A MECHANISM FOR ACTIVATING END-USER LEARNING AND PARTICIPATION IN OFFICE AUTOMATION

BY

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ABSTRACT

This thesis is about 'User Involvement', a theme that is becoming the core of a growing body of research in the area of systems development and implementation. Although the value of user involvement in facilitating change is generally accepted, and has been specifically advocated by many recent system development approaches, its application has proved to be quite difficult. History is replete with cases where the effective implementation of user involvement has been hindered, partly by users who have been ill-equipped technically and psychologically to contribute positively to the systems development process, and partly by the prevailing organizational climate and the lack of an effective mechanism and methodology for participation.

Problems experienced by offices in general - and in Egypt specifically - when introducing new office technology, as well as the need for further research on the subject of user involvement, have provided the impetus to conduct this research.

A new approach to user involvement in office automation is presented in this thesis. The distinctive features of this approach include a focus on evolutionary learning and participation prior to the introduction of new computer-based office systems; a coherent strategy that addresses within its framework contextual variables at the individual, group and working environment level; a computer -aided mechanism that facilitates and guides the process of knowledge assimilation, user analysis of requirements, and group interaction; a capability of adapting to different organizational contexts; and finally, an interface to selected system development methodologies. The approach has three complementary dimensions: incremental knowledge acquisition, experience with the technology, and guided group interaction.

To date the approach and mechanism have been implemented successfully in four institutions in Egypt. The scope and pattern of implementation have been influenced by the prevailing organizational and political circumstances at each user site. To draw on such experience in future implementations, a description of each case is provided.

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CHAPTER 1

INTRODUCTION

1.1 Background

Recent years have witnessed a rapid increase in the proliferation of new technological innovations in the office. The interest in office technology has been associated with many factors, among which are the growing number of people working in the information sector, escalating office costs, complexity and turbulence in the business environment, advances in technology and decline in equipment costs, competitive pressures, and new opportunities for enhancing productivity and gaining a competitive edge.

The appearance of the microprocessor was considered a revolutionary development as it was accompanied by a significant drop in the size and cost of computer hardware. Exaggerated claims made by many vendors of the new technology, contributed to its widespread adoption by large as well as small business firms. The incorporation of computer-based technologies into the office - generally referred to as office automation - brought many people into more direct contact with the technology, and provided faster and easier access to information, and computing power in general.

The new technology, however, did not in many cases live up to the high expectations associated with its use (Pava, 1983, Hirschheim, 1985, Long, 1987). Focussing on the technology to the exclusion of other human, social and organizational aspects associated with technological change, has often resulted in problems and system implementation failures. Excellence in technical design alone did not guarantee system success (Baronas and Louis, 1988).

Human adjustment to new technology and to change is considered one of the major obstacles impeding the effective implementation of office automation. Adjustment problems are experienced by both management and administrative personnel in accepting and working with new equipment, adapting to new organizational and human relationships, and assimilating new procedures (Matherly and Matherly, 1985). Computer-based office systems can transform the ways that people and organizations work and cause far-reaching social and organizational changes (Tapscott, 1982, Kling, 1983). Such changes have aroused feelings of uncertainty and anxiety which have led many office workers to resist the introduction of new technology (Peterson and Peterson, 1986). Moreover, the lack of technological understanding among managers has resulted in a "blurred and ambiguous picture of the future that office technology is intended to help create" (Keen, 1984) and is a frequently cited reason for the failure of many small business endeavours (Raysman, 1981, Delone, 1988).

Resistance to technological change has been also analysed from a 'group' perspective. New office systems may cause a redistribution of resources which poses a threat to individuals and their various interest groups (Evans, 1983, Hirschheim, 1985). The pluralism in organizations, the political aspects of information systems and the link between information and power have not received adequate attention (Keen, 1981).

Other possible obstacles to office automation are attributed to: an incomplete view and, possibly 'faulty', understanding of the office environment, by both designers and implementers (Grusec, 1985, Wynne and Otway, 1983); an inadequate understanding of the nature of office functions and human tasks (Damodaran, 1986); the neglect of important organizational and social issues, such as organizational restructuring, organizational learning, and cultural change (Pava, 1983); the difficulty of determining system requirements for non-technical users (Tapscott, 1982); and finally the absence of mechanisms for diffusing office technology and integrating it into the organization (Keen, 1983).

