower, funds, equipments, and technological tools other than information resources), the activities include: acquisition, maintenance, servicing, improvement and replenishment.

Finally, to facilitate communication, the activities of OCIS are: research, creating the conditions for debates, developing information for the management centre (MC), maintenance/updating MC information. Debates between the control and intelligence units are for balancing the internal and external situations of MPS. Debates among intelligence units are to derive common viewpoints and consensus concerning external environmental issues.

Figure 7-11 describes OCIS primary activities by the unfolding of complexity, modelling technique which offers a way to comprehend different activities at different levels, thereby enabling the allocation of tasks in OCIS.

Table 7-2 is a resolution distribution of discretion matrix for

analysing the distribution of power and responsibility related to OCIS activities at different levels of recursion. The activity/resolution part of the matrix provides a useful means to support the design and analysis of the OCIS information requirement. In this matrix the activities are derived from the activity modelling.

There is an element of matrix organisation in OCIS with the functional and non-functional personnel responsible to both IS manager and related functional managers. The IS manager and administrative manager are responsible directly to the chief executive. The IS manager handles all the activities related to information processing and IM. The applications (systems development), operations and technical services units reports directly to him. The services manager, on the other hand, handled resources other than information, which includes financial, personnel and

Note:

A symbol to indicate an activity for a resolution level

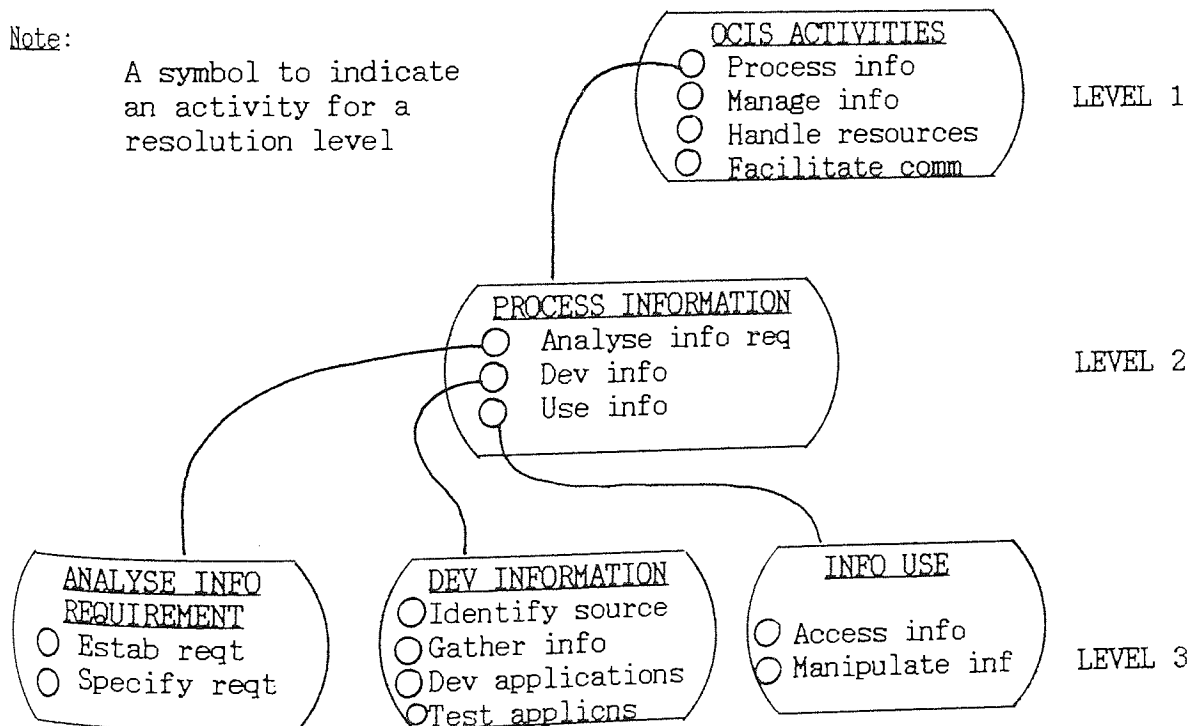


Figure 7-11 The Conceptual Model of OCIS: Unfolding of Complexity

										Other Tech. Pers.				X	X					
										Analysts				X	X	X				
										Non-tech. Personnel	X	X	X							
			X	X							Func. Mgr. (User Svs)	X				X	X	X	X	
X	X										Func. Mgr. (Fin / Adm.)	X	X				X			
		X									Functional Mgr. Services	X	X				X			
				X							Tech. Svcs Mgr	X				X	X	X	X	
					X						Operation Mgr.	X		X	X	X	X	X	X	
						X					Applic. Mgr.	X		X	X		X	X	X	
							X				IS Manager	X					X	X	X	
								X			CE of OCIS	X					X	X		
										RESOLUTION (ACTIVITIES)										
										UNITS					FUNCTIONS					
Finance	Admin	Service Dept.	Info. Centre	User Svcs. U.	Tech. Support	DP (OP) Unit	Applic. Unit	IS Dept	OCIS	Mgl.	Admin / Fin.	Personnel	Acquisition	Development	Maintenance	User Services	Planning	Research	Monitoring	Evaluation
				X				X	X	1	PROCESS INFO	X	X		X	X	X	X	X	X
				X						2	Analyse Reqt.				X		X	X	X	
				X						3	Estab. Reqt.				X		X	X		
				X						3	Specify Reqt.				X					
					X	X	X			2	Develop Info.	X	X	X						
				X		X				3	Identify Source	X				X				
					X					3	Gather Info.		X							
						X				3	Dev. Applic.			X						
						X				3	Test Applic.									X
				X				X		2	Use Info.	X				X				
				X						3	Access					X	X			
				X						3	Manipulate	X								
				X	X			X	X	1	MANAGE INFO.	X			X				X	
					X					2	Integ tools				X					
				X	X					2	Monitor info.	X							X	
					X					2	Update info.				X					
					X					2	Maint. info.				X					
		X						X	X	1	HANDLE RESOURCES	X	X	X	X	X	X		X	X
X	X				X					2	Acquire	X	X	X						
X	X				X					2	Update	X	X		X					
X	X				X					2	Maintain				X					
					X	X	X			1	FACILITATE COMM.	X			X	X	X		X	X
						X				2	Research							X		
					X		X			2	Organize Debate						X	X	X	
				X	X		X			2	Dev. Mgt. Centre				X	X	X			

Table 7-2 Resolution Discretion Distribution Matrix : OCIS

equipment. The user service unit and information centre, however, report to both the IS and services managers.

(3) INFORMATION SYSTEMS ANALYSIS

With the activity models mapped out, an analysis and review of the IS can be made by using another type of Maltese cross (Wilson 1984):- a device to display information requirements against actual information provision in a matrix format. In cybernetic terms, it is a tool to enable the management of complexity. The relevance of the tool is that it facilitates communication when used in debates and provides a structured presentation of the working of OCIS. To facilitate the application of the matrix, I will explain the transformation process from information categories (ICs) into data models useful for the purpose of OCIS analysis, followed by an illustration of the use of the matrix.

Using the model of OIS at the first level of resolution (Figure 7-9), a root definition for each of the four sub-systems (activities) is derived. Each of these models are expanded further at the second level of resolution producing its own set of activities (as in Figure 7-10 where the activity "process information" is expanded). One may produce other models at higher resolution levels with higher levels of details of information. As an illustration of the process I will consider the activity "process information" model with the activities: analysing information requirement, developing information, and using information. From these activities the input ICs are derived followed by identifying the activities that generate these ICs as output. This is done by taking each activity in turn and identifying its input and output, just like any

transformation process (Table 7-3). An IC can be defined as "the family name" for a particular data set, i.e. the lowest resolution level description of a set. An IC can be defined through the derivation of a data model for each of the categories. Figures 7-12 and 7-13 illustrate the process of transforming an IC into a data model by using the categories "MPS raw data" and "user requirement information" as the examples. The necessity to use this model is to support the aggregated level of information provided in the Maltese cross. The data model is the device which translates information (derived on the basis of its use) to data (which is provided as the output of the data processing network). The next stage is to construct the top half of the Maltese cross.

The basic components of a Maltese cross are OCIS activities, input, output, and information processing procedures (IPP). The activities (north axis) are taken from the "processing information" activity model in

INPUT	ACTIVITIES	OUTPUT
User requirement info Existing information Info acquisition policy	Analyse information requirement	Requirement analysis Acquisition decision
Requirement analysis MPS raw data MPS listing Acquisition decision MPS performance info Existing information	Develop information	Validated MPS info Rejected information
Validated MPS applic Real-time reports, etc. User queries Ministries information	Use information	User action User requirement decision MPS actions MPS executive reports

Table 7-3 Information Categories for "Process Information"

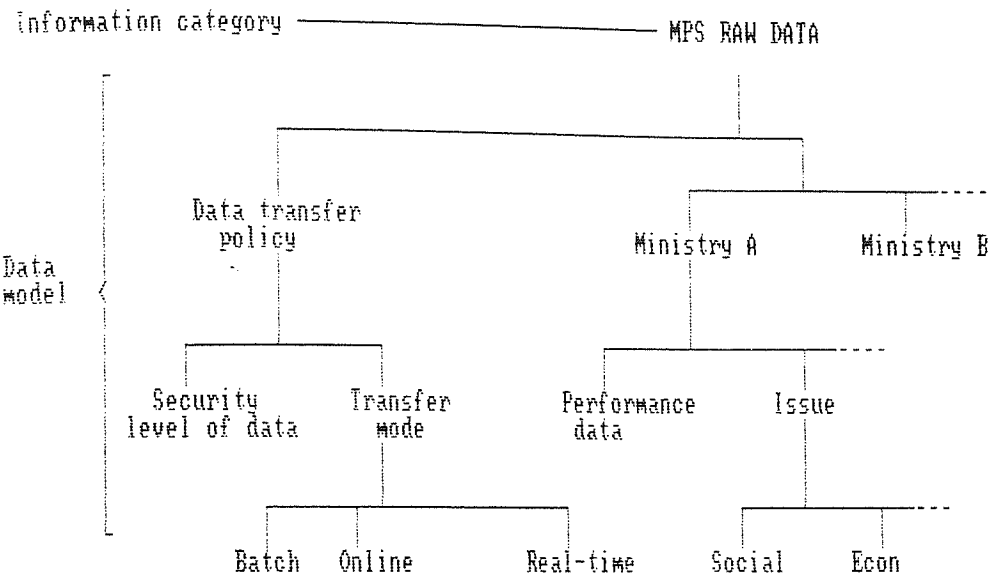


Figure 7-12 Information Category and Data Model for "MPS Raw Data"

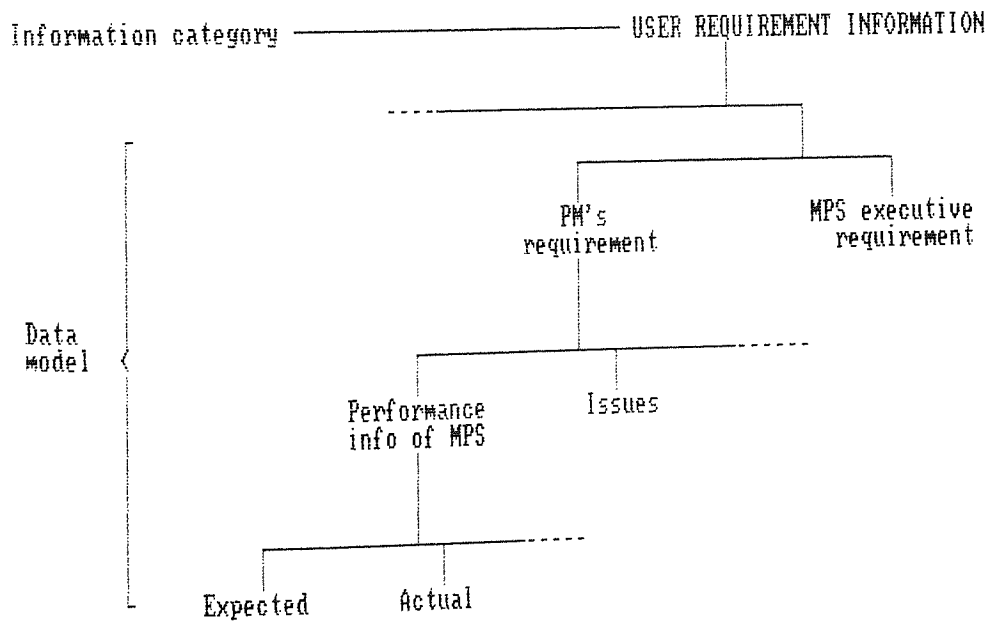


Figure 7-13 Information Category and Data Model for "User Requirement Information"

Figure 7-10. The input (east axis) and output (west axis) are the ICs as outlined in Table 7-3. The IPP (south axis) is a listing of the procedures and represents the state of the information processing network prior to the review. They are in simple terms manual or computer-based procedures which are necessary to transform an input into an output of each activity. Examples of IPP are information systems. Our concern in using the Maltese cross is to develop an approach relevant to the conceptual process leading to a specification of "what" information systems need to be designed. In illustrating the working of the Maltese cross, the activity model "process information" (Table 7-4) is used, with a cross "X" indicating the intersection point of two variables.

In the top half, the activity "use information" requires the input "validated MPS applications", "user queries", etc to produce "PM's decision requirements" and "MPS executive reports". We can also observe from the bottom half that it takes an IPP "applications development programme" to process the input "MPS raw data" into "validated MPS applications". In simple terms, the activities are carried out with the support of IPPs. The activity's output also provides timely data as input to other IPPs for facilitating other activities. The Maltese cross is completed by filling in all the Xs in the north-western and north-eastern matrices to give a complete picture of the activities and the activity-to-activity information flows. For the remaining south-western and south-eastern matrices, a picture is obtained of all the IPPs used to transform data into information.

7.5.4.2 REGULATORY LOOPS MODELLING

Regulatory loops modelling enables the analysis or description of relevant relationships involving the PM and MPS and supports the task of OCIS design. The emphasis is on the overall design of variety operators (VOs) - namely amplifiers and attenuators. In using the model, we can: identify which VOs to use; design the necessary VOs; allocate where the VOs are needed to close the loops; and integrate different VOs for enhancing the links between the PM and MPS. These VOs are really what the design of OCIS is all about. They constitute OCIS structures, relationships among components, and managerial tools (or products) required by OCIS.

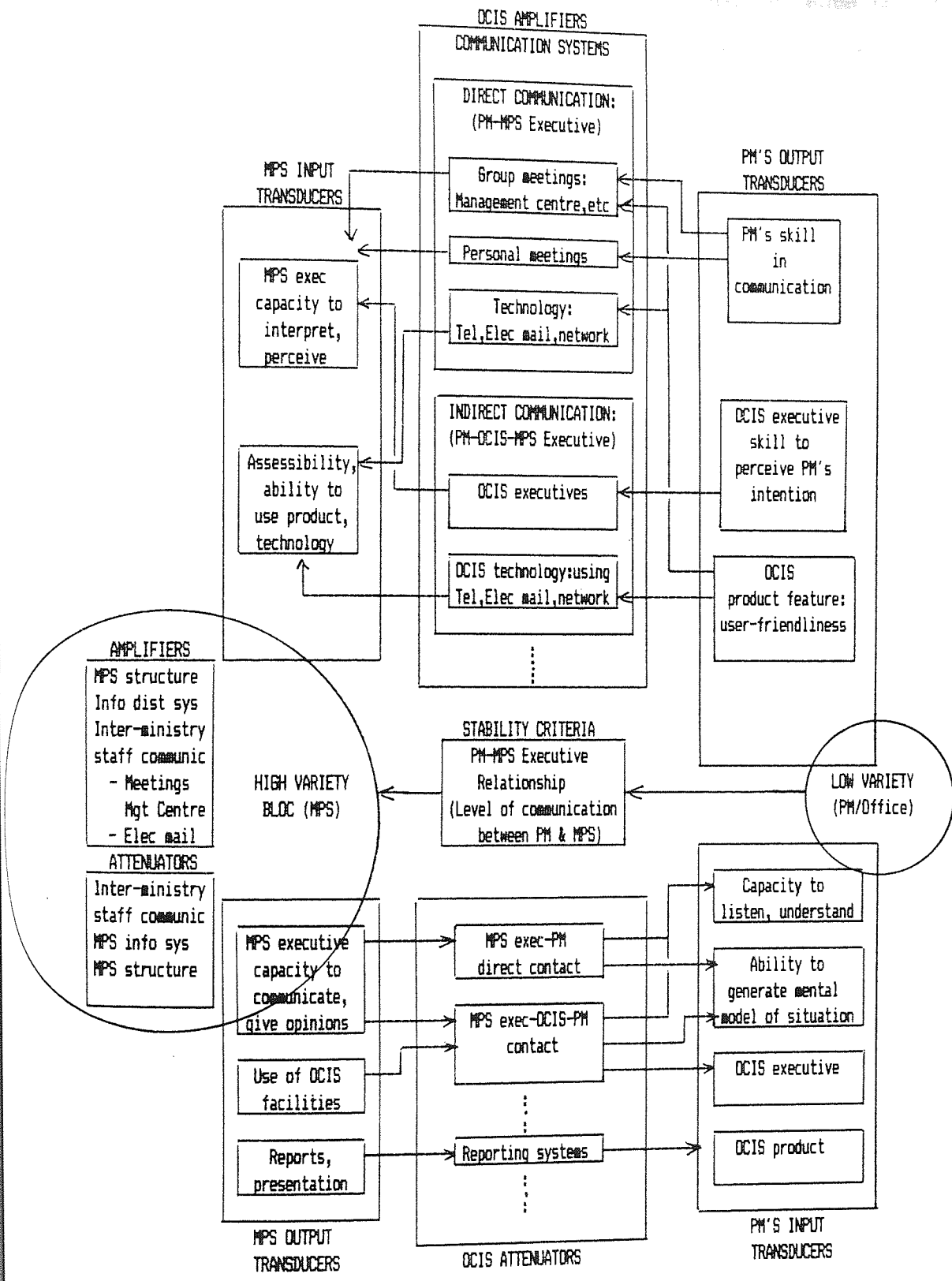
The idea is to have a variety balance between participants in a debate - in this case between the PM and MPS, or between the PM and the MPS management team. The PM will set, from his viewpoint, stability criteria, a mechanism to detect any significant change anywhere in the system. The PM, using a monitoring system provided by OCIS, will monitor an array of different variables. A report will be produced by the system on any that seem to be changing. Management tools such as Cyberfilter (see technical notes in Appendix 6.2) is a DSS which uses the stability criteria in providing a measurement system. Various variety operation channels and transducers are designed to complete and make effective these relationships. The basic conception of the mechanism is described in Chapter Two (2.2.4.3) using the layout as in Figure 2-11. By conforming to the models in Figure 7-7 for the basic design strategies and Figure 7-8 for the necessary basic components, the modelling of regulatory loops is possible.

Figure 7-14 is an illustration of the use of the regulatory mechanism for the transformation "PM's management of MPS (communication process)". I will be illustrating the use of certain tools in this example. However, a more in-depth study is carried out in the section "components modelling".

In the model, the variety balancing is between the PM (low variety bloc) and the MPS (higher variety bloc). The stability criteria identified are: PM-MPS executives inter-personal relationship (for communication strategy).

The PM, in managing MPS, needs to amplify his intention to the personnel of MPS who are actually carrying out the task of MPS. He needs to have good communication skills to amplify this intention. At the same time he has a certain perception of MPS, or ascribes a certain role of MPS as seen from his intentions which need to have ways to represent his mental models. In these respects, the output transducers act as his effectual communication capacity to stimulate an MPS response. OCIS can improve the PM's action by acting as spokesmen for the PM to communicate with MPS personnel. OCIS also can provide the necessary tools using the available technology, such as the method using related software developed at the University of Bath (Eden et al 1983) which helps managers to explore their own thinking. The idea is to provide the PM with a personal information system to enable him create in his mind the actual MPS situation. The verbal (speeches) or written (memos, letters, notes) actions of the PM will therefore represent a more accurate picture of the PM's mental model.

Next, communication channels are necessary to transfer the PM's translated models to MPS. The amplifiers are variety channels consisting of OCIS



TRANSFORMATION: A communication system to enable the PM's management of MPS.

Figure 7-14 Regulatory Loops: PM's management of MPS (Communication Support)

executives, sub-systems, processes, or products that enhance the PM's communication with MPS personnel. On an individual communication basis, the individual personnel of OCIS may provide such link. As the PM's confidential secretary, the chief executive of OCIS acts as a channel to amplify the PM's action to the executives of MPS. Speaking to the executives on behalf of the PM is a powerful means of relaying the PM's decision. This role is sometimes carried out by the other OCIS personnel. He also initiates personal meetings between the PM and individual executives of MPS.

Group communication, which is a more effective communication tool, is achieved through meetings. The role of OCIS here is to facilitate communication by initiating, organising and conducting meetings and providing the necessary meeting facilities such as the management centre. The use of technology helps in improving interpersonal relationship, thus providing a better PM-MPS executive relationship. Tools such as telephones, intercoms, computer networks and meeting rooms are some of the available technology.

Before any action takes place in MPS, the PM's information passing through the channels is interpreted by MPS executive, which is meant to be understood by the recipient personnel of MPS. MPS input transducers are the capacity of MPS personnel to understand, perceive and accept the PM's decisions and actions. The top executive of a ministry such as the Secretary-general is responsible to translate the PM's intentions to his ministry. He may do this by preparing the ministry's own written documents based on information from the PM. The information from the PM may have been filtered out by OCIS. In this respect, the personnel of

OCIS who translate the PM's intention for use by MPS, also perform the transduction act.

In the MPS, the absorption of variety is occurring all the time. This process reduces the requisite variety within MPS. It includes the internal interactions in MPS such as its formal and informal structures, inter-ministerial communication processes, and inter-personal relationships. However, not all the variety in MPS can be absorbed. While some unabsorbed varieties involve situations/states that are irrelevant to the PM, some of them are relevant but dealt with within MPS itself. Those states that are relevant but not absorbed within MPS are what is referred to as "residual variety" (Espejo 1986). They need to be absorbed if MPS is to remain viable. An improvement of organisational structures and conversations within MPS is therefore meant to support this process. In general, the absorption of variety in MPS will attenuate the overall MPS situation in relation to the PM, thus implying reducing the PM's problem of managing complexity (i.e. MPS).

The outcome of MPS action is then presented in a model that can be understood by the PM. Again, output transducers are needed, without which there will be a communication breakdown due to the PM's lack of understanding of the MPS situation. Thus, MPS executives may for instance produce reports that attenuate MPS situations. The reports need to use a combination of statistical figures, graphics, or other models to make them more meaningful and at the same time consist of an accurate representation of the actual events. The use of appropriate tools is beneficial to enhance executive communication capacity to stimulate the PM's response. OCIS can provide such communication tools using the available technology

which helps managers to explore their own thinking. The idea is to incorporate the system used by the PM with that of other top executives.

Communication channels are also needed to filter information from MPS to the PM. They are attenuators to facilitate PM-MPS relationships by having channels that provide for personal and group communications. Most of the amplifiers mentioned earlier also act as attenuators at the same time. The implication here is the use of these tools as a two-way link which is indeed the primary requirement for any communication system.

Finally, the PM's input transducers are necessary to convert the information provided through the communication channels into PM's action. They include, for example, his listening capacity, understanding and perception of a situation, reading of reports, and most important, the people directly in contact with him (i.e. OCIS executives).

It can be observed that the role of OCIS is as VOs (attenuators and amplifiers) and transducers which facilitate the organisational conversation. In the former, OCIS provides the people, processes and facilities to undertake the PM's action and transfer information, and vice versa. As transducers, OCIS interpret or facilitate the PM's action and information for MPS, and vice versa from MPS to the PM.

7.5.4.3 COMPONENTS MODELLING

A components model is for the purpose of identifying the necessary VOs of OCIS. The model is derived from the conceptual models in Figures 7-7 and 7-8. The use of a regulatory mechanism as illustrated earlier supports

the process of identifying these components. The models identified are treated according to the strategic classifications of structural, conversational and management considerations. The processes involved in this modelling are: identifying the necessary components for each of these strategies, allocating the components according to the strategies named above, and finally integrating them. The following discussions deal with each of the three strategies.

(1). ORGANISATION STRUCTURE

Obviously the PM, in managing his tasks, needs both MPS and PMO structures - the MPS structure to formulate plans and implement the government policies, and the PMO to act as a VO between him and MPS thereby supporting the PM's management of MPS. In Chapter Six, the methodological study on MPS infers the need for a structural VO to support the PM. The study illustrates a number of adjustments made to MPS. For OCIS, a design of its structure - units, processes, activities, task allocation, and procedures - is required.

The purpose of a structural design is to have enough flexibility to support the conversational and managerial strategies. As an information support office, it is proposed that OCIS organisational units operate within a matrix structure. The idea here is to facilitate implementation of tasks through better integration. For example, in the development of information applications, a Systems Analyst is able to carry on developing applications for the PM by reporting to an Applications Development Manager (or any other analysts taking charge of the applications development project). This is despite the fact that he is reporting to a

functional head of administration for matters relating to services, training and staff requisition.

The relationship with the administrative head is a continuing one, while the relationship with the Project Manager is likely to be transient depending on the duration of the project or the particular need for the analyst's services. He may, in another project, report to the Communications Manager where his expertise is required to develop, say, a computer network. Under the present organisational climate, however problematic a matrix form of organisation may be, such structure is very useful for projects to be managed with an assured level of success.

Another important structural aspect is to have more lateral relations in OCIS. Project teams are instances where lateral relations encourage more direct inter-personal contact, thereby permitting OCIS to process more information without overloading hierarchical communication channels. The management team is to be formed as a critical part of the lateral management necessary to provide better inter-personal relationships. Here, the PM has the opportunity to engage in discussions with planners, researchers, and other top ministerial managers.

Processes, comprising of activities, tasks and procedures are to be moulded to satisfy this modified structure. It is important that, as VOs, processes provide the links between the PM and MPS executives, while within OCIS, they are well linked with each other. With these design considerations, the processes should relieve overloads by moving decisions from high in the hierarchy to lower levels. That is why the discussion on organisational conversation (in the next part) is so vital and is very

much related to structural design.

Activities of OCIS indicate an emphasis on the identity of OCIS as an information office of the PM providing effective communications. Activities allocated to units and roles are called tasks which are typically found in an employee's duty list. The recursive discretion distribution matrix in Table 7-2 provides the necessary illustration of the relationships between the activities, units, functions and roles in OCIS.

Procedures are guidelines to support individuals and units in executing tasks and activities in a coordinated way. Besides coordination, it also supports planning, integration and monitoring (Table 7-5). As VOs, they are designed as action amplifiers for carrying out specified tasks and as filters to the tasks' complexity. Work procedure, for instance, is a documentation to provide information on the organisation, task description, and methods to perform the task and is therefore an attenuator of task complexity. Desk files, kept and maintained by each individual, are documentation tools that contain an employee's duty list, departmental work procedures, organisational objectives, targets and so forth, all of which help an individual in performing his role in the organisation according to the overall mission of MPS.

Other possible procedures are office work procedures, a text preparation system (which includes PM's speech preparation), and reporting procedures, all of which are integrated in the desk file system. In computerising, the procedures further enhance the action amplification of tasks. They are accessible by individuals through PCs which improve the job of filing.

Procedures Functions	Work proced	Meetings preparation	Visit Sched	Text prep	Reporting system
PLANNING		X			
COORDINATION	X	X	X	X	X
MONITORING					X
INTEGRATION		X			

Table 7-5 Procedure-Functions Table

storage, retrieval and processing of procedural information.

(2). CONVERSATIONAL TOOLS

Organisational conversations relate to the interactions between the PM and MPS, and the relationships among the components of OCIS. The basic tools for conversations are communications and information distribution systems. The contents of Table 7-6 illustrates the basic processes for inter-personal relationships between the PM and MPS executives with some examples on the products and equipments used to carry out the processes.

In order to support organisational conversation IT products and equipments in the shape of office, computers, and telecommunication tools are necessary. The table will show some selected examples for these communication systems. The possession of these products is not enough - their usage has to be integrated.

COMMUNICATION TYPES	VARIETY OPERATORS	
	PROCESSES (SUB-SYSTEMS)	PEOPLE PRODUCT/EQUIPMENTS
Individual communication	<p>PM-MPS executive direct personal contact</p> <ul style="list-style-type: none"> - Appointment system to facilitate PM's personal meeting - Preparation of personal meeting (agenda, issue) <p>PM-MPS executive indirect personal contact</p> <ul style="list-style-type: none"> - System to handle voice/electronic communication <p>PM-OCIS-MPS executive</p> <ul style="list-style-type: none"> - Reporting system - File handling system 	<p>Display, documents</p> <p>Voice messaging product (telephone, enhanced tel)</p> <p>Comp hardwares, softwares</p> <ul style="list-style-type: none"> - Elec mail sys (PROFS) <p>Service staff, comp pers</p> <p>Reports (written, briefing)</p> <p>OCIS executives</p> <p>Voice messaging products</p> <p>Elec messaging products</p> <p>Communications personnel</p> <p>Text processing, voice/electronic mssg products</p> <p>OCIS exec (on PM's behalf)</p> <p>Elec mail products</p> <p>Files, documents</p>
Group communication	<p>PM-MPS executive face-to-face meetings</p> <ul style="list-style-type: none"> - Meeting facilitating process - Meeting preparation - Meeting process <p>PM-MPS executive remote conferencing</p>	<p>Management Centre (as a forum for debates)</p> <p>Voice/elec message products</p> <p>Text processing tools</p> <p>OCIS exec (Info manager)</p> <p>Software: Databases/Queries (SQL/INTELLECT, STAIRS, Cyberfilter, Videotex)</p> <p>Hardware: PCs, keyboards, displays, boardnoter)</p> <p>Info manager, analyst</p> <p>Teleconferencing products</p> <p>Telecommunication personnel</p>

Table 7-6 OCIS: Communication Systems for MPS Conversations

The main design however is with respect to the communication processes as amplifiers/attenuators to link the PM-MPS. The communication system strives at enhancing inter-personal contact between relevant people involved with OCIS, i.e. the PM as primary user, the executives of MPS as secondary users, the OCIS personnel who are involved in the internal processes of OCIS, the analysts (both in OCIS and MPS) who develop applications directly and indirectly for OCIS. From the table, the communication processes between the PM and MPS executives are on either an individual or on a group basis. For individual communication, the links are either PM-MPS executive or PM-OCIS-MPS executive. The PM-MPS executive link means the PM's ability to communicate face-to-face with MPS executives or indirectly by making telephone calls.

In both cases, OCIS acts as a variety operator by making the necessary arrangements for the PM's personal appointments and phone calls. OCIS may amplify the situation by advising the executive about the PM's intention for the meeting. OCIS may provide a write-up of the necessary information requirements by the PM. As an attenuator, OCIS will provide the PM with information relating to the matter to be discussed, by producing a summary report with the necessary figures and diagrams. In the PM-OCIS-MPS executive link, OCIS acts as the spokesman for the PM. In this type of communication, the role of OCIS is not only to provide the channels for amplification and filtration, but to act as a transducer. The processes of filing and handling of input-output documents provide the necessary channels. So are the personnel of OCIS who have the capacity to communicate with the PM and MPS executives. As transducers, OCIS interprets the PM's action and intention. It also presents to the PM reports from MPS in a way that the PM can understand.

Other relationships, such as among OCIS personnel, may be facilitated with lateral relations - direct contact, liaison roles, task forces and teams. While a lot of initiative is needed for individual communications, the creation of small discussion groups and project teams facilitate lateral communication for groups. Managers have to encourage such contact. For an employee and his immediate boss, a reporting process ensures the necessary link. Inter-personal contact may be elevated through the use of variety operators (VOs) - liaison personnel, informer, and message-server. These people acting as VOs are the secretaries, personal assistants, notice servers, office assistants, or any other employees. Indirect communication using IT is fast increasing in popularity, where electronic message systems are used to complement traditional voice telephones and the enhanced telephony system. With electronic messaging, the PM has the ability to communicate with more than one MPS executive at once. A number of copies of messages may be transmitted a single time. The coordination feature here is therefore a plus factor. For instance, the use of PROFS enable links between the PM and relevant executives in MPS.

Group communication is normally held through conferences or meetings. The role of OCIS as a variety operator is to provide a channel to link the PM with a group of MPS executives by providing a forum to facilitate debates and discussions. Various options are available today in the form of face-to-face or remote meetings. In the traditional sense, a normal meeting room using manual facilities such as notes, minutes of meetings and blackboards may provide the communication. However, newer forms of meetings as provided by the availability of technology may improve the communication aspect, thus making the meeting more productive.

Electronic meeting rooms (e.g. COLAB) and the Management Centre (MC) are among the technology-based meeting rooms having the basic aim of providing formal channels for inter-personal communications in group problem-solving and decision-making processes. Unlike the traditional meeting concept, they provide both direct and indirect interpersonal contact. Electronic meetings are in the form of audio-video, audio only, audio plus papers, or computer mediated systems. The application of electronic messaging facilities for distributed computerised conferencing enables remote meetings to be held between the PM and MPS executives at unscheduled times. For OCIS, the MC, with these added remote conferencing facilities, is recommended.

Another form of communication is between man and computer, which requires a system (normally referred to as man-machine interface) that improves information flows from the machine to the man and commands from the man to the machine. Cybernetically, this interface implies a transduction process which improves the users' application of a certain technology (such as electronic mailing system), and thereby further enhance personal and organisational communication systems. In the development of applications, the growth in "intelligent knowledge-based systems" (IKBS) makes it possible to apply AI and ES to OS practices. Tools such as Viplan have been planned to provide expert knowledge for managers. However, the implications of such developments remain to be seen, as their development is in its early days.

An overall computer network for the MPS is designed to make feasible the communication types as described above. It is a technology-based variety operator which improves the inter-personal relationships between different

individual and organisations using OCIS facilities. This implies a better integration and use of the different products and systems in OCIS through a computer network architecture, thus enhancing the communication processes for OCIS. Figure 7-15 depicts a possible networking system for OCIS. In linking different systems, two issues are to be considered - managerial and technical.

The managerial issue is related to the benefit of such links, as reflected by the information-sharing among top MPS executives. An information interchange helps the usage and manipulation of information in both local IS in ministries and parent IS in OCIS. It therefore implies an effective inter-usability of both OCIS and ministerial MCs. The fostering of communication between MPS executives and the PM in the network, through office applications, will expedite this flow of information.

The technical issues of portability, adaptability and compatability may hinder communication between systems. Compatibility, which is the most crucial of the three, implies the capability of software and hardware of operating or existing in harmony. With different machine types and the variety of software in today's IS environment, better coordination and integration of systems are required. Compatibility enables free movement of products between different machines and softwares. As an illustration, compatible systems within MPS enable easy downloading or uploading of information (including documents, texts, graphs, maps, and others) between ministries and OCIS. The use of the electronic meeting-room concept needs such compatibility in communications. Another form of link is between various software components. An integration system is needed to connect

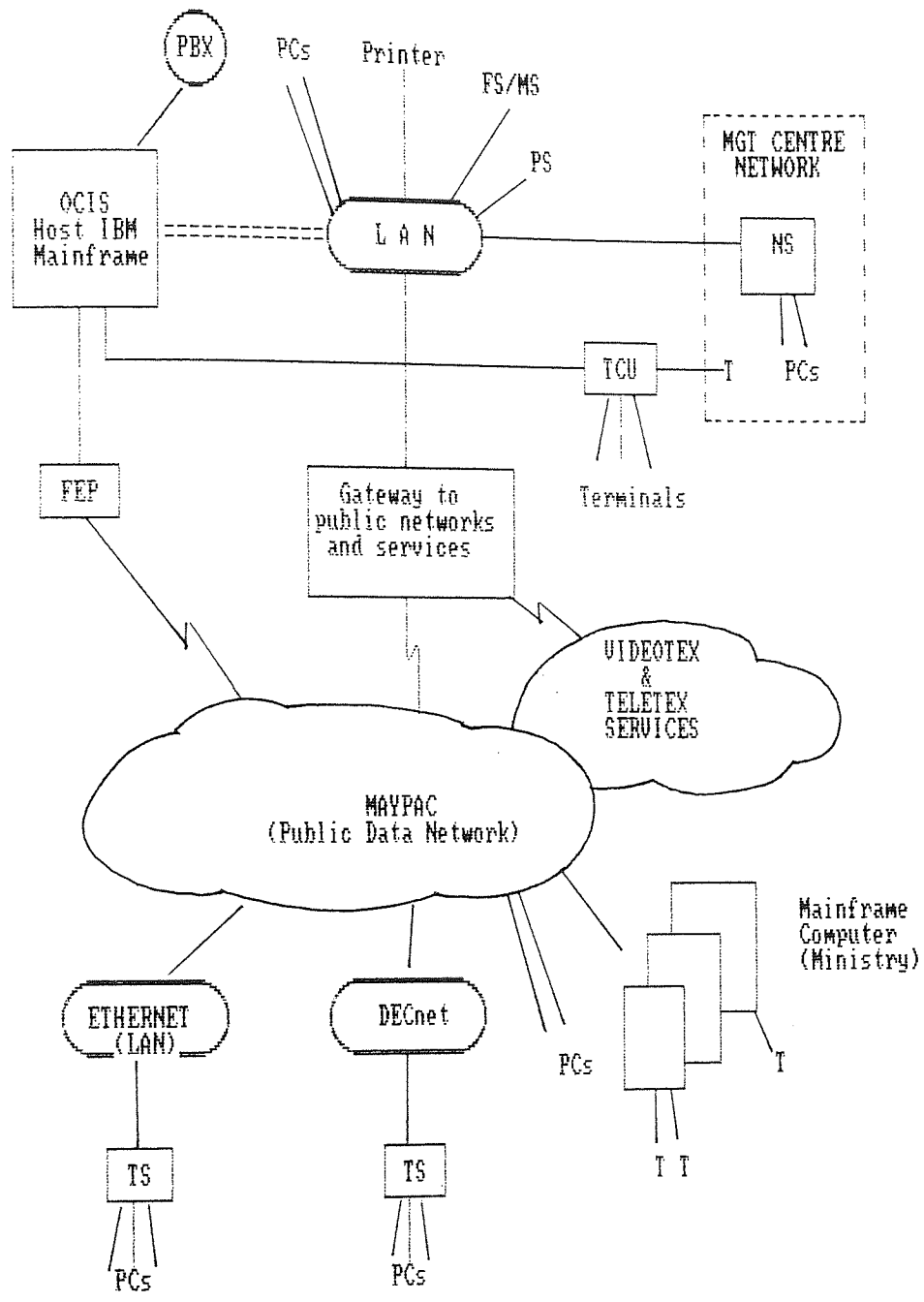


Figure 7-15 OCIS Computer Systems Network

Legend:

- ETHERNET PC network
- FEP Front End Processor
- FS/MS File Server/Mail Server
- LAN Local Area Network
- NS Network Server
- PBX Private Branch Exchange
- PC Personal Computer
- PS Printer Server
- TCU Terminal Control Unit
- TS Terminal Server

- Remote Link
- Local Link

(Note: For explanations on technical terms refer Appendix 6.2)

various softwares in the network.

Information distribution systems (IDS) are tools to support the transmission of information between the PM and MPS executives, and among the executives. The types, processes and related products for information distribution are shown in Table 7-7. OCIS, as the variety operator, has to provide the channels for amplification/attenuation and the transducers in the movement of information from the PM to MPS and vice versa. The processes involve the actual transmission, storage and other use of information.

In transmitting information to MPS, a number of amplification processes are carried out by OCIS. For example, upon receiving a verbal request by the PM, an OCIS executive may perceive and transcribe the request into a report in a more structured way. Here, the information undergoes transduction and amplification. The report document is then carried through to the destination through the mailing system either by personal delivery or post (amplification channel). Another example is using a technological product such as PROFS to transmit information. PROFS, for instance, provides facilities for reporting, document transferring and filings. So, we have a tool to improve the transmission of information, where information is transferred much faster. Information may be presented on the screen and in printed material (if printers are available). On the other hand, reports and documents from MPS needing the PM's action also go through OCIS. The same products above may permit the preparation of reports, and transferring of reports, and transferring of reports in many forms. The presentation may be filtered information in the form of structured reports using meaningful graphs, figures or models.

INFORMATION DISTRIBUTION TYPES	VARIETY OPERATORS	
	INFO DISTRIBUTION PROCESSES/SYSTEMS	PEOPLE PRODUCT/EQUIPMENT
Transmitting information	Message distribution sys (direct person-to-person)	Voice information (telephone, radio), others (TV)
	Message distribution sys (info dist using media)	Elec mails (PROFS), advanced voice store/forward (intelligent answering service eqpt using telephone/terminal, personnel (secretaries, operators, etc)
	Document distribution system	Letters, documents, printers, facsimile, clerical staff, postal services, printing media (govt printers, newspapers)
Storing information	Filing sys - manual - automated	Paper files Elec mail products (PROFS) Computer hardware/PCs Filing clerks, secretaries, computer personnel
Other support	Reproducing information	Photocopier/intelligent copier, Printers

Table 7-7 OCIS: Information Distribution Systems for MPS Conversations

Apart from communication and information distribution aspects of variety operations, the use of products and equipments is also relevant as supporting tools.