Given the above human, social and organizational problems, user-involvement and participation was called upon to supplement the quality of technical design, in many recent approaches to systems development (for example, Mumford and Weir, 1979, Hedberg, 1980, Land, 1982, Mumford, 1981, Pava, 1983,and Hirschheim,1985). There is growing belief that vendors and technical specialists are not in a position to handle such problems effectively. Eason (1983) notes that "it is far better that the pressures for change and growth come from within from informed users than that changes are imposed in a revolutionary way from outside".

The effective implementation of user participation has, however, proved to be quite difficult. Several reasons associated with characteristics of the user and the organizational climate have been advanced to account for this difficulty (see, for example, Damodaran, 1977 and 1986, Eason, 1982, Mumford, 1983, Hirschheim, 1985). So far, there is no adequate information about when and how much user involvement is appropriate (Ives and Olson, 1984), and about the specific mechanism through which involvement is liable to take effect (Robey and Farrow, 1982).Bronsema and Keen (1982) note that although the implementation literature emphasizes the need for user involvement , it fails to provide techniques for making it effective.

A mechanism and a methodology for user involvement are needed to prepare users for technological change and to support them in contributing to the development, design and implementation of office systems.

1.2 Problems and Key Issues Addressed

A realistic approach to user involvement within the context of the office, should take a global perspective and address concurrently the major human, social, and organizational problems outlined in the previous section.

Accordingly, this research is aimed at developing and implementing a coherent user involvement strategy that addresses within its framework:

* Users' attitudes and resistance to technological change.
* Users' lack of orientation with respect to the potential of the new technology and its possible implementation.
* Group behaviour, manifested in conflicts of interests and intra-organizational power and politics.
* The need for a conceptual framework through which to perceive the office environment and office work.
* The need for a mechanism and a methodology for effective participation.

A new approach to user involvement is proposed in this research and is based on evolutionary learning, participation and group interaction.

1.3 Motivation for Research

1.3.1 Contextual and Implementation Challenges

The approach presented in this research evolved as a result of cumulative observations and surveys grounded in active experience, as well as exposure to empirical findings obtained by other practitioners in the field. The application context is the Egyptian office environment.

Contact with management and support staff in both private and public sectors in Egypt, revealed many difficulties encountered in association with new office technology . Inadequate information about the potential and impact of information technology, shortage of expertise, low quality of training, conflicts of interest and power, and the absence of a guiding mechanism have made the introduction of new technology a rather haphazard, piecemeal process with limited or hardly any productivity benefits. There are many cases, particularly in the public

sector when equipment was purchased and simply gathered dust from lack of use! In some cases the decision to introduce new technology was not based on real needs, but was possibly taken to adhere to an overall policy, or for very superficial reasons such as wanting to keep up-to-date. Non-technical managers have found great difficulty in choosing the 'right' technology considering the wide array of tools and the pace of change. Lacking experience, they also found difficulty in analysing their working environment, and in specifying problems and needs. People in a number of offices have expressed their need for guidance and support in understanding, coping with, and managing the new technology. Resorting to external 'experts' or consultants for assistance has often proved unfruitful and costly.

It is such problems and needs, combined with a scarcity of skilled people, and escalating office costs, that provided the initial impetus for this research.

A more detailed analysis of such background experience, as well as results of exploratory surveys of the local environment are presented in chapter 3.

1.3.2 A Call for Research

A review of the literature has been conducted to search for approaches and/or mechanisms that address the contextual challenges presented in the previous section.

It was found that neither with the traditional technology-led approach nor even under the more recent socio-technical approaches do end-users become involved until the analysis process has been initiated. The end-users have had no prior preparation and, in consequence, have been ill-equipped to contribute effectively during the system development cycle.