As variety operators, these tools will be effective if their usage by executives results in better communication and information flow. A networked OCIS which integrates various software tools will provide the PM and other MPS executive users with easy access to information, thereby

filtering the highly complex MPS information. A network of MPS electronic mail systems allows both amplification and attenuation through better communication among personnel. For instance, the system provides the facilities to query databases and distribute information using the file transfer facilities.

More importantly, the executive information system relevant to the PM's use helps to attenuate the information for the PM. Information is kept in a PC-system linked through OCIS LAN or inter-ministerial LANs. Some of the mainframe conversational tools (Appendix 6.1) used for these purposes are INTELLECT for information retrieval, PROFS for messaging, OBE for integrated use of databases and electronic mail, and VMAS for user-friendly integrated development and retrieval tools.

As for PCs, Viplan, Coordinator, Cyberfilter, and many more (see Appendix 6.2) are useful tools for OCIS. What the design is supposed to permit is to make transparent to the user not only the use of different softwares, but the integration of PC with mainframe products. Bear in mind that well linked products encourage users to use the system and therefore infer good communication. A number of such products like VM PC, Paradox SQL, MacMainframeII, TAC and many others have emerged in the market (Appendix 6.3).

Another aspect of communication is coordination. Coordination systems facilitate better working relationships between different agencies in carrying out MPS activities. They are attenuators to MPS complexity. Each of the ministries and their respective departments, divisions and units need to build organisational models at different levels of

recursion, which may be used during coordination and integration debates. IS and OS design guidelines or specifications (where information usage is interchangeable within the MC network) provide such needs. The necessary model to coordinate MPS implementation of policies is a coordination information system (CIS) which incorporates the MPS scheduling system, work procedure documents manual (Manual of Office Procedures and desk files) and communication tools.

(3). Models for the PM

As asserted in our IM strategy, perceptual filters and effectors are required in PM-MPS attenuation and amplification processes. The PM has to have a concept of the MPS in order to have managerial control over it. Such a concept exists in the form of MPS filtration models which are derived from his perceptual objectivity, conceptualisation, logical thought and ability to listen. The models are retrievable by the PM through application systems built in computers or individuals, and, as filters, they improve the PM's lack of information capacity.

The use of these models are supported by the related retrieval systems. The degree of complexity of the retrieval system determines the effectiveness of its use. For instance, a simple menu system requiring one press of a key on the keyboard is a better transducer than a retrieval system where the operation requires a lot of keying action. With the element of simplicity, the PM is more apt in interacting with the system and take the necessary action by making constructive comments and proposals for change. With the models, he can manipulate the information provided. This is possible if models are designed for the purpose of

attenuating MPS complexity rather than to overload the PM with as much information as possible.

Normally, apart from determining the type of information required, it is also important to improve the presentation of the information. Models can be portrayed in textual or non-textual (graphs, flowcharts, maps, etc) forms. Textual data are kept in OCIS database, where the types of information retrieved are text information systems from MPS and OCIS data, statistical reports, research reports, status reports (as economic reports), information analyses, etc. Non-textual models are kept in a model base system, which consists of simulation models, VSM, activity flowcharts, and so forth.

As an example, based on the MPS methodological study in the earlier chapter, I will classify MPS models into two classes: structure and situation. Structural models concern the existing MPS organisation, and use tools like the Viplan database. Other structural models are the VSM of MPS, intelligence models, and resolution discretion distribution matrix (Figure 7-9). Situational models include such things as status models of current national issues, a simulation model of MPS expenditure, and a performance report.

The personnel of OCIS, are transducers and variety operators who handle models for the PM. As transducers, they provide useful models for the PM to manipulate the real world situation of MPS. They provide this by interpreting, verbally or in written reports, the current or forecasted MPS situation to the PM. For example, the process of verbal conversation between the PM and an OCIS executive is in a way similar to the process of

database interactive inquiry by the PM. The mental capacity and perceptual knowledge of an executive is therefore crucial in providing the PM with the desired information.

It is therefore more practical for an executive to be supported by OCIS models during a discussion with the PM. Through accessing the IS models, he is able to interpret or summarise them for the PM's use. The crucial point here is not only when an executive needs to use the models, but how and what he interprets in the event that the PM is unable to perceive the models. So, in either case, an executive acts as the the PM's filter, enabling the PM to transduce a situation.

Another form of model that aids the PM to manage his personal task is referred to as the routine support system (RSS). The RSS, as a basic support tool for the PM, acts as an amplifier that enhances the PM's action. The features here include the handling of PM's diaries (or time management system), directories of files, reminders, and others. For example, the product PROFS provides most of these facilities. Such a system provides a model of his task, helping understanding of its complexity. With the diary scheduling system, future planning can be made enabling him to monitor his task effectively. This tool, apparently, is carried out by the CE of OCIS on his behalf, and acts as an amplifier/filter between the PM and his task.

As an amplifier, OCIS provides MPS with the necessary channels to understand the PM's mental model. This can be done by designing the necessary communication channels in OCIS that provide the necessary models for MPS use. These models are designed after considering the criteria

that may affect the PM's usage and transmission of information --i.e. his effectual capacity. It includes his creativity, diagnostic use of concept, presentation capability, timely response and style. In the final analysis, he expects the commitment of MPS personnel to execute the overall task of MPS (e.g. to formulate and implement national policies). In both cases of PM-MPS filtration/amplification, OCIS personnel play a major role either directly through personal contact, or indirectly through the use of intermediaries such as IS and technological tools.

In conclusion, a final component model of OCIS is deduced (Figure 7-16). Among the proposed models based on the information requirement analysis are the conceptual models, activity models, information requirement analysis (information processing procedures), Management Centre (to be discussed in Chapter Eight) and components model. The various components are integrated to ensure that activities are carried out with maximum benefit. The integration of various OCIS components are as illustrated in Figure 7-17. It models the PM's management of information supported by an integrated OCIS applications. It is a comprehensive way of illustrating:

- a). the use of OCIS by the PM - this is seen by the arrowed lines denoting information flow into and from OCIS. OCIS provides the necessary interfaces (include OCIS executives), structure, and product;
- b). the relationships involving people and processes - the people involved are the users of OCIS including the PM, the MPS executives and OCIS personnel. The PM is related to the processes supported by OCIS executives and other interfaces. The executives of MPS can access the process through their local ministry's system or as part

OFFICE COMMUNICATION AND INFORMATION SYSTEM

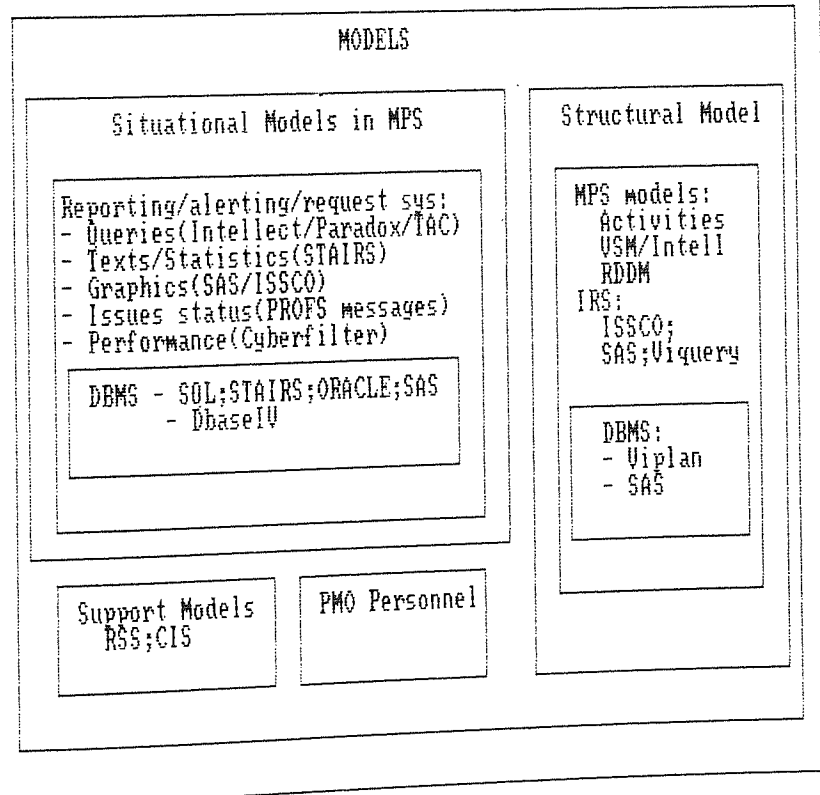
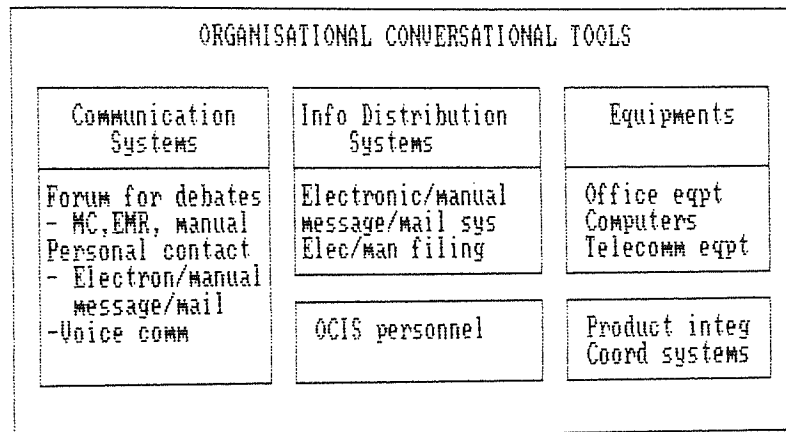
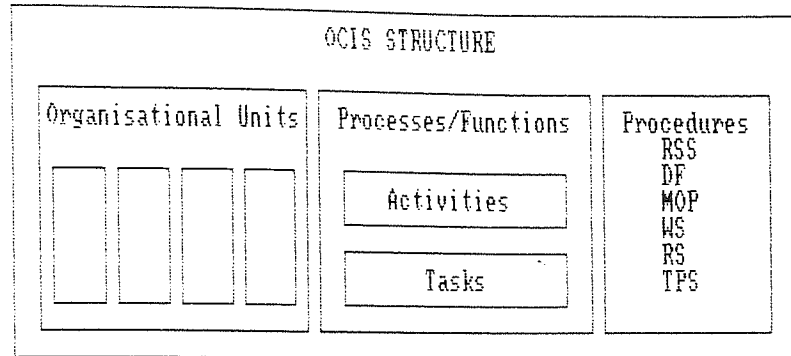


Figure 7-16 Model of "OCIS" Components

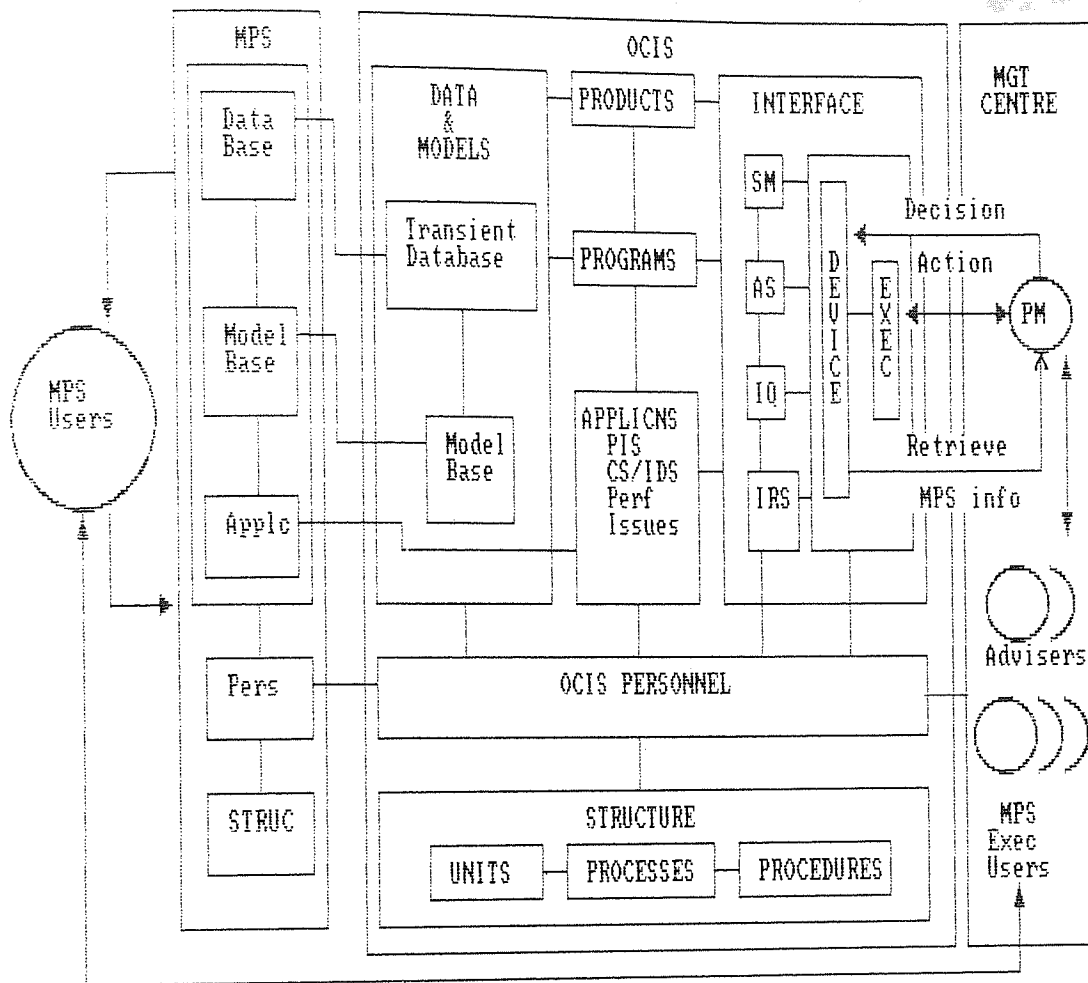


Figure 7-17 Model of PM's Management of MPS:
Integrated OCIS Applications

Legend (for Figures 7-16 and 7-17):

- AS Alert System
- CIS Control Information System
- CS/IDS Communications System/Information Distribution System
- DBMS Data Base Management System
- DF Desk Files
- EMR Electronic Meeting Room
- IO Interactive Query
- IRS Information Retrieval System
- MC Management Centre
- MOP Manual of Office Procedures
- PIS Personal Information System for the PM
- RDDM Resolution Discretion Distribution Matrix
- RS Reporting Systems
- RSS Routine Support System
- SM Selection Menu
- TFS Text Preparation System
- WS Work Schedules

Note: The products named in this model are for the purpose of illustrating their possible integrated use to fit the design of OCIS. Description of products are in Appendices 6.1 and 6.2.

- of the management team using the facilities of the management centre. The personnel of OCIS are the developers and implementors of the processes;
- c). the links between different products and their integration in OCIS - as far as the users are concerned, the complexity of the different products used is transparent. What they access will be an integrated OCIS system;
 - d). the three strategic structural, conversational and managerial tools - these are the amplifiers, attenuators and transducers which include the structure (units, processes and procedures), people, products, interfaces, models, and the management centre; and
 - e). the powerful use of a variety operator (amplifier/attenuator) in the shape of OCIS that supports the PM in performing his tasks.

Basically, the model is made up of the three phases of the research project, involving the studies on: MPS, OCIS, and the PM. The MPS project, which is organisational based, is the methodological study from Chapter Six. The OCIS project, which relates to systems design, is as discussed in this chapter.

Finally, the PM project is about management relationships and the usage of decision tools, and therefore partially related to the Management Centre design (to be discussed in Chapter Eight).

7.5.5 TESTING "OCIS" MODELS

In an action research project, testing is the process of comparing a newly designed system with the existing one. This is done by feeding either

actual or hypothetical data into the designed system. The output is then matched against the output of the old system on the basis of systems performance. For the research, the testing is carried out by comparing OCIS with PMO. But the process of testing its validity is done differently as there is no actual testing of MPS data using OCIS. As an alternative, an academic test will be carried out by comparing the differences in the office syntax/language used in the two systems. This entails the discussion of a new way of developing a methodology for systems design based on the underlying language, using cybernetic principles with new insights. Basically, it is to bring about a new office syntax relevant to the applications of cybernetics. In doing this, the people involved in management cybernetics, and those practitioners in information and office systems need to be convinced of a possible description of an information office in a useful way.

The purpose of this section is therefore: to establish how different is PMO from OCIS; and to consider what kind of changes are required to make it a practical proposition. The key to the difference is not technology, but the interpretations of human and technological reforms in a more effective office. The design methodology, and not the actual design contents, is also crucial. Although the study is a general comparison of design methodologies between cybernetic and other non-cybernetic office applications, the use of PMO may not reflect the generality of the existing situation in office practices. For practicality and manageability in carrying out the research exercise, the comparison is based on OS as practised in PMO. Table 7-8 is used to illustrate such comparison with proposals for improving PMO.

COMPARISON CRITERIA	EXISTING PMO	OCIS
<u>CONCEPTION</u> Definition Interest Views Success factor	A "management service" office using IT in IS/OS to support PM's task/action Trend in IT OS as solution of problem; Technical perspective PM's satisfaction; Usage of IT by PM & exec	An integrated info/office system to support the PM's management of MPS Problem in IM OS as methods/tools for problem-solving; Organisational perspective PM's satisfaction; Interpersonal relationships
<u>FUNCTIONS</u>	PM's task management; Lack functional cohesion	PM's information support; Functional cohesion
<u>MODELS AND METHODOLOGIES</u> <u>Methodologies</u> Primary focus Problem Theories Design strategy <u>Models</u> Types Views Man-machine Syntax	Model focused Towards hard system; Non-systemic Need to automate Technology-based No definite theories Physical design driven based on traditional office function; Information technology	Methodology focused Cybernetic-soft systems; Systemic Problem-solving Management oriented Cybernetics Organisational design driven based on VO needs; Information management Recursive, logical Filter/amplif (variety op) Integrated system Mixed cybernetics and traditional conventions
<u>TOOLS/PRODUCTS</u> Definition Use IT Tools	To convert products IT products Not well integrated IT-emphasis	Tools are variety operators VOs include structure, interaction and IT products Integrated use IT supported

Table 7-8 Comparative Office Models: OCIS and PMO

7.5.5.1 OFFICE CONCEPTION

The definition of the term "office" for PMO may be made from two viewpoints. Firstly, PMO as an organisation, is an office that provides management and services support for the PM to carry out his task. This is PMO's primary role. Secondly, there is a technological office in the organisation to support the above role. Here, IS and OS use integrated computer, communications and office product technologies to support PMO's primary activities. CEIMS, as PMO's information unit, plays a secondary role in providing information systems and office facilities using IT. OCIS, on the other hand, is a system to support the PM's management of MPS. It is an integrated system whose primary activities are to process information.

The OS designed for PMO is based on the trend in the development of IT, and aims at improving the efficiency of PM's daily task management. For OCIS, the development is based on the identification of a problem, i.e. information management. The perceived problem of PMO is to improve the use of IT among executives. A technical solution is preferred to solve the problem, and hence the creation of CEIMS. The implication here is that technology provides a solution to the problem. Hence, the installation of IT devices to the PM and most MPS executives. The social and ethical problems of innovation are less well considered. Too much blame for the ineffectiveness of the system is put on the attitude of the users.

In contrast, OCIS views the problem as the PM's information management

needs. This needs an organisational solution through the design of the communication and control processes of MPS. OCIS provides the variety operations to amplify and attenuate information and communication. The implication here is the integration of both human and technological processes in OCIS development. IT devices, such as PCs and terminals, are therefore only one aspect of the overall process, and are regarded as supportive of the real requirement, which is the users' information needs.

Looking at PMO's situation, there is the separation between the two office views of PMO. The management service office itself is organisational in nature while the OS view is regarded as a purely technical proposition. This inability to integrate organisational performance with the use of technology implies different definitions of purposes. The result is ineffective methodological design of OS and IS applications, thereby an inability to attract management use of the system as envisaged. OCIS, on the other hand, views OS to include organisational as well as relationships and managerial aspects. While PMO conceptualise the OS as a tool to support PMO, OCIS is viewed as a tool to support PM-MPS interactions. For PMO, OS is regarded as a technological tool to solve productivity problem. OCIS, however, is a tool to reduce the PM's managerial problem.