Eason (1982) reports that although with user involvement the influence of users has moved to an earlier phase of the design process, they needed time before they were capable of making an effective contribution, and by then the design was "frozen" and there was only a limited

"window" through which users may influence design decisions. Although the education of users is advocated by almost all approaches, mechanisms that specify what users should learn, when, and how are not adequately specified.

The issue of user 'readiness' or 'predisposition to become involved' (Ives and Olson, 1984) prior to the initiation of any system development effort, has not received adequate attention from researchers.

At the group level, mechanisms that address conflicts of interest and power, and enable negotiation, confrontation and bargaining to be carried out as part of the systems development process have not been clearly specified.

The behaviour of individuals in organizations may in fact be viewed as operating at three levels, the individual, the group and the organization (Gibson, Ivancevich and Donnelly, 1985). Given this multi-level perspective there is a need for a coherent user-involvement strategy that addresses the issue of user 'readiness', in conjunction with other critical and related issues among which are group behaviour, conflicts of interest and power, and environmental forces.

Finally, despite the many theoretical advantages of user involvement in systems development, it has received in actual practice inadequate attention during the design and implementation process.

Given the inconsistent and inadequate information about how strategies of user involvement work in practice (Ives and Olson, 1984, Baronas and Louis, 1988), there is growing pressure for more theoretical and empirical research in this area, and for the development of appropriate approaches and tools.

1.4 Scope and Organization of Thesis

This research focuses on the non-technical potential users of computer-based office technologies and systems. 'Early' learning, participation, and guided group interaction, are perceived to be vehicles for activating the involvement of such users. It must be pointed out at this stage that learning in this context is not directed towards a specific computer-based system or office automation tool. Learning here means education that is initiated well in advance of any technology decision being taken. It involves an analysis and understanding not only of the potential and impact of the new office technology, but a further analysis at the individual, group, and organizational levels with the purpose of understanding the environmental context, problem areas, personal and business needs. It must be stated that the outcome from the implementation of the user-involvement strategy, mainly mobilized orientated users, preliminary assessment documents,and a suitable climate for change, is intended as valuable input to subsequent system development processes.

This thesis has in general two main objectives:

1. To develop and outline a user involvement strategy;
2. To develop and implement a computer-aided mechanism designed to activate end-user learning and participation in the systems development process.

Testing and implementation of this approach has been carried out within the context of the Egyptian office environment.

Before introducing the subject of user involvement, chapter 2 presents an analysis of the three entities with which this thesis is concerned: the 'people', the 'office' and the 'technology'.Exploratory studies of the local environment are then described in chapter 3 for the purpose of illustrating the contextual challenges that motivated this research. In recognition of the problems associated with technological change and technology centered approaches, the trend towards user involvement and participation is introduced in chapter 4. A review of

participative approaches is presented in the same chapter, indicating obstacles impeding effective user involvement, possible refinements and a proposed solution. This sets the ground for the introduction of a new approach to user involvement. Chapter 5 introduces a strategy and a mechanism designed to induce involvement through 'early' learning and participation while keeping pace with and contributing to the systems development process. Chapter 6 provides a more technical orientation of the computer mechanism. Empirical findings and lessons learned from the implementation of this new approach are then presented in chapter 7. An appraisal of the learning and participation methodology follows in chapter 8, outlining contributions and evaluation criteria. Finally, conclusions are drawn in the last chapter regarding achievements and recommendations for further research.

CHAPTER 2

PEOPLE, OFFICE AND TECHNOLOGY

2.1 Introduction

This chapter is based on the premise that the formulation of a clear user involvement strategy is not possible without a clear understanding of its interacting components i.e. the 'people', the 'office', and the 'technology'.

Section two introduces the 'people' or the human side of organizations. A behavioural approach is presented, calling for an analysis of human behaviour from three different but complementary perspectives: the individual, the group, and the organization. To identify the functional needs and profiles of people in offices, different classification schemes are then described, followed by a definition of the term 'end user', including a proposed classification scheme.

Section three of this chapter introduces the complex context of this application, 'the office' domain. To acquire a rich conception of the office and the nature of office work, an overview of different office perspectives, views, and models is then presented.