Another contrasting conception is determining critical success. While both PMO and OCIS consider the PM's satisfaction as the vital success factor, there are differences as well. For PMO, due to the technological emphasis on information and office support, the success is based on the PM's usage of the system, such as the frequency of accessing CEIMS models and texts. In the case of OCIS, the essence is relationship - i.e.

inter-personal relationships among the personnel of MPS and OCIS, especially between the PM and MPS executives. The success factors are stability and adaptation which can be achieved through the design of variety operators - i.e. mechanisms to facilitate communication and information distribution. The communication and information tools improve inter-personal relationships. The availability of information, on the other hand, provides the PM with the ability to control the situation he is managing.

The main reason for the different conceptions of "office" is with respect to the basic notion of "system". As already mentioned, this research is based on a systemic or holistic thinking, and therefore emphasises organisational problems and relationships. Technology is a necessary tool, but only to support the human and organisational processes. The best possible way to change the existing PMO is by absorbing the concept of systems approach and soft systems thinking among the existing personnel, especially the managers in PMO.

7.5.5.2 FUNCTIONAL COMPARISON

The objective of PMO is to provide efficient, systematic and speedy office management services in running the affairs of the PM. In doing so, the necessary functions are office management and administration (filing, finance, services, personnel, security), processing (information - text preparation, media coverage), coordination and liaison (among various organisation in MPS relating to PM's tasks), and research. As a result, the functional units forming the PMO structure are Administration/Finance, Special Functions (PM's speeches and texts), Press/Media, and Information

Services Units. The emphasis is on the Administrative, Special Functions and Press Units.

The role of the Information Unit (CEIMS) is secondary. The unit is viewed as another DP part of the office which merely provides the service function as and when required. The DP functions attributed to CEIMS are acquisition, development, maintenance, monitoring, and user service. Due to the increasing demand for an improved information support for the PM, information processing in PMO is becoming more crucial to PMO. The DP role of the unit is being extended. However, because of the inability of management and designers to cohere the aspects of organisational and technical design, the role of information processing remains secondary. Only its technical aspect is being improved with time. The crucial aspect here is the clearcut separation of organisational and technical functions, i.e. lack of functional cohesion and integration.

OCIS, on the other hand, recognises that the organisational functions are basically related to its information and communication support to improve the PM's IM capacity. Other than administration and personnel, which are secondary functions of OCIS, the overall information processing functions include management, acquisition, development, maintenance, user services, planning, research, monitoring, and evaluation. These primary functions are systemically part of OCIS organisational functions and regarded as part of the main system. For instance, monitoring is carried out at all levels of OCIS. At the top level, the management team (using the management centre), monitors the overall MPS progress. At the lower level, a technical monitoring may be carried out by analysts or other technical personnels. The key here is the occurrence of functional

cohesion where there is a decomposition of OCIS into subsystems.

The issue of functional cohesion may be improved through elevating the information processing role of CEIMS in PMO. CEIMS, in its design approach, has to consider the organisational aspect, especially the decomposition of PMO and the MPS mission as perceived by the PM. This will attract more executive involvement in planning, development and evaluating the system. More involvement by executives is possible through providing better communication facilities and IS.

7.5.5.3 MODELS AND METHODOLOGIES

Methodologically, it is difficult to make a definite comparison. However, a methodological comparison is useful in order to carry out the design in both systematic and systemic ways. A methodology necessitates the study of problems related to an organisation. The design of CEIMS to support PMO is based on the need to build models based on specified application needs. The design of OCIS, as this research suggests, is based on a problem-solving methodology. Generally, however, PMO is model focused while OCIS is methodology focused.

The methodology to design CEIMS is basically dependent on the requirements of the users and the urgency to develop an application. These criteria are determined respectively by the MPS executives and the head of CEIMS, with the CSG having the final say. But basically, most of the approaches taken are inclined towards a hard system methodology, and non-systemic in nature. The designer takes the problem for granted and as specified by users without studying the problem which necessitates the

design in the first place. On the other hand, OCIS adopts a systemic approach which is the characteristic of the cybernetic/soft systems methodology that it uses.

While the development of PMO is the result of changing circumstances, the development of OCIS is based on the occurrence of a problem. The development and growth of PMO starts with a manual system of supporting the PM in performing his task. This manual system of scheduling, planning, organising, and coordinating the PM's tasks is replaced by a computerised system. Under the new system, facilities such as diary management, electronic mail/messaging, and other office tasks are handled electronically. The information support facilities are also integrated into the system at the same time.

With OCIS, its development is due to the emerging managerial problem in handling the complexity of information in the real world, i.e. the problem situation involving the PM's IM needs in relations to MPS, the organisation he is managing. Not only does he need to handle MPS overall task (of providing service to the population), but he has to manage his personal managerial task (such as the preparation of speech, meeting different people, and presiding at meetings).

There is no specific use of theories in the design of PMO. It is based on the practical experiences of analysts and whatever current trend in the IT market. A major setback here is the strong influence IT vendors have in PMO especially in the purchase and use of IT products. For OCIS, the theories used are cybernetic. The design of an OS in PMO is merely as a follow-up to the existing DP and MIS developments. In fact, PMO's CEIMS

design strategy is based on the technological rather than the organisational needs of PMO. In most cases it is a matter of conversion from manual to automated systems with the help of available office technology.

The main difference is in the design strategies. OCIS's main strategy is based on the notion of variety operators (amplifiers/attenuators). Here, OCIS is regarded as a VARIETY OPERATOR (VO) supporting the PM. Having recognised this need, the three strategies encompassed in an information management framework are organisational structure, organisational conversation, and manager-to-tasks fit.

The conclusion that can be drawn from the highlighted methodological differences, is the over-emphasis of technology in PMO. One way of improving existing conditions, is to put more emphasis to human-technological design. Technology, although still useful, now plays a supportive role. In the long run, the recommendation is for the use of a proper systems methodology in design. The use of a cybernetic framework will encourage the design of filters and amplifiers pertaining to organisational structure, relationships and managerial capacity. The integration of these three variables are critical to form a balanced system.

Models in PMO are of two types. They are either models built by CEIMS which includes text, graphic and chart displays, or the traditional manually developed models documented in files. Most probably, however, they are perceived to be information displays that are used by the PM and other executives when they are requested.

Models are viewed differently in OCIS. They are more than just displays. They are amplifiers and attenuators that enhance the PM-MPS relationships through better communication and information flow. While PMO's models are descriptive and analytical, the models in OCIS are recursive and logical. For instance in OCIS, these characteristics are evident in variety operations modelling, activity modelling, regulatory loops, and recursive models.

Another aspect of models in PMO is the absence of thought about integration between man and machine systems. The components of PMO consist of an integrated computer supporting a set of manual systems, with both processes isolated and not well linked. However, OCIS, as a model, is a single human-technological system. The management centre is a good example to illustrate the man-machine integration where users, models, technology are all incorporated into a single communication and information management process.

The different approaches in model design and the contrast in the models itself have been illustrated above. A number of recommendations can be made to improve PMO. These proposals are the result of new ideas emerging in OCIS model design. A number of new syntax are used in OCIS, mainly from cybernetics, which can be incorporated in a future model design in PMO. The use of FILTERS and AMPLIFIERS provides a major contribution to PMO's model design. For instance, they are used in OCIS's regulatory model (Figure 7-14) to improve PM-MPS communication. In the IM framework (Figure 2-13), they are used as the basis for design strategy. The three variety operations strategies (structural, conversational, and managerial) enable the follow-up design of other OCIS models. This new cybernetic

language, a departure from the traditional views, may complement the existing syntax used in PMO.

An important case of modelling is the viable system model (VSM). It is used as the means to diagnose MPS. While this research provides the methodology for diagnosis, in the long run PMO can carry out the real diagnostic study of MPS. The result of the diagnosis may help improve the design of information and office systems in PMO. For example, models such as PMO's balancing and integration mechanisms (Figures 6-19 to 6-32) may be designed to improve the working of MPS. They are part of the VSM structure, and are designed using the regulatory mechanisms.

7.5.5.4 TOOLS/PRODUCTS

For PMO, tools are products used in either a technological or manual process to convert an input into output. These products are identified as IS tools and office products including processes, software, and equipment. Conversely, in the context of OCIS, they are technological amplifiers/attenuators used to support OCIS processes and people, and their relationships. One might say that the PMO is IT-emphasised, whereas OCIS is IT-supported. One of the most powerful tools used in OCIS is the MC, which is an integrated system of processes, people, and products used to facilitate organisational debates. Again, the centre is regarded as both a filter and an amplifier. The introduction of this tool in the PMO environment may improve planning and monitoring through group discussion and decisions.

CHAPTER EIGHT

THE MANAGEMENT CENTRE

The organisational study based on cybernetics principles indicates the need for designing channels, variety operators (VOs) and transducers between different variety entities in MPS. In terms of the VSM, the relationships between intelligence and control, for instance, need the balancing role of the policy function. The need for a Management Centre (MC) as part of the design of OCIS stems from the fact that the primary mission of OCIS is to act as the PM-MPS main informational VOs. OCIS can accommodate this by providing a powerful communication tool with the aid of IS, OS and IT. The MC, in this respect, is regarded as the channel to facilitate such communication.

8.1 MANAGEMENT CENTRE CONCEPT

The notion of Management Centre (Beer, 1979) is proposed by Stafford Beer. It extends the concept of the Operations Room as well as replacing the boardroom and other committee rooms. Beer refers to it as a tool of total management, relevant at all recursion levels. It is intended to meet the requirements of management in enhancing communications between the executives of an organisation. In MPS, the MC is where the three management functions of policy, intelligence and control can communicate with each other in a continuous mode and absorb each others' variety. The communications are of various modes and between different management groups.

One such interaction is the debates between control and intelligence where the policy function acts as a balancer. Here, the policy function is to close the intelligence-control interaction loops by making decisions if necessary - for instance, if a consensus cannot be reached after debates are carried out and there is a need to cut short discussions. In other instances, the communication takes place in the policy function where the purpose is to make use of organisational information to make a group decision.

Such top-level interactions become more conclusive with the support of efficiently integrated IS applications and technology-based facilities. Under these improved conditions, decisions by the policy-makers, planners, coordinators, and others are made more timely. The concept of MC is distinct from that of the electronic meeting-room (EMR), although for both, the use of modern office and IT is predominant. While EMR emphasises technology, MC uses EMR as one of its tools. Nonetheless, both have the same objective, of providing amplification and attenuation through improved communications.

8.2 ROLE OF MANAGEMENT CENTRE

This section introduces the roles played by the MC and considers how OCIS supports its operation.

Basically, a MC is designed for use by the PM and top MPS executives to facilitate the planning, coordination, monitoring, and integration processes in MPS. The role of OCIS is to enable such use by providing MC with logical and physical support involving information, human and

technological resources. By operating in a "real time" mode, the MC provides OCIS with a "tool" to facilitate communication, information manipulation, and regulation of operation.

As a communication facilitator, the MC is a high variety channel which allows for a high rate of two-way interactions between personnel. The primary links facilitated by the MC are between the PM and MPS executives, and between the intelligence and control functions. The former enables regular interactions between the PM and his ministers, while the latter involves debates between the executives of the intelligence organisations (EPU, SERU, ICU) and control organisations (Public Services Department, Treasury, MAMPU).

These debates enhance the process of obtaining a rich picture of the problem situation in order to obtain a consensus of opinion for decision making. In a session, important issues are considered, points are discussed, views are exchanged, and decisions are taken. The types of debates taking place in the MC may include policy discussion, monitoring, planning, reviewing, briefing, integration, brainstorming and others. While most of these discussions are familiar in any meeting, the monitoring and integration sessions are vital for our purpose.

To support communication, a MC needs IS as is provided by OCIS. As an information centre, it houses information of MPS, using integrated models at different levels of recursion. The types of information may be determined by the information requirement analysis, the process of which has been covered in Chapter Seven. Effective use of information is by using the available models, reports, statistics, graphs, and other data to

get a rich picture of a situation. Simulation models are useful to enable the PM and other executives to perceive alternative situations by trying out different variables. This is especially useful in a planning session, when deciding on the resources to be allocated.

Finally, the MC is the regulatory centre or hub from which OCIS operates. Beer refers to it as a corporate "brain" which extends OCIS nervous system into MPS and the nation. To regulate the relationships and information use, the role of OCIS is as the initiator or facilitator. OCIS is responsible to ensure that information is well maintained, the right people are involved in debates, and the meetings run without any technical hitch. To support this function, OCIS provides the necessary human and technological resources. Developing, maintaining and enhancing the MC are handled by OCIS personnel (analysts and technicians), thus require a satisfactory level of expertise and skill. OCIS also provides technological resources such as computer equipment, office products, and communication tools which store and process the necessary information.

8.3 DESIGN OF MANAGEMENT CENTRE

This section discusses the key aspects of the necessary models used in a MC design. The emphasis is on the logical design; as such the technical components are of secondary importance. Illustrations are made for the purpose of stressing certain logical points which are necessary at some stage of the discussion.

8.3.1 LOGICAL MODELLING

8.3.1.1 RECURSIVE MODELS

A recursive model helps to illustrate the relationships of the different MCs in MPS. Figure 8-1 illustrates the structural model at MPS, ministry and department levels. These models are linked in an OCIS network where information flows between MPS, ministries and departments.

8.3.1.2 REGULATORY MODELS

Regulatory models are useful to illustrate the MC's variety operation role. Figures 8-2 and 8-3 show the MC as filters and amplifiers. In these examples, the communication and information support functions of the MC are depicted for the PM-intelligence-control and PM-MPS relationships. In Figure 8-2, the MC serves as a forum for intelligence-control debates, i.e. to balance the internal operation and external environment of MPS. The PM, here, mediates the discussion. At the same time he monitors the process and has a final say to settle any disputed points and to arrive at a conclusion.

Figure 8-3 illustrates the MC's role as an information centre and an information distribution channel in order for the PM and his team to monitor MPS progress. As an information centre, the PM and the management team (MPS executives) are able to use the MPS models provided by OCIS to understand the complexity of MPS. As a communication channel, a meeting session enables the PM to interact with the ministries through direct

Note:

MC Management Centre
M Model

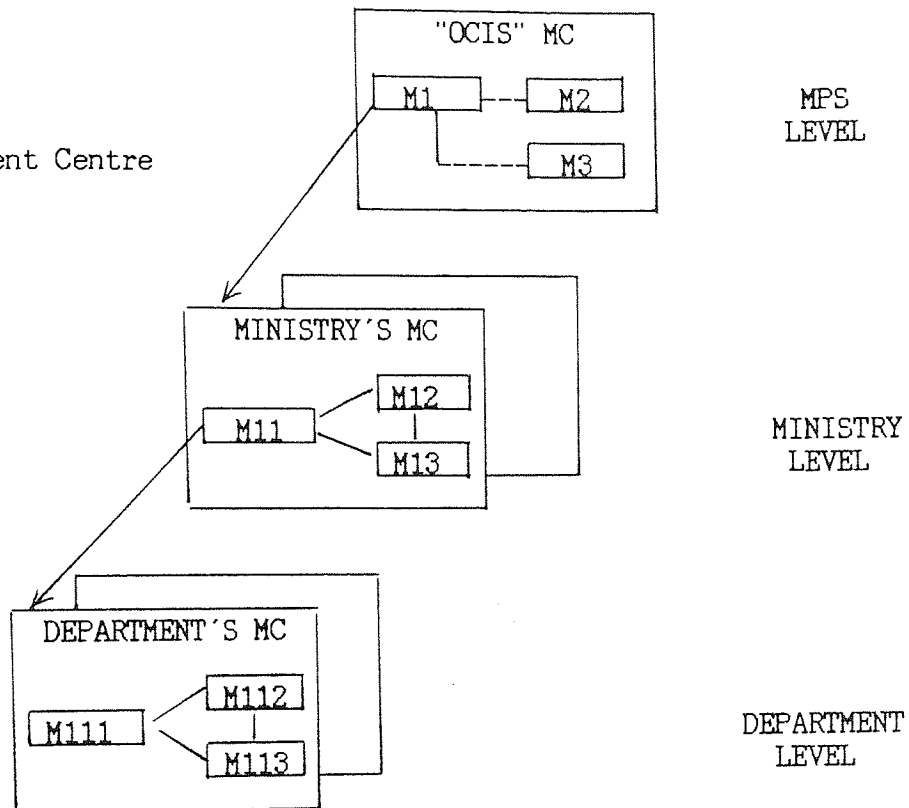


Figure 8-1 Management Centre: Structural Modelling

contact with their top executives.

Here, a minister, for instance, has two roles - as part of the management team, and as part of the MPS operation. As part of the management team, he contributes to the discussion. By doing so, he is helping to absorb the requisite variety of the team (shown in Figure 8-3 by the arrowed lines between the PM and the team). As a result, the complexity of the team will be amplified and that of the ministries attenuated, and therefore a better handling of MPS complexity. As a member of MPS, he is a transducer in an information distribution process. For example, he acts as an input transducer by perceiving the PM's decision, translating its meaning and laying down the requirement or rule for his ministry to take

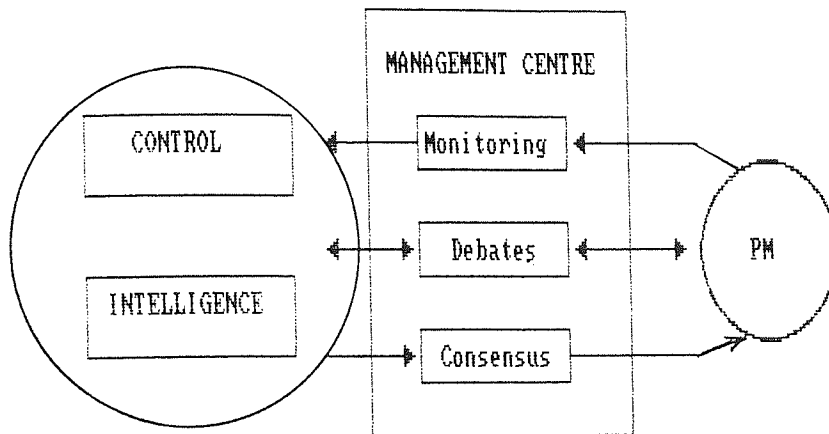


Figure 8-2 Regulatory Mechanism: MC as Variety Operator
(Balancing Intelligence-Control)

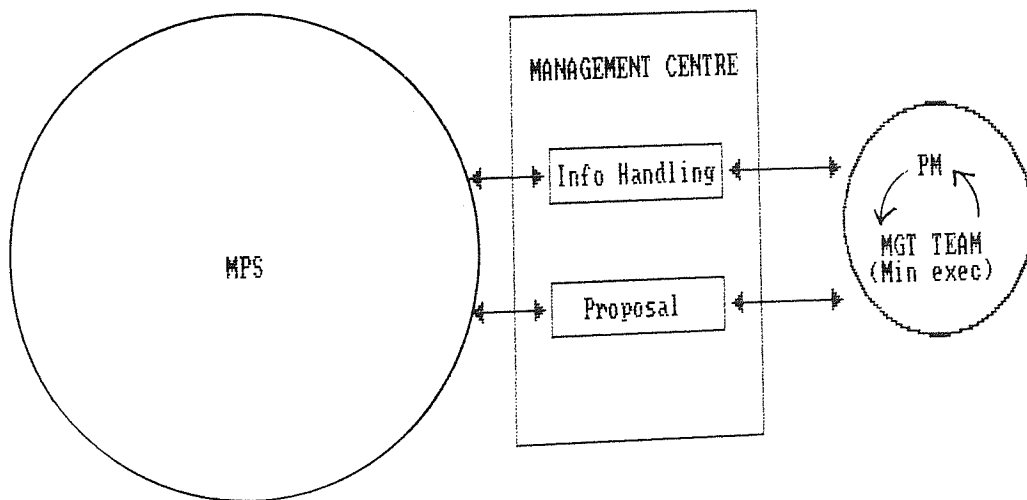


Figure 8-3 Regulatory Mechanism: MC as Variety Operator
(Monitoring MPS)

action. As an output transducer, he transcribes his understanding about his ministry in a report for the PM's attention and use.

The important point about having a MC is that all these processes involving information being filtered, amplified and transduced are done speedily and without a third person involvement. The minister can report directly to the PM and can expect an immediate response from the PM. So, OCIS task in filtering and amplifying information is greatly reduced with the MC available as an information and communication channel.

8.3.1.3 ACTIVITY MODELS

An activity model describes the logical operation of the MC. The model in Figure 8-4 illustrates the basic primary and regulatory activities of the MC. The primary activity is the filtration and amplification processes - communication and information distribution. The support activity involves the regulation of the MC operation by OCIS. Figure 8-4 is used to explain these processes.

From the model, the communication process is supported by information use and the regulatory activities of OCIS. The communication process becomes effective with the retrieval of information. This involves information sharing between the members of the team. A discussion is carried out while information from OCIS is manipulated. Finally, a consensus or decision is reached collectively, or in exceptional cases by the PM.

OCIS, as information channel, is generally responsible for ensuring the availability and distribution of information for MC and its users. The

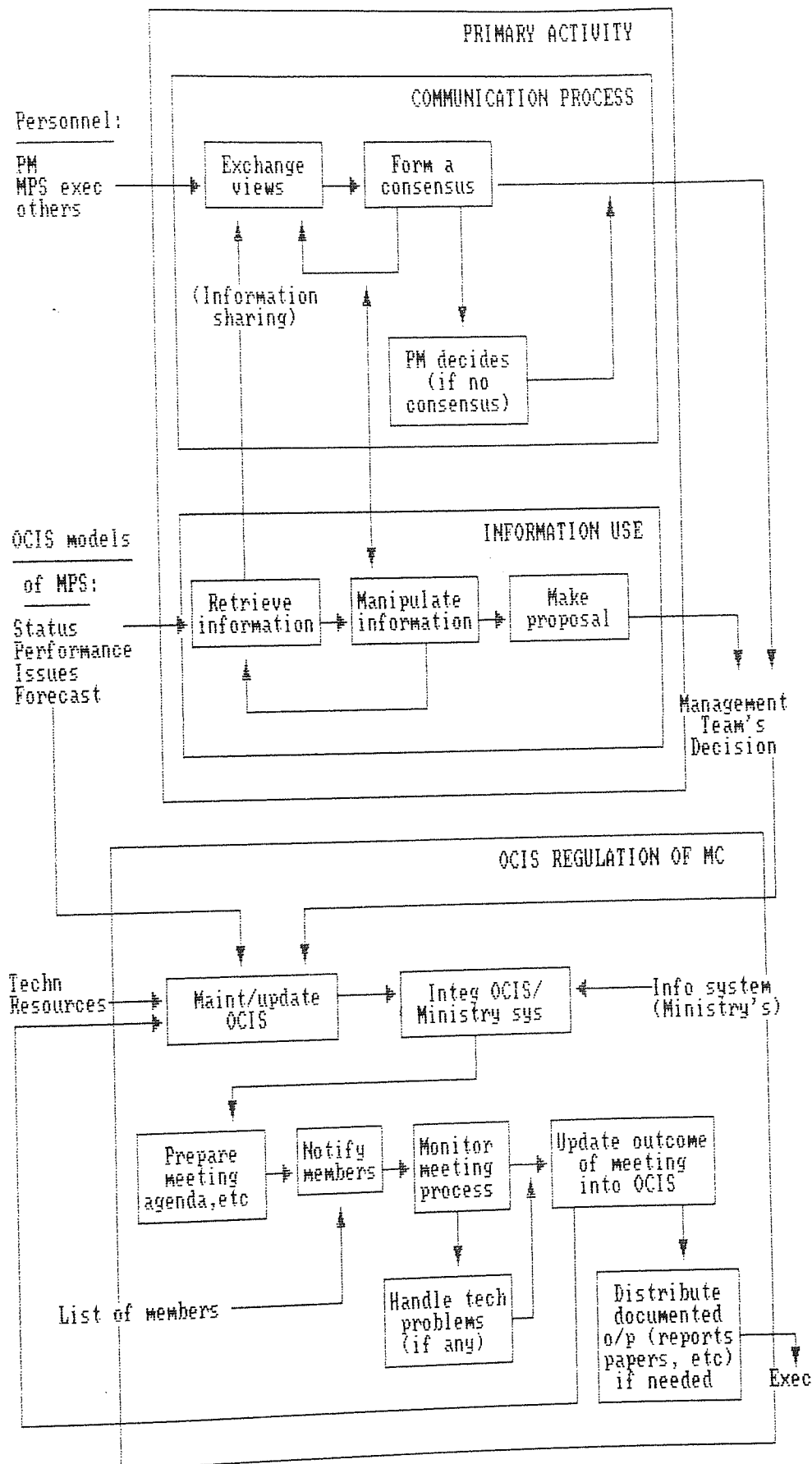


Figure 8-4 Management Centre: Activity Model

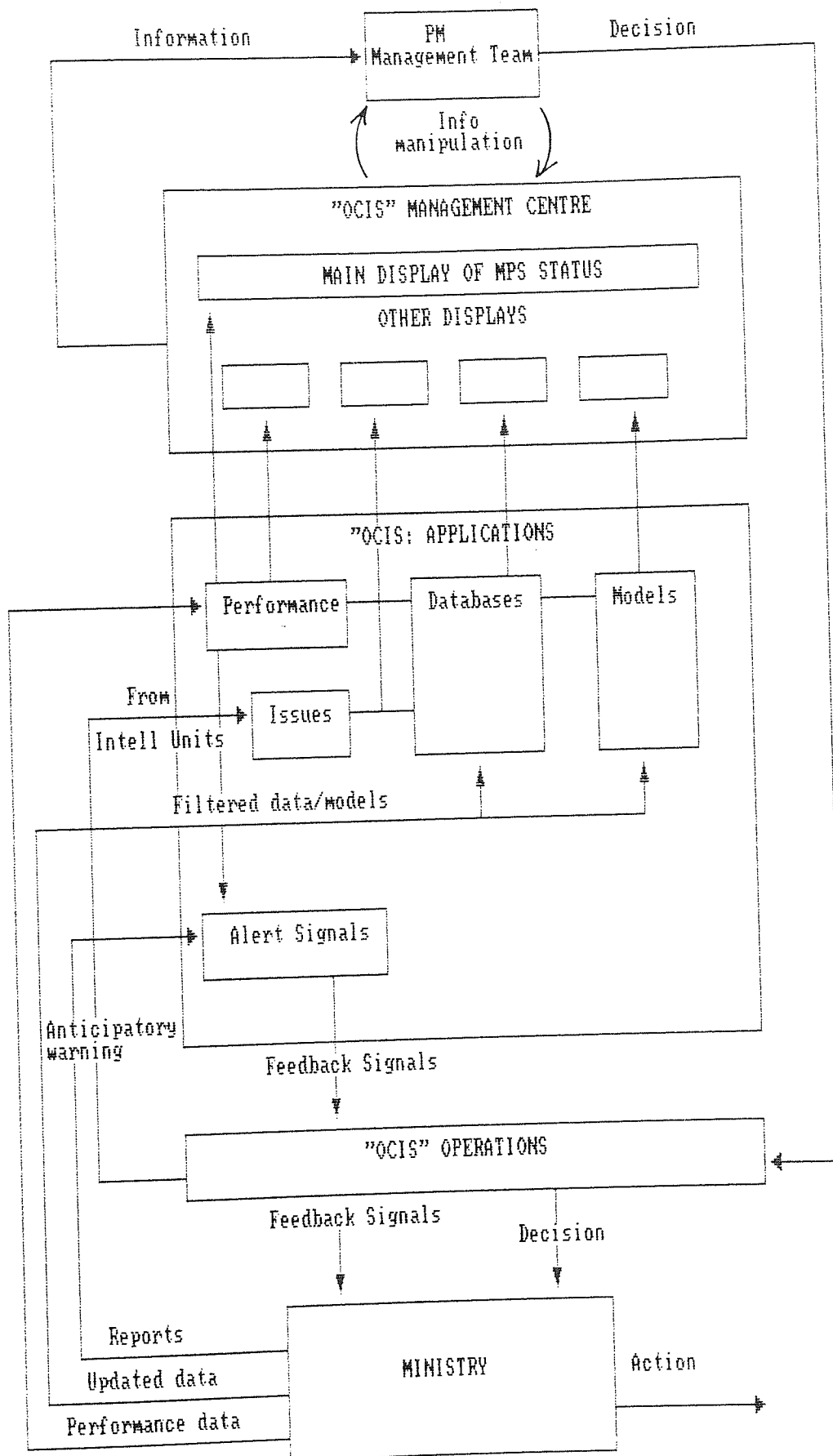


Figure 8-5 OCIS Management Centre: Information Handling

information is derived from two sources: OCIS and ministry databases. OCIS applications are filtered information on MPS, such as aggregated statistics, graphs, maps and summarised reports using the source from the ministries' databases. The updating of OCIS applications is done at MPS level, by OCIS and at ministerial level, by a ministry. However, such updating is basically controlled and monitored through OCIS. Figure 8-5 is a logical model showing the handling of information and the use of the MC as filters/amplifiers between the PM (with the management team) and the ministries.

Accessing of information is through either the alert signal or reference system. The alert signal is an early warning system where a user is warned by the system in advance of actions he may be required to perform prior to a meeting. This system enables preparation of information relevant for use in the discussion. OCIS, by acting on such an initiative, can update its information in time for the meeting. For instance, an executive may be required to refer to a latest report from SERU regarding a certain socio-economic issue, or he may be advised to refer to a message from the Treasury.

This is a form of anticipatory mechanism useful as filters of the environmental situation and of internal MPS events. The executive may be required to refer to a directive from the PM who is asking for specific information. Here, the system serves to facilitate the action of the PM who may need a certain piece of information to prepare himself for the meeting. Signals may be in the form of auto-messages flashed on the screen as soon the executive user (or usually his personal assistant) logs into the system. During the meeting, latest issues or events may be

highlighted to the team in this manner. These illustrations relate to the variety operation role of OCIS, through the MC system, to distribute and prepare meeting information.

During a discussion information can be accessed by the following interface facilities: menu retrieval system, and interactive query system. The members may need to make references to certain statistics, forecasts, texts, or other information to support the points discussed. Other aids like an electronic board may be used if the PM or any other member wishes to clarify certain points.

It is suggested that the discussion is to be paperless. If no papers are used in the discussion, available information from the system will be fully utilised. Whatever information needs to be noted can be written on the boardnoter, where the information is simultaneously entered into the computer. The main problem here is the use of the board which may create uneasiness on the part of the members. My proposal is that whatever decisions or notes are to be transcribed will be on a piece of paper provided (note that only minimal quantity is provided and papers are not to be taken into a meeting room). Based on the information available and the agreed consensus, the members involved make certain decisions, with the PM having the final say. The decision made in this meeting can provide the necessary input to the weekly Cabinet Meeting. Information pertaining to specific meetings, and the decisions made, are accessible by the PM and relevant executives sharing the specific meeting database.

As a communication channel, OCIS prepares and initiates meetings using the MC. The way meetings operate is partly determined by the type of

informational issues handled. These are basically of two types - routine and proactive. These necessitate different types of discussions. They are the discussion of routine matters (checking on status of individual ministries, discussing less urgent issues) and proactive matters (potentially important issues requiring immediate attention as decided by the PM, normally with advice from OCIS).

Basically, we can categorise the meetings as: PM-Ministers and inter-ministerial debates. In the PM-Ministers meeting, the PM chairs the session, and the members include the relevant Cabinet ministers. This meeting is held at least twice a week for a short duration of an hour or two. The ministers might be required to attend for any of several reasons, such as a ministry performing below expectation, or an important issue to be discussed related to a ministry. Due to the time constraints it is impractical to hold daily meetings involving them. There are ways to overcome this problem, such as by having representatives. The PM may be represented by the Deputy PM or a Minister in the PMD, while other ministers may be represented by their deputies. Another alternative is where meetings between the PM (or the chief executive of OCIS as representative) and relevant MPS executives (PMD and Treasury) are held at least once a week.

In inter-ministerial meetings, either intelligence or control-intelligence issues are involved. For instance, discussion within intelligence units (such as between EPU, SERU, MAMPU and DS and ICU), is to integrate the different issues arising out of the environment. The outcome of such debate is useful in determining the ministries responsible for the issues identified.

The second type of discussion is between the MPS internal and external situations (i.e. between control and intelligence respectively). This is a balancing process initiated by OCIS involving PMD (EPU, ICU, SERU) for intelligence and MAMPU, Treasury, and PSD for control. The balance to be achieved here is between the resources required in carrying out the government policies and the plans based on research and forecast (i.e. intelligence). EPU, for instance, might be focussing upon the plan to be carried out, while Treasury makes decisions as to the financial resources to be allocated. The Public Services Department determines the personnel requirement.

In cybernetic terms, an important variety operation role of the MC is to enable the members to absorb each others' variety. How can this take place during a meeting? This is possible if the members, in exchanging viewpoints, are able to communicate on the same wavelength. What the MC can do is to provide the members with the right kind of information and an environment that provides a conducive meeting atmosphere. Information displays and other media, the design of the room (to be discussed later), and equipment used are important for uninhibited interactions between the members. The information provided must have the right level of detail to suit management, although a certain amount of technicality needs to be included so as not to rob the information of meaning.

For example, textual information may be improved with some graphic support. Better still, information tools such as simulation models enable a discussion to be carried out productively due to the information being actively manipulated. The process of trying out various alternatives enhances debates, and provides a better proposition than an ordinary

report, graphs or charts. Although it seems trivial, the positioning of wall displays and seating arrangements may also affect the flow of the meeting.

During a discussion, the PM may need to get the views of a minister not attending the current session. The telephone conferencing facility enables the particular minister to participate in the debate. The minister concerned may, by using the ministry's MC information facilities at the same time, provide the PM with the necessary information.

Finally, OCIS controls the operation of the MC by facilitating interpersonal relationships through a communication process, providing/maintaining information, technological and human resources.

To support the inter-personal communication, OCIS firstly acts as an initiator, by advising the PM on members, agendas, and other relevant information (as attenuator of the PM's task). OCIS also acts as initiator by calling the meetings and providing the necessary basic information to the management team members (as amplifier of the PM's task). During a discussion, OCIS provides an analyst in the MC to handle any problem relating to the use of information systems and technological equipment which may disrupt the free flow of the meeting. At the same time, the analyst acts as an observer throughout the discussion. The aim here is to consider future improvement that may further enhance discussions. In the meeting itself, a representative of the OCIS information systems manager acts as secretary whose role is to transcribe (an act of transducing) the meeting output into the "Meeting DSS" - an application concerning meeting information for the PM's and the team's use. In these meetings, OCIS is

the secretariat.

8.3.2 PHYSICAL MODELLING

Physical models support the MC. Its mechanistic model is not discussed in depth. The points to consider are those aspects of physical modelling that influence the communication and information handling roles of the MC. The key factor here is the technology-user interface that supports the design.

8.3.2.1 ROOM LAYOUT

The requirement here is to design an MC environment or room layout for effective communication. As an effective meeting place, the room has to be conducive to interpersonal communications where executives are made to feel at ease with the use of facilities and with one another. As long as communications are smooth and information flows freely across the room supported by reliable data, the room serves its purpose. An informal atmosphere is preferred to highly formal set-up - no minutes, minimum use of papers, comfortable chair, coffee room or club house atmosphere. Refer to the model in Figure 8-6.

Excellent projection with normal constant light (such as without having to switch on, off, dim, etc) provides clear and convenient viewing. Lighting, however, may be controlled in an adjacent observation or control room if required.

The room is to be totally user-friendly so that there is no need for a

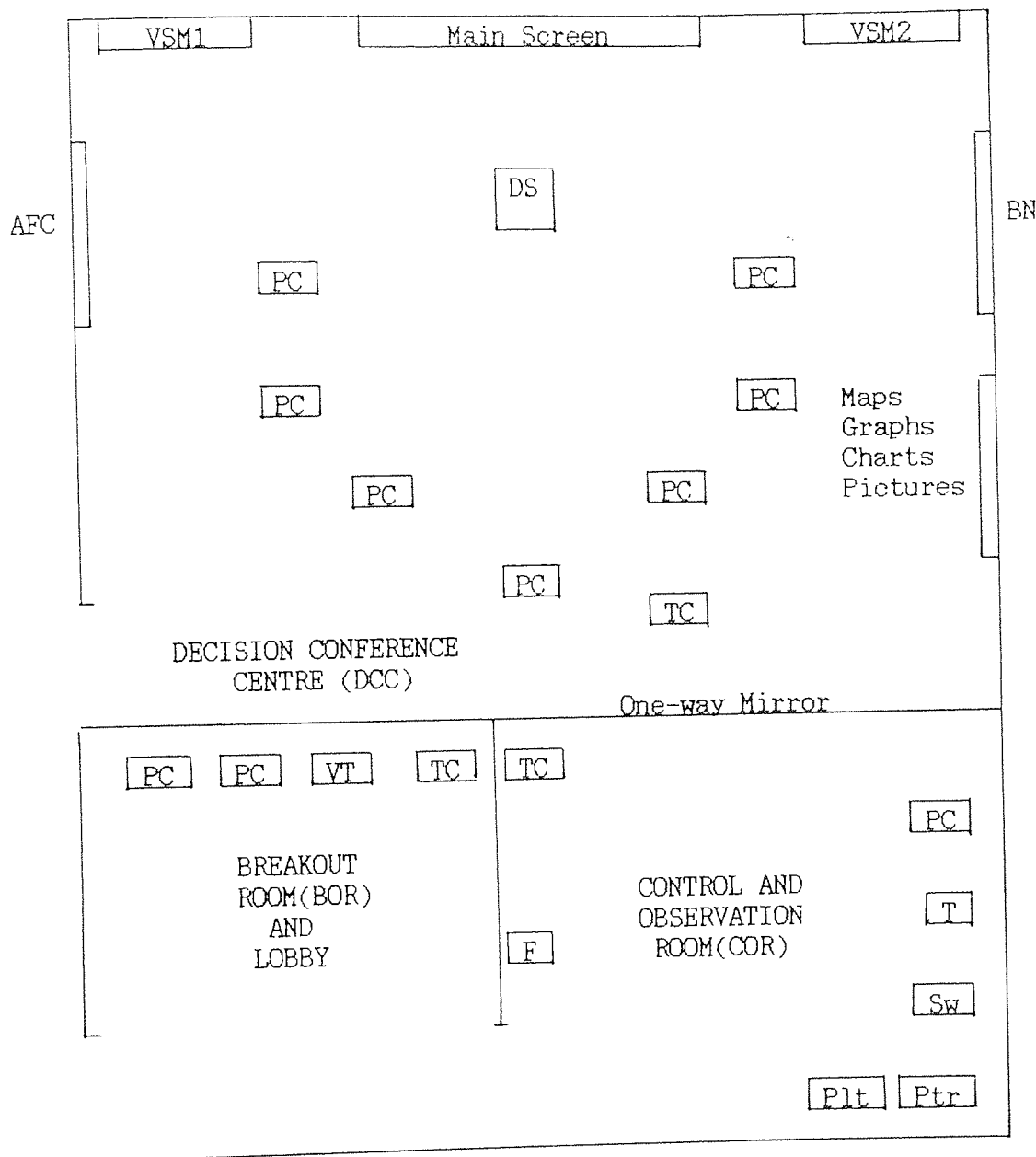


Figure 8-6 OCIS Management Centre Room Layout

Legend:

- AFC Activity Flowchart
- BN Boardnoter
- DS Display System
- F Facsimile
- Plt Plotter
- Ptr Printer
- Sw Switcher
- T Terminal
- TC Telephone Conferencing System
- VT Videotex

technician to be around. A technical representative may be located in an adjacent observation room, and used in case of system breakdown or other necessity. The highest level technical person stationed as observer is the OCIS IS Manager or his representative.

The atmosphere has to be comfortable, with not more than seven participants. More participants result in higher complexity, while less means not enough absorption of variety due to less exchange of information.

8.3.2.2 FACILITIES

Basically, the facilities for the centre are output displays, input equipments, seating facilities, and other support gadgets such as a display system projector, and remote conferencing facilities. The MC is made up of three rooms: The decision conference centre (DCC), lobby/breakout room (BOR), and control/ observation room (COR).

DCC is the main discussion room which houses all the displays as well as the equipment for use by the members to input queries or requests. The implements installed may vary from highly technical to non-technical. However, they are meant to be sensitive to the competence of the executives involved. Their availability provides a choice to members on the type of tools they wish to use. Top level users like the PM and ministers, may prefer to use a simple menu system supported by the displays on the walls. For PMD executives involved in intelligence-control debates, the boardnoter may be more meaningful in conducting their discussion. The boardnoter is a transducer enabling the

PM to understand certain models better.

The lobby is a rest room as well as a waiting room. It is also used as a breakout room where extra sessions are held by an individual minister or executive with his assistant (who is not normally involved with the MC's management team, but brought by the minister in case the minister needs informational or other support). Urgent phonecalls may also be made here.

Finally, the control/observation room is used by OCIS staff. The room is regarded as a preparation room as well as a secretariat room to record the meeting for the PM's use. The observation of events during the meeting is necessary to improve MC's overall meeting environment. The support function of the room is to ensure there is no breakdown, and if there is any, immediate action is to be taken. The OCIS personnel stationed in COR also provides the necessary backing in case of members having difficulty using the tools to access information.

INPUT AND OUTPUT

In presenting information, the types of images for display in the room have to be attractive, clear and meaningful. They need to present an attenuated information of MPS and the environmental situation.

The primary output is displayed on the walls of the DCC. The main wall has a main screen and two VSMs of MPS and ministries. The main screen is used as a shared display of information relevant during the course of the discussion. For instance, it may use the display on current MPS performance status (i.e. by using the indices figure and time series) to

start a monitoring discussion. It is also used to do a forecasting by manipulating the input data. Other additional information is used for reference purposes. For instance, statistical, graphic, maps and other models are available from OCIS databases. A display system (e.g. Barco projector) supports the big screen display. The second wall has a display of an MPS activities flowchart. The third wall displays a boardnoter and other support models in the form of diagrams, charts, graphs, pictures, etc. A boardnoter is an electronic board replacement to a traditional chalkboard. It is both used to input and output information during the course of the discussion.

Small screen presentation is also available through the PC screen. This display is a private work area which is used when enquiring into a member's own personal DSS or retrieving the ministry's information, which is of no significance to the other members at that particular time.

The videotax/teletax is used to view current events and issues. Television broadcasting and video films may be used to support discussions. So is the use of slide projectors which sometimes provide better presentation of images to support discussions. It may be used in the event of information not being available in OCIS model bases. There is also a printer in the COR where printouts (charts, graphs, texts, etc) are provided on request to members after the conference session has ended. A facsimile is used when the PM requires a printed display of new information from a ministry which is unavailable in the current system.

In the input of information, the question of how these images can be selected is considered. The choice is between using a traditional

keyboard, specially designed keyboard or other interfaces. Generally, there needs to be uninhibited use of any form of interface.

PC keyboards are used for keying in to retrieve information using the menu system (by pressing a single number) and for making queries using an interactive query system (using a natural language). Physically, a PC keyboard is attached to the switcher-board enabling members to switch from PC to mainframe information and vice versa. They are also used with the boardnoter system.

Instead of a full keyboard, there is a possibility of using a system driven by an infra-red switch (like remote control for a television set). This makes possible interrogation of the computer mode, which asks the member to make a selection from the series of single digit "menus" of options. Beer (1975) has made use of this design in a Chilean government project.

A voice system is another possibility which may be used by members, although it encounters usage problems of its own. However, despite the emerging availability of various novel form of access, the use of a keyboard is presently still the best option.

8.3.2.3 MEMBERS OF MANAGEMENT TEAM

The DCC is to accomodate not more than seven team members. For the committee involving monitoring MPS status, the members include the PM as chairman, Deputy PM, 2 key ministers, CSN with a senior civil servant (e.g. Secretary-General or Director-General) and the chief executive of

OCIS. The IS manager or his representative may also be present to provide necessary technical support. The role of OCIS personnel is to assist the members whenever necessary. In a planning session the members are the PM (as chairman), chief executive of OCIS or representatives, CSN, Director-Generals of EPU, SERU, Treasury and EPU, and IS manager of OCIS. Sometimes, there is a need to involve more than seven members in a discussion. But, whenever possible, the discussion should be restricted to seven members. The lower the number of participants, the better is the personal interaction. Members may take along their support staff who may use the lobby for waiting, preparation and recalling information from their respective ministries and departments.

8.4 IMPLICATIONS OF THE MANAGEMENT CENTRE

Development of the MC is relevant to OCIS as it provides a "tool" to facilitate personnel communication and to regulate the flow and use of information for OCIS operation. MC, in cybernetic terms, is a "variety operator" providing a high variety channel for communications. With better communications, the processes of decision-making, planning, and coordination are greatly enhanced and integrated. A good working relationship is also achieved.

MC makes more meaningful the concept of "group decision-making". With MC, decisions are made by members of the management team with the PM (supported by OCIS) at the helm. The decisions are made after a process of debates involving the key executives. The team work for the decision process is in retrieving, sharing and use of information. The important point here is an active involvement of the ministers. The PM only

intervenes if consensus is not reached. In cybernetic terms, the PM acts as a closure of the management interactions.

The intelligence and control functions in a VSM are involved in a number of important debates. One of them is planning, which is a process of determining the course of action to be taken in implementing a policy with a given allocation of resources. It is a process of intelligence-control balancing involving the control organisation (as provider of resources) and the intelligence organisation (as requestor of resources). At the end of it, the implementing ministries are the users of the resources.

A plan may prove to be successfully implemented if it is allocated with the necessary financial, manpower, and other resources. However, a plan may be well budgeted, yet is impractical due to a lack of skilled manpower to utilise the available technology. In this case, the involvement of good research to support the plan is necessary. This shows that the process involved in intelligence-control needs to be well integrated in order to handle the necessary discussions. OCIS initiates such debates and the PM (as policy maker) administers the closure, i.e. monitors the discussion. A common consensus of decision is hopefully achieved.

The role of OCIS is significant in ensuring the success of the MC network covering MPS, ministerial and other levels. The information requirement, design of applications and maintenance of the system are made with much needed cooperation and coordination from other ministries. In fact, an important role of OCIS is to coordinate ministries' IS that are relevant to PM's requirement.

The use of IT provides powerful support in running the meeting. Without IT, it is not possible to support a real time OCIS operation, remote information retrieval, and other functions. OCIS use of "real time" information handling enables a decision to be made with less fuss and delay than that which normally happens in manual meetings, where additional information is frequently not available in time. At times, the PM needs to access a ministry's information which is not available in OCIS. He may additionally need a hard-copy document. The availability of computer and telephone conferencing systems, facsimile, and networking support creates such a possibility.

In conclusion, the creation of a MC implies the establishment of a direct contact between the managers who share a problem; the creation of an integrating role; and the creation of permanent groups or management teams for constantly recurring, inter-ministerial problems. As a result, there is less need to create liaison roles to link departments, minimising the creation of temporary groups (task forces) to solve problems affecting several ministries. Although there is an emphasis on technology, it is the interpersonal relationship that is still regarded as a critical success factor of MC. However sophisticated the equipments used, a MC fails if it cannot adequately support inter-personal communications. The design of MC has to be a right blend of useful information, advanced facilities, comfortable environment and user-friendly interfaces.

CHAPTER NINE

CONCLUSION

9.1 IMPLICATIONS AND BENEFITS OF OCIS

The previous two chapters described in some detail the implications and likely benefits of OCIS design. These fall under two main categories. Firstly, the OCIS design is based on a new methodology using cybernetic principles and tools. Secondly, is the matter of the impact of such a design on management and organisational behaviour.

9.1.1 DESIGN METHODOLOGY

The OCIS design methodology (Figure 7-4) incorporates aspects of the systems approach and cybernetic principles. Notably, the systemic views underlying soft systems and cybernetic methodologies provide the basic platform for the methodological design of OCIS. Thus the use of "root definition" helps in initially understanding the relevant names for OCIS, while cybernetics provides the tools to study complexity.

Management cybernetics provides the methodology to study the complexity of MPS and offers the tools to support the PM's management of MPS. The law of requisite variety and the concept of variety operation (amplification and attenuation) are the fundamental principles used. The concept of structural recursion and the regulatory mechanism, offers the methods for a logical modelling.

With different complexity levels between management (the PM) and the organisation he manages (MPS), the cybernetic solution is for managing an acceptable balance of variety. The need is to amplify the PM's capacity and at the same time to attenuate MPS complexity to enable the PM to manage MPS with a greater understanding of the MPS situation. At the same time, MPS will more accurately appreciate the PM's action and perception. These principles are integrated in a framework for design, called the information management framework (Figure 2-13).

Basically, the design of OCIS is based on the integration of the information management (IM), information system (IS) and information technology (IT) strategies. IM is the management strategy; IS the applications strategy; IT the technological strategy.

The IM strategy or framework, which is derived from cybernetics, implies designing a variety operator (VO) to tackle the PM's management problem, and forms the foundation for the research design. Its strategy is to design filters and amplifiers to adequately balance the different PM-MPS variety levels. Three design strategies are proposed, involving structure, organisational conversation and managerial capacity. These strategies can be found in all aspect of the modelling, while incorporating the cybernetic principles and tools mentioned above.

The IS and IT strategies, on the other hand, are used to illustrate the necessary OCIS applications and technological products/tools used. Their roles are to support the use of the IM strategy.

There are a number of models/tools used in the design process! The basic

modelling tool is the structural recursion model. It provides a logical model of the overall situation involving the organisation, the parent organisation and the organisation under it. Another model, the transformation model, is used as the basis for activity modelling. It uses the principle of "naming the system". The use of VSM strongly supports the design of OCIS, in that it enables the identification of filters/amplifiers necessary for OCIS. The regulatory mechanism is used to facilitate in identifying the necessary VOs based on a two-way relationship. A tool such as Viplan is used in data collection, although it is ultimately attempting to aid diagnosis.

Based on the models developed, a key design syntax emerges in the form of "variety operators" (VOs), which are amplifiers and attenuators/filters. In cybernetic terms, office is viewed as a VO which is made up of a complex set of relationships between different components including structure, people and tools. These VOs produce an acceptable balance of complexity between a manager and the organisation he is managing. The design of OCIS therefore implies the design of VOs that will improve the PM-MPS relationship.

9.1.2 MANAGEMENT AND ORGANISATIONAL BEHAVIOUR

In order for OCIS to act as a VO, its impact on MPS organisational behaviour and management is important. For instance, the design may trigger an adjustment in MPS organisational structure with changes made to the set-up of units. The VO of the communication process may lead to the creation of a management team and a necessary staff adjustment to support the management centre.

The information distribution process may need an information systems unit. There is a revamping of responsibility and positioning of units due to changes in certain processes. OCIS also necessitates the use of new technology to provide filtration/amplification tools. As a result, manual processes such as filing, information distribution, and reporting are being automated. Automation means the introduction of new processes. There may be a shift in power and control, most of which will be moving into the information area. This change may affect management style and role.

There is a two way causal loop between individuals and organisation. OCIS may improve the quality of thought or intellectual performance through better interpersonal contact, ably supported by useful information and technology. It can evolve to meet the changes in user needs. The use of tools such as the Maltese Cross for analysing information processing products gives an indication of the need to modify the IPP required in the OCIS operation.

One of the important effects of OCIS is that it provides means for the coordination and integration of information and activities. This is facilitated by the use of communications and information distribution products supported by IT tools. The "management centre" (MC) plays a crucial role in this respect. It is a powerful variety operation channel that enhances interpersonal communications and information use with the support of OCIS personnel and technology.

The MC helps to improve the integration among ministries and departments of MPS, and therefore reduces the complexity involved in handling a

conflict situation such as one that involves environmental issues and problems. Better integration implies more effective management regulation, because it increases the channel capacity between ministries and departments. Of course, the greater the ministerial integration the greater the need for coordination. OCIS addresses these problems.

Organisational performance is improved with better communications and control processes. Powerful communication tools may improve interpersonal relationships. In using the MC, the distribution of decision-making responsibility through group decisions and debates reduces conflict management. The MC reduces the gap between management and information availability, making decision-making more timely and effective.

Although technology is supportive to OCIS design, the crucial factor is to address the human-technology element. These two are complementary and both are necessary for the variety operation processes to be effective. For instance, the use of microcomputers (PCs) is enhanced in the design only because they provide the executive users with a tool to interact with the system. PC use is brought about by the need for PC-mainframe links which in turn provide a possibility of using more diversified PC products. Diversity of products, in a well integrated form (i.e. designed), will enrich the user with relevant information. A mainframe system is best utilised by using large databases and is not singly suitable to support managerial decision-making.

The trend today is a shift from centralised to distributed allocation of power and responsibility in decision-making - therefore, from centralised to distributed systems, from mainframe-based to micro-mainframe

integration. The PC has broken the barriers between users and systems. The increasing executive use of PC reflects the improvement in the design of man-machine interface systems, which stress user friendliness. The role of technology is also critical in facilitating remote communications and integration of OCIS applications and technology in MPS. For instance, the public packet switching system of the Malaysian Telecom (MAYPAC) lessens the cost of data links between ministries and OCIS. Again, the fact that this technology acts as a powerful determinant of communication among its users serves its purpose as a useful VO.

9.1.3 CAUTIONARY POINTS

Various problems are however attached to OCIS use and design. Firstly, it is difficult to determine the information requirements of the executive user. Unlike in traditional payroll and personnel systems, executive needs are heterogeneous. In OCIS, for instance, the range of applications of potential use to the PM are unlimited. The use of a technique such as the Maltese cross, may provide a means to lessen the number of the various information systems. Moreover executives are normally provided with terminals or PCs, but some have no capability to operate them. In this case, the best thing may be to let their assistants operate the devices.

The problem of the wide range of possible combination of products and networks for OCIS needs to be addressed in the design strategy for IT, as do issues to do with the changes of the environment. As a large organisation, MPS adaptation to environmental changes becomes a key issue. Mechanisms to enable such adaptation, including MPS research process and reporting system, are significant in OCIS design.

9.2 CONTRIBUTIONS OF RESEARCH

The research summary in Figure 9.1 sums up the overall meaning of the research, its purpose, and the transformations involved. The research process is based on three main methodological designs, which are the furthering of work by Espejo and others at Aston University. These are an overall problem-solving methodology, approach to study organisation, and approach to design system.

The key issue is design, although design is only possible with the support of the other two processes. The input is based on the problems of MPS and

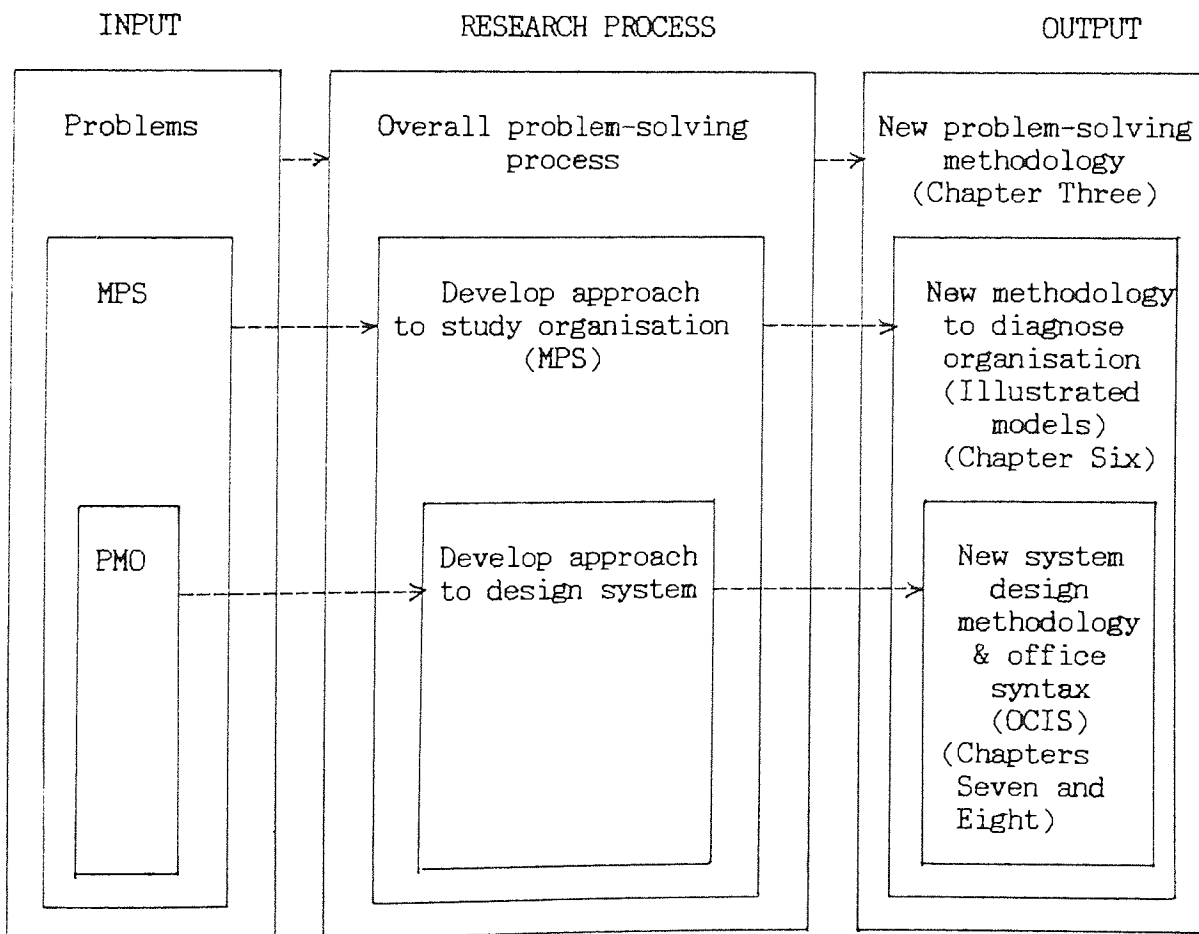


Figure 9-1 Research Summary: A Systems View

PMO in the context of organisational complexity and information management. The output is what the research produces, which includes the application of a problem-solving methodology (Figure 3-3); the use of a methodology to study/diagnose organisation (Chapter Six); and a methodology to design a system producing OCIS (Figure 7-4), a new office syntax based on the cybernetic principles (Chapters Seven and Eight). This diagram represents an aggregate picture of the meaning of the research.

With this in mind, the contribution of the research can be judged from different perspectives. The two main original claims of the research are: firstly, the application of new methodologies; and secondly, the development of a new office concept.

9.2.1 NEW METHODOLOGIES

As regards to methodology, three approaches have been unfolded (as discussed earlier in this section). In the overall problem-solving process, the author has combined the cybernetic methodology (CM) and soft systems methodology (SSM). The key ideas used from SSM are "root definition" and "rich picture" which provide useful support for the tools of CM. The reflective methodology of SSM enables the practitioner to have a rich picture of an organisation and more accurately appreciate and cope with its complexity. In using the CM tool "naming the problem situation", the practitioner is able to narrow down, structure and focus upon the viewpoints of individuals, and pinpoint the organisational mechanisms to deal with complexity.

The research has not set out to change any fundamental concepts in cybernetics and information management, though some of the cybernetic models/tools have been modified. For instance, the original structure of the VSM, with its main functional elements, are retained. Improvements are suggested through providing new syntax especially as regards its communication channels, variety operators are introduced. In addition the models are simplified to suit the design objective. The generalised use of these models/tools is through the idea of the management centre, anticipatory mechanism, and other variety operators.

The research offers a design method for an office system. The design approach, based on the principles of variety engineering, provides an alternative view in the design of an office that supports the PM's management of MPS.

9.2.2 NEW OFFICE CONCEPT

The next claim of the research is furthering the concept of office system. The application of cybernetic principles (with original and modified syntax), supported by the information management framework, produces OCIS - an office viewed as a VARIETY OPERATOR built to support the management process by using information effectively, and supported by efficient communication systems.

With this concept, the transformation taking place is a shift from technological to organisational appreciation in the context of communication. There is therefore a stress on the human element for design purposes. The novelty is the use of a cybernetic method to

effect transformation that allows for the indeterminate and rich relations which take place between human beings as they perform their roles at the same time as suggesting new organisational structures.

9.3 CONCLUSION

The ideas created by the research are applications of evolving methodologies in problem-solving, organisational study and office design. From the point of view of design, the research offers an alternative view for office systems design. Far from the traditional view of isolated systems for office, MIS, or even ES, especially in the Malaysian scene, the design has integrated all these into a whole system. This agrees with the basic principle underlying systems approaches. The research design incorporates the technological elements, in line with current IT developments but the central notion here is the use of IT in a systemic manner. The research also offers an office language or syntax which is seen from the various OCIS models. A unique feature in the design of OCIS is the use of the principle of "variety operation".

One of the most important aspects of cybernetics is the stress on communication. In the present context, the management centre (MC) can be seen as a powerful channel to facilitate communication, and becomes effective with the necessary information systems support. Given the state of technology, the high level of technical expertise, and more important, the usefulness of the information system designed, it is practicable to implement a MC. The idea is to create an environment where the executives have control over the situation, instead of being overwhelmed by the technology used.

In Malaysia, the research is intended to be used as a stepping stone for the introduction of systems and cybernetic ideas. One of the ambitions of the author is to apply the insights in a practical project. This project should involve a small (i.e. more easily managed) public sector organisation. In this way, there will be the opportunity to improve understanding of the theoretical principles, and at the same time to test them against reality.

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REPORT ON USER APPLICATION AND SYSTEM ANALYSIS BY CEIMS USERS

1. Objective

The aim of this report is to identify and analyse the level of systems usage by primary, secondary and PMO users throughout 1987.

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3. Usage Analysis

3.1 Applications Usage

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Table A1.1 - Number of Applications Integrated According to Type and Classification of Applications.

Type	Classification of Applications		Total
	General	Restricted	
Data Base (SQL & STAIRS)	21	30	51
Texts (Flat files)	388	71	459
Charts/Maps (Admgdf/Admsave/Exec)	788	132	920
Total	1197	233	1430

3.1.4 From the 51 Data Base applications, only 50% is accessed by primary users. From this percentage, 33.3% are from GENERAL applications and 17.7% from RESTRICTED applications.

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3.2 Frequency of Usage

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3.2.3 In the first six months (1.1.1987 - 30.6.1987), as many as 16.67% of primary users never "log on" into the CEIMS system whereas 23.44% of secondary users never "log on" into the system.....

3.2.4 In the second six months (1.7.1987 - 31.12.1987), as many as 21.11% of primary users never "log on" into the system, while 22.99% of secondary users never "log on" into the system.....

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3.3.2 The total time utilisation of the system by primary users throughout 1987 is 24.67 hours

3.3.3 The total time utilisation of the system by secondary users throughout 1987 is 48.77 hours

Table A1.2 - CEIMS Systems Operating Time By Classification of Users

Users	Operating Time (Hours/year)	Percentage (%)
Primary	24.67	0.79
Secondary (Support)	48.77	1.55
Development	241.19	7.68
Maintenance	24.98	0.80
Operations 1	80.12	2.55
Operations 2	80.80	2.57
Systems	79.80	2.54
	580.33	18.48

4. Conclusion

From the results of the analysis based on the aspects of usage of applications, frequencies of usage and system time usage, the conclusions derived are:

4.1 The level of applications and systems usage are very low compared with the availability of system, particularly to primary and secondary users.

- 4.2 Primary and secondary users are more interested in using the Data Base applications compared with Text and Chart applications (Note: 43.8% of the Chart and Text applications are concerning Organisation Profiles).
- 4.3 The users of Prime Minister's Office in general access all the three types of applications mentioned above exceeding 60% of the total of each type of applications.
- 4.4 The frequency of systems usage by primary users is between 32% and 57% while usage by secondary users is between 32.2% and 60% throughout 1987.
- 4.5 Time usage of the operating system by real users (primary, secondary and development) is about 10% of the total system operating time in 1987.

Note: The above are selected extracts translated from the original textual report written in Bahasa Malaysia entitled "Laporan Analisa Penggunaan Aplikasi dan Sistem Oleh Pengguna-Pengguna SMPKE" dated 18th January 1988.

SOURCE: SMPKE (1987)

DESCRIPTIONS OF MALAYSIAN TERMINOLOGIES

1. CABINET

Cabinet is a council of ministers consisting of the Prime Minister (as chairman) and an unspecified number of Members of Parliament. It is constitutionally an advisory body performing the Ruler's executive power. It formulates policies. Its policies and directives are implemented by the government administrative machinery (at Federal level) and therefore becomes a ruling body.

2. EXECUTIVE

FEDERAL EXECUTIVE POWER

The executive authority vests in the Ruler on the advice of the Cabinet or minister responsible, with the exception of certain discretionary matters.

GOVERNMENT EXECUTIVE (FEDERAL)

Its function lies with ministries/departments. The chief executive (non-political) of a ministry is the Secretary General. The chief executive of the PMD (non-political) is the Chief Secretary to the nation, who is also the non-political head of the public sector.

3. PUBLIC SECTOR

The public sector consists of Government ministries, departments and statutory agencies at federal and state levels, and all administrators and staff in it. The public service and service commissions form the non-political component and owe loyalty to the Ruler while serving the Government in power.

4. MINISTRIES

4.1 MINISTRY OF AGRICULTURE (MA)

The objective of MA is to increase incomes in rural society through improved crop production by improving agricultural services and modernization in technology. Benefitors are smallholders. Key departments are Agriculture, Fisheries, Drainage. Key statutory agencies are Malaysian Agricultural Research Development Institute (MARDI) to promote use of technology to increase productivity in agriculture leading to modernization, and Federal Agricultural Marketing Authority (FAMA) for better marketing.

4.2 MINISTRY OF FINANCE (MF)

Also referred to as the TREASURY, it is a Central Agency of the Government whose function is to control national expenditure.

4.3 MINISTRY OF LABOUR (ML)

The objective of ML is to restructure and promote a balanced distribution of manpower in accordance with the national socio-economic policy. Manpower Department (DM) of ML aims to upgrade and produce skilled and semi-skilled workers through training programme. It also channels manpower to industries/employees as well as collects, analyses and disseminates labour market information for manpower planning.

4.4 MINISTRY OF LAND AND REGIONAL DEVELOPMENT (MLRD)

MLRD ensures that those in the rural sectors have reasonable income to enable them to improve their economic and social conditions. It will maintain a balance in development between regions by increasing manpower and improving the economic and social conditions of those living in under-developed regions whose livelihood depends on land utilization. One of its key agencies is the Federal Land Consolidation and Rehabilitation Authority (FELCRA), which develops and rehabilitates State land schemes and alienated lands. The aim is to increased employment in agricultural sector, improved productivity of participants and increased land ownership with equitable distribution. Federal Land Development Authority (FELDA) carries out land development and settlement which gives the rural people the opportunity to resettle in planned settlement projects providing essential amenities. Rubber Industry Smallholders' Development Authority (RISDA) modernises smallholder sectors. Finally, Regional Development Authority (RDA) consists of JENGKA, KEJORA, KEDA, KESEDAR, DARA, PERDA and KETENGAH are located in different States.

4.5 MINISTRY OF NATIONAL AND RURAL DEVELOPMENT (MNRD)

MNRD aims to uplift the standard of living by increasing employment opportunity for rural inhabitants and improving their economic status and social conditions. Activities of MNRD include developing and restructuring villages, providing basic facilities and utilities, providing social amenities, and establishing industries utilizing local resources to encourage rural participation and increase incomes. A key agency under the ministry is Council of Trust for the Indigenous People (MARA) which emphasizes on training rural population enabling them to participate in commerce and industry.

4.6 MINISTRY OF PRIMARY INDUSTRIES (MPI)

MPI aims to increase income and employment of small producers by undertaking research, development and marketing of primary products.

4.7 MINISTRY OF PUBLIC ENTERPRISE (MPE)

MPE aims to restructure society by increasing "bumiputra" (indigenous people) participation in management, equity ownership and entrepreneurial development in the corporate sector. Key agencies for MPE are State Economic Development Corporations (SEDCs), State Agricultural Development Corporations (SADCs) and Urban Development Authority (UDA). SEDC develops the economy of the states in areas of trade and industrial sector, while SADC concentrates on the

development of agricultural projects, such as opening up of new lands. UDA implements projects in urban areas on development, redevelopment, settlement and resettlement for the benefit of the urban poor.

4.8 PRIME MINISTER'S DEPARTMENT (PMD)

PMD plans, coordinates, formulates and ensures implementation of all government policies and objectives. Below are some of its divisions.

a. ECONOMIC PLANNING UNIT (EPU)

EPU is a central staff agency of the government for planning national economic development by acting as the secretariat to NPC, NDPC and other important economic committees and panels. It does economic planning for the Cabinet. It also coordinates expenditure for development plan, carries out economic research with the Statistics Department, and plans for expenditure. Its general functions are therefore planning, research, advisory and coordination. Activities carried out are: preparation of 5 year and annual development plan; initiate social and economic research; evaluation the progress of 5 year development plan and recommending changes; advising the government on current economic problem by maintaining intelligence on current overall state of economy and prospects for growth over the next 5 years; reconciling public sector investment targets with development proposals for allocation and expenditures..

b. IMPLEMENTATION COORDINATION UNIT (ICU)

ICU is a central agency which coordinates policies of Ministries and Departments. It also acts as Secretariat to NAC for monitoring projects of the Government. Its main functions are coordination, monitoring and reviewing, advisory, planning, liaison, secretariat (to Cabinet committees), and supervisory. Its activities are to monitor and evaluate the implementation of national programmes in detail, review the physical progress; identify problems, propose remedial actions, and formulate new strategies to speed up implementation.

c. MODERNIZATION AND MANPOWER PLANNING UNIT (MAMPU)

MAMPU is responsible for administrative planning and modernization, and to provide management consultancy services to the public service. It also coordinates the process of manpower planning and development.

d. NATIONAL INSTITUTE OF PUBLIC ADMINISTRATION (INTAN)

INTAN, a training institute in the PSD, is a central personnel agency of the Federal Government. Its main aim is to improve the efficiency of the whole administrative system to effectively develop and maintain national policies and programmes.

e. PRIME MINISTER'S OFFICE (PMO)

As the PM's confidential office, PMO undertakes research as directed by and on behalf of the PM, concerning current social, political, administrative, religious and economic issues (such as privatisation, Look East). In most instances, the PMO complements research by other agencies.

f. PUBLIC SERVICES DEPARTMENT (PSD)

PSD is a central personnel agency of the government and is a department of the PMD. It coordinates the management of personnel policies. Among its activities is that of manpower planning and training in the public services.

g. SOCIO-ECONOMIC RESEARCH UNIT (SERU)

SERU's primary objective is to carry out investigations on national socio-economic issues, giving priority to the evaluation of socio-economic development programmes and projects and to channel the results of the investigation to the planning and implementation authorities concerned at all levels as a feedback and input for the scrutiny of the government policy and programme to achieve the aims of the national socio-economic policy.

5. COMMITTEES

5.1 NATIONAL COUNCILS (NC)

Under the set up of the Malaysian Government, there are three NCs which are responsible for the overall planning, coordination and security of the country. These councils are answerable to the Cabinet, and consist of senior Ministers chaired by the PM. National Economic Council (NEC) considers plans before submitting to the Cabinet for approval, and consists of NDPC. National Action Council (NAC) coordinates and supervises the implementation of development plans. National Security Council (NSC) is responsible for national security. Figure A2.1 shows the relationship between these councils and central agencies to facilitate national planning, coordination and security.

5.2 CABINET COMMITTEES (CC)

CCs are permanent committees formed to assist the Cabinet in matters of policy making. It basically coordinates policy-making. It also coordinates Ministerial activities, assisted by NC. The committees are formed based on specific issues and consist of related ministers as chairsmn and members. Normally, the PM is the chairman being the head of the Cabinet. Some of these committees are CC on Fifth Malaysia Plan, Cabinet Economic Committee, National Council on Islamic Affairs, Cabinet Anti-Drug Committee, CC on Tourism. The PMO is represented in any committee where the PM is the chairman.

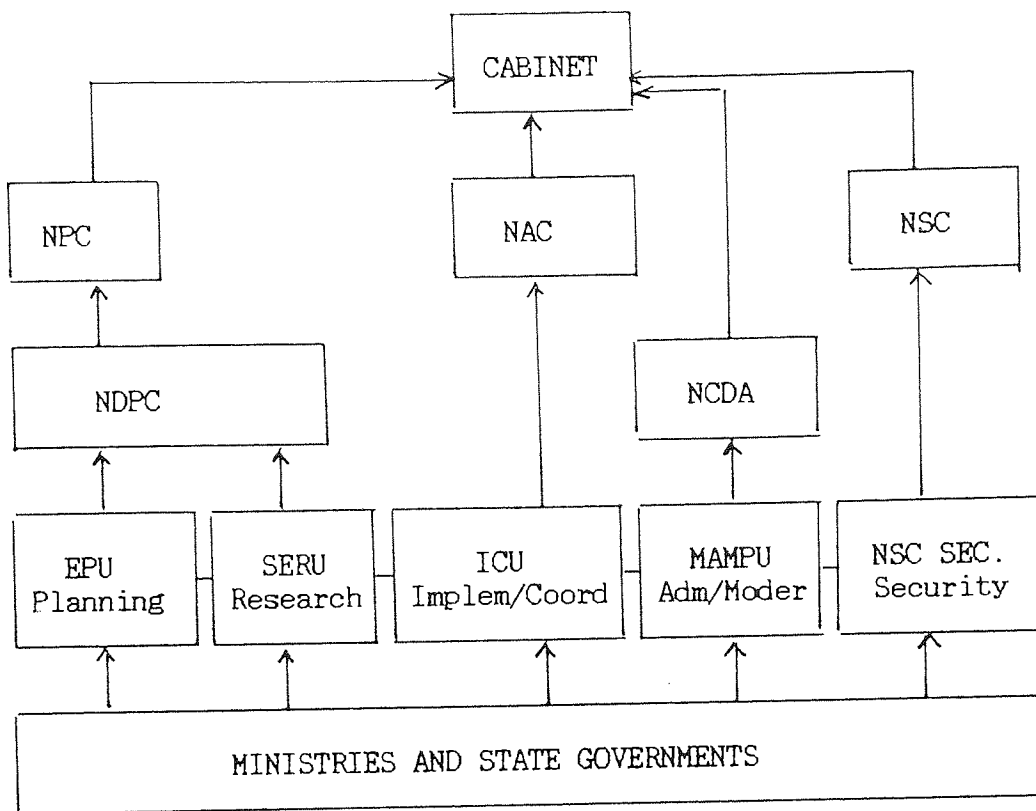


Figure A2.1: Machinery for National Planning, Coordination and Security

5.3 ECONOMIC PANEL (EP)

It consists of political leaders, senior government officials, semi-government bodies, private firms and academicians who are experts in various economic fields. It assists the NPC to review and examine national economic policies.

5.4 NATIONAL DEVELOPMENT PLANNING COMMITTEE (NDPC)

NDPC consists of senior members of the public service and it principally acts to formulate and review all plans for national development and make recommendations on the allocation of resources. In the exercise of its functions, it may use its own discretion to make decision or make reference to Cabinet or the NPC. As all proposals for government plans must go through NDPC, it is the most powerful planning body. Its secretariat is EPU.

5.5 NATIONAL PLANNING COUNCIL (NPC)

The NPC consists of senior Ministers. It considers all matters of major public policy in the economic field affecting national development.

EXHIBIT A2.1

LIST OF FUNCTIONAL AND SERVICE MINISTRIES

FUNCTIONAL MINISTRIES

- 1) Prime Minister's Department (EPU, ICU and PSD)
- 2) Ministry of Finance (Treasury)

SERVICE MINISTRIES

- 1) Agriculture
- 2) Culture and Tourism
- 3) Defence
- 4) Education
- 5) Energy, Telecommunications and Posts
- 6) Foreign Affairs
- 7) Health
- 8) Home Affairs
- 9) Housing and Local Government
- 10) Information
- 11) Justice
- 12) Labour
- 13) Land and Regional Development
- 14) National and Rural Development
- 15) Primary Industries
- 16) Public Enterprises
- 17) Science, Technology and Environment
- 18) Trade and Industry
- 19) Transport
- 20) Welfare Services
- 21) Works
- 22) Youth and Sports

EXHIBIT A2.2

LIST OF ABBREVIATIONS

CC	Cabinet Committee
DA	Department of Agriculture, MAG
DI	Department of Information, MI
DMP	Department of Manpower, ML
DS	Statistics Department, PMD
EP	Economic Panel (PMD)
EPU	Economic Planning Unit, PMD
FELCRA	Federal Land Consolidation and Rehabilitation Authority, MLRD
FELDA	Federal Land Development Authority, MLRD
FIC	Foreign Investment Committee (PMD)
ICU	Implementation and Coordination Unit, PMD
MA	Ministry of Agriculture
MARDI	Malaysian Agricultural Research Development Institute, MA
ME	Ministry of Education
MF	Ministry of Finance
MH	Ministry of Health
MHS	Ministry of Housing
MI	Ministry of Information
ML	Ministry of Labour
MLRD	Ministry of Land and Regional Development
MNRD	Ministry of National and Rural Development
MPE	Ministry of Public Enterprise
MPI	Ministry of Primary Industry
MTI	Ministry of Trade and Industry
NAC	National Action Council
NC	National Committee
NEC	National Economic Council
NPC	National Planning Council (PMD)
NSC	National Security Council
PMO	Prime Minister's Office
RDA	Regional Development Authority (MLRD)
RISDA	Rubber Industry Smallholders' Development Authority (MLRD)
SA	State Agency
SADC	State Agricultural Development Corporation (MPE)
SEDC	State Economic Development Corporation (MPE)
SERU	Socio-Economic Research Unit, PMD
UDA	Urban Development Authority, MPE

- Sources: (a). SMPKE, 1986
(b). "Information Malaysia 1987 Yearbook" Ed. G.Karim,
Berita Publishing, Kuala Lumpur 1987.

APPENDIX 3

ROOT DEFINITION

"Root definition" (RD) is a means of naming a system as in the fourth phase of the "soft systems methodology" (SSM) and the problem structuring stage of the cybernetic methodology. The original idea of RDs comes from Checkland using the following variables :

CLIENT or CUSTOMER (C)

Beneficiaries or victims of the system(s)

ACTORS (A)

The agents who carry out the activities (transformation) of the system

TRANSFORMATION (T)

The transformation of input into output of the system

WELTANSHAUUNG (W)

Image of the world (world view) that makes this system meaningful

OWNERS

Those who control and can abolish the system

ENVIRONMENT

External constraints affecting the system

The above six variables form the mnemonic **CATWOE** which says that human activity systems are in constant change and therefore any name is bound to capture a "transformation" of one kind or another.

As used in the research, RDs are used in "naming the system" which is in a more simplified version which excludes Weltanschauung and Environment. The modified version is **TACO** which constitutes transformation, actors, clients and owners. The arrangement also changes to **TACO**, putting into priority the transformation variable, since it is the core of any system.

VIPLAN

1. INTRODUCTION

Viplan is a method supported by software designed by Espejo at Aston University, that intends to create a rich and consistent knowledge base to support the cybernetic analysis of organisations. It is therefore a useful tool for organisational diagnosis and design. Success in using Viplan depends on achieving adequate support by people in the organisation.

It can also be viewed as an expert system in so far as management of complex organisation is concerned. Compared with other ES tools, Viplan is unique as its emphasis on organisational effectiveness. In this it is very different from others which are mainly built around the applications of medicine, science and engineering.

The present version is at its initial stage of design and usage where application has already been carried out for data gathering and analysis. Its potential as a diagnostic tool for organisation is not tested yet and should not be compared with the others. The prime importance is its usability to managers. At present a lot of rebuilding and redesign is required by the product developer in order to finally realise its design and diagnostic objectives.

Viplan is a systemic tool which, in general, has much to offer to managers.

I intend to look at Viplan in the context of its overall applications including its data gathering, analytical and diagnostic capabilities. Finally, comments will be made on its applications in the Prime Minister's Office (PMO).

2. VIPLAN AS A TOOL FOR DATA MANIPULATION

The main purpose of "Viplan Projects" is to produce useful results for the participating organizations, and these projects should produce in each case an "organizational diagnosis". Prior to this, data need to be collected.

Data are usually collected and analysed before they are usable by users in the form of information. In Viplan context, data collected need to be reliable for use in Viplan if Viplan is to be of effective use in diagnosing organisation. In this respect, Viplan provides the facilities for data collection thereby providing enormous aid to users.

2.1 DATA MANIPULATION APPROACH

A lot of interactions with management group within an organisation is required in Viplan. In trying to make it workable, analysts have to get the involvement of key personnel in organisation. This is due to the fact that we need to gather only organisational data that are perceived by these people including data on individual roles, committees, functions, activities, etc. These data may not be identical to those normally kept in documents and files in the organisation. The analyst, however, need also to get hold of these documentation to complement those acquired from relevant personnels for determining discrepancies. The observation that follows are approach to collect, analyse and handle Viplan data.

- a). General discussion with the main organisational contact: The first step is to establish the availability of general information about the organisation, e.g. organisation charts, names of managers, names of organisational units, flowcharts of production processes, information flows, organisational functions, committees, working groups, etc. This information should permit to enter "known names", in advance to the interviews, in the "right hand side" screens of Viplan.
- b). First meeting with individual managers: The interview schedule for these meetings is that suggested by the Viplan questions. In this first meeting it seems unlikely that the computer will be of any use. Interview can be conducted by various means, depending on individual analysts, interviewees and circumstances.
- c). Data analysis will be a major aspect of the work. The idea is to transcribe the interviews to paper and use these documents to complete the information for each role in Viplan. After interviews, Viplan can be used for data entry and checks. Checks are used for consistency and completeness of the collected data. The checks will permit us to establish the information needed to confirm us when interviewing other managers. The advantage of using the output of the Viplan checks as an input for future interviews are that they permit to check immediately whether there are aspects that have not been covered by the answers of the manager. For instance, we may detect that an already named communication (by another manager) with this manager has not appeared in this interview.
- d). Second meeting with each manager: The purpose of this meeting is to complete the database, sort out inconsistencies and check our personal views about the situation. The computer can be used here. The attraction to the manager would be the knowledge-base already formed in the computer after the first round of interviews. At this stage, it is possible to "query" the database asking aspects like flows of information from one point to another, reports being sent by an organisational unit to others and so on. This is done by referring the menu of queries (Qint) in Viplan. Before this second meeting, we need to have clear view of the "organisational names" we wish to test (i.e. the relevant viable systems we want to study using the VSM), the "technological models" of these organisations and the tables recursion/functions. Beer's diagrams like the VSM, regulatory loops, etc might be useful here.
- e). Resources necessary to run Viplan. We need to access to an IBM AT or compatible, preferably with 640K (but not less than 512K) memory and hard disk.

2.2 COMMENTS ON USE OF VIPLAN FOR DATA COLLECTION

After going through the data collection phase, I was quite at ease using the product. However, there are some shortcomings faced which are described below:

- a). it is not easy for beginners, especially for those who do not have basic knowledge on recursivity characteristics of organisations. This problem will be solved naturally after some practice in keying in data.
- b). the amount of data required to be keyed in is huge and time consuming, especially when it involves important organisational personnel.
- c). the process of entering the data cannot be done directly into the system, and therefore the system is not interactive as such. An

analyst who keys in the data needs to work with the user of the organisation to transcribe the data first onto paper (normally after going through some interviews) and then transfer the data from paper into computer. So, the analyst has to prepare proper schedule and plan to undertake this exercise, especially if users are to be involved.

In practice, data collection process related to Viplan will take a long time, involves careful planning with users, needs initial exposure of certain concepts by analysts and users alike, and involves a lot of cross-checking by different user data. However tedious the process may be, the effort is worth making.

3. VIPLAN AS A TOOL FOR SYSTEM DIAGNOSIS

Every managers will certainly welcome the promise that Viplan can create a rich and consistent database to support the analysis of organisations. I do not wish to make unfair comments here since Viplan is still in its infancy and its diagnostic capability is still not yet tested. The chief difficulty that I foresee, is in gaining support from key organisational personnel. It is rather difficult to force users (the roles within the organisation). Coupled with this, there must be adequate understanding on the part of analysts regarding Viplan's intention itself as well as knowledge on the complexities of components, communication and structure of the organisations. The systemic nature of the product makes it rather difficult for analysts, users and management to grasp.

4. TECHNICAL ISSUES

A number of technical problems emerged in the course of using Viplan:

- a. User-friendliness: Viplan is not easy to use, especially initially. Going through the menus horizontally is time-consuming. One can get lost along the way and do not know one's position, especially if unfamiliar with the organisation. The menus are not clear enough.
- b. Response time: Response time is too slow in going into some of the menus.
- c. Help facilities: Help facilities are not helpful for guiding users in time of difficulties. There need to be more help facilities, and they need to be located at critical parts of the structure.
- d. Windows: As an interactive system, I feel that there are too many windows in a screen, which makes it rather difficult for analysts. Some instructions in windows need improvement.
- e. Updating of data is a tedious process.

5. ASSESSING THE POTENTIAL OF VIPLAN IN PM OFFICE

For Viplan to be made applicable to PMO it needs to fulfil the following purposes:

- a. to provide information support to staff, primarily executives, with regards to the understanding of organisational functioning.
- b. to enable executives to monitor product flows, processes and tasks associated with PMO as well as identifying and reducing discrepancies.
- c. to be able to use Viplan alongside existing tools in PMO in their

effort to improve organisational and staff productivity.

With the above objectives in mind, a fully developed version of Viplan could contribute in a small way towards better management of PMO and its subunits. Its introduction does not affect the components of PMO although it enables better performance by these components. This is possible in several ways.

Firstly, the chief executive (the CSG) can make use of the tool maybe through his secretary in consistently reviewing and updating at the global level any functions, activities and processes he feels necessary. In this way, any changes will be attended to almost immediately. The senior executives can make use of the updated information in revising whatever activities and processes that may follow suit. At this stage, we have improvement in information quality in at least two levels of recursion. At the same time, these executives, through the filtration impact of meetings, discussion and reportings, may provide views, opinions and criticism that may upwardly effect the CSG's decision at high level. The whole process is repeated recursively at the lower levels, although the decisions are becoming more technical and specific.

Secondly, Viplan does not imply a total replacement of the existing tools. To quote an example, existing MIS tool CEIMS with its related applications (Ministrial databases, profiles of people and organisations, etc) and office system (PROFS) application will still be used, although improvements are required. Tools of productivity like Desk Files and Mannual Office Procedures are the best case that can be considered if Viplan is to play a positive role. The existing application of Desk Files (DF) for individuals and Mannual Office Procedures (MOP) for PMO and its subunits is rather taken for granted by most organisation within the public sector. In PMO in particular, most information related to DF/MOP is documented. The master information is kept in diskettes while the staff keep printed copies of relevant parts of DF/MOP. The main problem is that the information is not well maintained and frequently inconsistent and outdated. The information in the master diskette may be the latest version since they are kept in the office of the CSG but those held by staff normally are seldom updated and thus inconsistent overall. It therefore does not fulfill its aim of providing the staff with an understanding of how the organisation works and how they perform according to the stated requirement of DF/MOP.

With Viplan we may not need DF/MOP anymore. Viplan will serve as DF/MOP and a lot more. With the existing capability of Local Area Network (LAN) Viplan can be easily accessible since what is needed are PCs.

Thirdly, Viplan helps the running of PMO through its interactive retrieval (query) system accessible only by PMO's executives. We know that Viplan could create a rich and consistent data base to support the cybernetic analysis of organizations as elaborated earlier. The queries in addition to the basic database will provide a powerful means of information support to executives. One important aspect of Viplan to be considered is the need for analysts to be able to respond to need of executives in building the necessary queries at different levels of PMO.

VIPLAN QUESTIONS
Data Gathering

DESCRIPTION OF JOB/RESPONSIBILITIES

1. Roles you hold / defining authority (**)

(** Delete if not applicable)

ROLE: _____

1.1 Unit(s) this role manages

UNIT : _____

1.1.1 Parent unit(s)

1.1.2 Subsidiary units

1.1.3 Functions of this unit

FUNCTION : _____

1.1.3.1 Products used by this function

PRODUCT : _____

a. Units supplying this product

b. Committees supplying this product

c. Environment supplying this product

d. Roles supplying this product

e. Frequency of arrival

f. Product complexity

g. Characteristics of this product

1.1.3.2 Products produced by this function

- _____
PRODUCT : _____
a. Units receiving this product

b. Committees receiving this product

c. Environment receiving this product

d. Roles receiving this product

e. Frequency

f. Product complexity

g. Characteristics of this product

1.1.3.3 Characteristics of this function

1.1.4 Internal services for this unit

SERVICE : _____

1.1.4.1 Parent unit(s)

1.1.4.2 Subsidiary units

1.1.4.3 Functions

1.1.4.4 Internal Services

.2 This role's supervisor(s)

.3 Roles supervised by this role

1.4 Activities performed by this role

ACTIVITY : _____

1.4.1 Products used by this activity

PRODUCT : _____

- a. Units supplying this product
- b. Committees supplying this product
- c. Environment supplying this product
- d. Roles supplying this product
- e. Frequency of arrival
- f. Product complexity
- g. Characteristics of this product

1.4.2 Products produced by this activity

PRODUCT : _____

- a. Units receiving this product
- b. Committees receiving this product
- c. Environment receiving this product
- d. Roles receiving this product
- e. Frequency
- f. Product complexity
- g. Characteristics of this product
- h. Products whose status this describes

1.4.3 Purposes of this activity

Committees with you as Secretary/Defining authority
Committees (**)

(** Delete whichever is not relevant)

COMMITTEES : _____

2.1 Products used by this committee

PRODUCT : _____

- a. Units supplying this product
- b. Committees supplying this product
- c. Environment supplying this product
- d. Roles supplying this product
- e. Frequency of arrival
- f. Product complexity
- g. Characteristics of this product

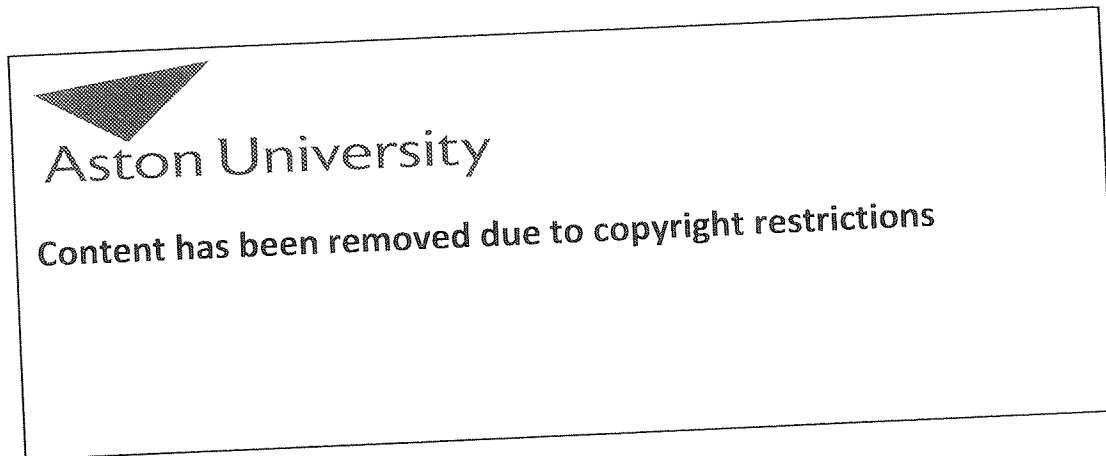
2.1 Products produced by this committee

PRODUCT: _____

- a. Units receiving this product
- b. Committees receiving this product
- c. Environment receiving this product
- d. Roles receiving this product
- e. Frequency of production
- f. Product complexity
- g. Characteristics of this product

2.3 Purposes (roles) of this committee

Figure A5.1 FORMULATION OF NATIONAL PUBLIC POLICY
(FEDERAL LEVEL)



(Source: Hussain, A. Atory. "Pengantar Pentadhiran Awam"
Utusan Publications, Kuala Lumpur, 1986)

TECHNICAL TERMINOLOGIES

PRODUCTS (HARDWARES/SOFTWARES/EQUIPMENTS) ON MAINFRAME COMPUTERS

INTELLECT

Application for retrieving information from SQL database using a natural language system (English language format) that acts as an interface for SQL users. Useful for middle managers. It can run on IBM mainframe with VM operating system.

ISSCO

A software for developing sophisticated graphs and maps on mainframe computers. It can be used on IBM systems with VM operating system.

QBE (Office-by-Example)

An IBM's newly developed integrated office information system supporting office features such as database tables, word processing, electronic mail, graphics, images, etc. It is an extension of the earlier IBM's QBE (Query-by-example) and works under VM environment.

ORACLE

A DBMS (Database management system) on mainframe (and micro) systems, which is IBM-compatible. It is possible to employ uniformly the language SQL both on mainframes and micros.

PROFS (PROFESSIONAL OFFICE SYSTEM)

PROFS is an IBM office management product on IBM mainframe which provides facilities such as diaries, electronic mail, messaging, etc. It is claimed to be a useful tool for middle and top managers.

SAS (Statistical Analysis System)

SAS/CMS is the basis SAS product usable on an IBM mainframe. SAS/FSP is a database management system (DBMS) with facility for direct accessing of applications developed using VM's development tools. SAS/graph supports the producing of maps and graphs. SAS generally can be used on both IBM 3279 and other terminals.

STAIRS (Statistical Analysis and Retrieval System)

STAIRS is a database system for retrieving text. STAIRS/CMS is used on an IBM mainframe running VM operating system. It may be a useful text retrieval tool to middle managers.

SQL (Structured Query Language)

SQL/DS is an IBM database management system on IBM computers. It supports INTELLECT for query purposes, and is useful for technical people and low level managers.

VMAS (Virtual Machine Application System)

VMAS is an IBM product for use on IBM (or compatible) mainframes running a VM operating system. It is an integrated software that integrates application, develops graphics, provides planning aid, and forecasting. It may be useful to low level managers.

TECHNICAL TERMINOLOGIES

PRODUCTS (HARDWARES/SOFTWARES/EQUIPMENTS) ON PERSONAL COMPUTERS

COORDINATOR

The Coordinator (a product of Action Technologies) is a workgroup productivity system currently used in IBM PC-compatible machines for everyday operations in sales, finance, general management, and planning in organisations of a variety of sizes and types. It provides facilities for generating, transmitting, storing, retrieving, and displaying records of moves in conversations. Unlike electronic mail systems that take messages and information as their starting points, it is based on language/action focused on the "conversation manager". It is a system for managing action in time, grounded in a theory of linguistic commitment and completion of conversations (Flores et al 1988).

CYBERFILTER

Cyberfilter is the name for a computer system which aims at creating an effective balance between managerial capabilities and organisational complexity. It is based on the cybernetic notion of variety filtration. It was first developed by Stafford Beer (1975) where it was applied in the regulation of activities within an organisation. It uses the Bayesian statistical theory, according to the Harrison-Stevens protocol where it examines streams of data flowing within the enterprise for any alerting signal that might enable a manager to take action to avert trouble before it results in damage to the enterprise (Espejo 1979a). In a way, it is also a decision support system.

DBASE IV

Dbase IV is a relational database management system which may be run under MSDOS, on IBM PCs or compatibles. It enables the design of simple to sophisticated databases. As a high level programming language, it can perform reasonable sophisticated calculations.

ECF (Enhanced Connectivity Facility)

This IBM product works on an IBM mainframe running VM. It allows PC to use mainframe printers for PC output, to set up and use mainframe disks as PC disks, and to use virtual mainframe files. The virtual disk appears to the PC as if it were an additional hard disk on the PC, and holds its information in PC format. Standard DOS Copy, Dir, and similar commands can be used. Other users logged on to mainframe can share the use of this disk if authorised. This provides sharing of PC data and programmes, as well as backing data to mainframe. (Also in Appendix 6.3.

INTELLECT

Developed by Artificial Intelligence Corporation (AIC), this is a microcomputer implementation of natural language interpretation capabilities providing users with a stand-alone system with natural language features. It is a microcomputer version of INTELLECT

system of IBM mainframes. It interfaces with existing PC software like DbaseIV (on its input side) and graphics packages to format displays (output side). Its minimum requirement is an IBM PC with 512K bytes of memory and a hard disk drive. (Also in Appendix 6.1)

IRMA 3270

Emulation card for PC-mainframe link which is fitted into a PC and allowed to be connected to a mainframe controller by a coax connection. The PC will look and behave like a standard 3270 terminal.

IRMA 3

A product of DCA, it is an emulation card to enable PC access mainframe applications. It allows PCs to be connected to dial-up or leased telephone lines and emulate more advanced screen features such as graphics and file transfer. DCA has produced more advanced product that allows PC to emulate more advanced screen features, such as graphics and file transfer. (Also Appendix 6.3)

IRMAPRINT is a protocol converter which allows standard printer to be attached directly (using coax connections) to IBM mainframe.

MacMainframeII

It enables Mac users to be connected to IBM mainframe. It allows text, binary, and document files to be exchanged between Apple Macintosh and IBM mainframe. (Also Appendix 6.3)

MSDOS

A disk operating system for the PC.

OMEGA

OMEGA is an office system methodologies/models which is an outgrowth from the field of artificial intelligence. It is a knowledge-embedding language used to embed specific office job descriptions into an office worker's workstation support of problem solving (Barber 1982). Among its special features is its ability to handle unexpected contingencies, as well as making the actions performed by an office worker more comprehensible.

ORACLE

A database management system. (Also see Appendix 6.1)

Paradox SQL

A PC-mainframe linking product which enables IBM PCs and compatibles to query SQL-compatible mainframe data. (Also Appendix 6.3)

STORYBOARD

IBM's software to enable preparation of presentation materials with the use of text and graphic facilities making the presentation attractive. Can be used as a replacement to slides.

5. TAC
It is a Lotus product as an add-in to Lotus 1-2-3 spreadsheet, and a matching programme running on the mainframe running VM and TSO. Running TAC in conjunction with 1-2-3 enables PC user to automatically perform SQL requests, extract data, manipulate it as required, and place it into any designated area of the spreadsheet. This is an excellent micro-mainframe link implementation. (Also Appendix 6.3)

3. VIPLAN
See Appendix 4.

5. VM PC (Virtual Machine/Personal Computer)
It is an operating system used on IBM PCs (and compatibles) enabling the implementation of IBM's mainframe VM multiuser operating system on a suitable PC. It allows multiuser operation on a PC, cooperative processing with a VM host, and off-line development of VM systems. The program needs a largest, fastest and most expensive MCA machine. It is useful as a departmental system. (See Appendix 6.3)

TECHNICAL NOTES

MICRO-MAINFRAME CONNECTIONS

The connections are based on a system using host mainframe (IBM 3083) running a VM operating system:

PCs refers to IBM PCs, IBM compatibles, Apple Macintosh, Apple Compitables depending on types of connectivity as explained below.

A PC is linked to OCIS IBM mainframe host in two ways:

A PC can be emulated as a normal mainframe terminal, using these products:

IRMA3 for IBM PC and compatible to emulate IBM 3270 terminals. This mode can however be switched off for the PC to be reverted to its original PC function.

IRMAPRINT enables PC printing from IBM mainframe.

MacMainframeII allows to connect Mac users to IBM mainframe, where Mac is emulated as IBM's 3278 or 3279.

A PC is connected to mainframe as intelligent workstation allowing it to perform more and more of the tasks formerly performed by mainframe.

A PC can download data from mainframe by using PC application programme, can browse data and print a report.

A PC can be used to enter data which can later be uploaded to mainframe for processing.

Therefore, the mainframe is used as a huge file server.

The products to facilitate these connectivities are:

IBM's SAA (System Applications Architecture) for distributed database.

VM PC for PC to IBM mainframe running VM. The PCs required are fast 386- or 486-based IBM compatible PC.

MacMainframeII allows file transfer between Apple Macintosh and IBM mainframe.

Paradox SQL enables PC user to query SQL data on mainframe. The PCs referred to here are any IBM-compatible 80286 or 80386 PC with 3270 emulation.

TAC is an extension to Lotus 1-2-3, running on the mainframe. It enables PC user to perform query on SQL.

ECE allows PC to use mainframe printers for PC output, to set up and use mainframe disks as PC disks, and to use virtual mainframe files.

TECHNICAL NOTES

COMPUTER NETWORKING PRODUCTS

DECNET

Digital Equipment Corporation's network architecture that allows connectivity from the PC level to large mainframes. It also provides the capability to bridge its customers and equipment into the IBM environment through the use of gateways.

ETHERNET

Developed by Xerox in cooperation with DEC and Intel, this local area network (LAN) interconnect DEC minicomputers. It has become a popular LAN for microcomputers.

FILE SERVER

It is an interfacing device/product between PCs and hosts. It collects and consolidates groups of PCs. It in turn is connected into the host. It provides centralised local storage for users and delivers processing capability that can be used for application processing or development. (Also see network server)

FRONT-END PROCESSOR (FEP)

FEP is a processing system that offload some of the processing load from the central computer. It typically handles communications coordination functions before the data is sent to the central system for processing. Examples are the terminal control units (TCUs) for local links and communications controller for remote links.

GATEWAY

Gateways are products that allow different networks to communicate by providing protocol translations between the networks. It therefore allows data to be transferred back and forth between networks.

LAN (Local Area Network)

LAN is a communication network connecting computer terminals and other devices within an organisation. LANs may also connect with other private or public networks. It is one of several short-distance data communication schemes typified by common use of a transmission medium by many devices and high data speeds. LAN uses the necessary products and devices to connect workstations (including PCs) so that they can communicate to each other. LANs can be connected in several topologies, including a star, ring, or bus.

MAYPAC

A public data network service offered by the Malaysian Telecom using the packet-switching network. It offers value-added services particularly to the Malaysian public sector organisations at a reduced cost because of communications resource sharing.

8. NETWORK SERVER

The network server, often another PC distributes the requests of PCs on the network. File servers, print servers, communication servers and others perform similar tasks according to their required network applications.

9. PBX (Private Branch Exchange)

A network similar to a telephone switching station using a message-switching technology to network stations to each other. Only a modem and phone set need be available at the end-user end. The newest, third generation PBXs are digital switches which handle both voice and data communications.

10. SNA (Systems Network Architecture)

An IBM network infrastructure that permits connectivity from the personal computer level to the largest host mainframe. SNA provides support for a variety of network protocols within a basic network architecture.

11. TOKEN RING

An IBM's Local Area Network developed in the early 1980s designed to support a broad variety of host machines, including mainframes as well as smaller computers such as PCs. It uses a token-passing technique (token access procedure) with a sequential or ring topology.