Section four deals with the implications of 'new office technology' and the barriers to its effective application. Considering the diversity and the fast rate of change of office technology, it is not always clear what it actually encompasses. Accordingly, an overview is first presented illustrating what this term presently indicates. Next a clarification of the confusion surrounding the term 'office automation' is attempted, followed by an examination of the problems associated with technological change.

Finally, section five evaluates the analysis presented in the previous three sections, and draws a set of conclusions of significance to this research.

At this point, it is worthwhile indicating that the sequence of the three terms 'people', 'office', and 'technology' has been chosen deliberately to emphasize the importance of directing primary attention to the people and to their working environment, prior to the introduction of new technology. Although this may be generally accepted, it is not universally applied in practice, as much empirical evidence indicates.

2.2 People in Offices

2.2.1 A Behavioural Approach

This research focuses on 'People' in offices. From a behavioural perspective it is concerned with issues such as the following:

* What motivates people to learn about new technology?
* What influences individual, group, and organizational learning?
* What facilitates the acceptance of technological change?
* How can conflicts between individuals and groups be resolved or managed?
* What induces people to participate in the introduction of new technology?
* What knowledge and skills do people need to prepare for technological change?

The above 'people' issues involve complex behavioural aspects, that cannot be adequately explained by considering them only from one perspective. Insights from the field of organizational behaviour help to deal with such issues, and offer different but complementary perspectives to the understanding of the behaviour of people in organizations.

Organizational behaviour is defined as "the actions and attitudes of people in organizations" (Gordon, 1987). It is concerned with "understanding, predicting, and influencing individual behaviour in organizational settings" (Knudson, Fleenor and Callahan, 1986).

Organizations are not just concerned with the processing of information, they are political systems that generate power and influence which controls the allocation of resources and the execution of tasks (Long, 1987).

To involve people in the introduction of technological change, they need to become aware of the dynamics of their behaviour and that of others within their organizational work context. After all, human performance, satisfaction and acceptance of change are "directly related to the closeness of fit between the characteristics or personality of individuals and various features associated with their interpersonal and work environments" (Gale and Christie, 1987).

Three levels of analysis are necessary (see, for example Baron, 1986, Knudson, Fleenor and Callahan, 1986, Gordon, 1987):

* At the individual level, for example, needs, attitudes, motives, learning styles, abilities.
* At the group level, for example, politics, norms, conflicts.
* At the organizational level, for example, structure, technology and culture.

An important concept related to the behaviour of individuals in organizations - in this case the office - is that of the 'goal' (Gale, 1987). People do not necessarily share or pursue the same goals. 'Goal directed behaviour' needs to be considered at each of the above levels, the individual, the group and the organization. Individuals need involvement mechanisms that enable them to recognize, enhance and adapt their behaviour in conformance with this hierarchy of goals.

It is also important to consider that the work done in offices is carried out by individuals in communication with other individuals and groups, i.e. as part of an organizational team. Communication between individuals and groups may take place on the basis of the formal structure of the office and organization. However, considerable communication is based on an informal web of interpersonal relationships that develop over time. New office systems can allow for both formal and informal communication to occur between office workers. Communication is not always required for business purposes. Social interaction often takes place for personal satisfaction. Changes to such patterns need to be initiated and negotiated by those involved, otherwise serious adverse effects may take place.

2.2.2 Classifying Office Workers

A variety of classification schemes have been developed to distinguish between different types of office workers. For the purpose of identifying the generic needs and profiles of target users, exposure to such classification schemes is necessary.

Individuals in offices are generally classified according to their job category (see, for example, Lieberman, Selig and Walsh, 1982) as:

1. Managers
2. Professionals
3. Secretaries and Clerks

A different but not conflicting classification of office workers (for example, Long, 1987) distinguishes between :

1. Knowledge workers, and
2. Information workers.

Knowledge workers include professional/technical employees, and managers, whereas information workers include secretarial and clerical personnel. The distinction between the two categories is based on the nature of work performed by each. Traditionally, information workers are thought to be more involved in the routine handling of information, in contrast to knowledge workers who are more occupied in creating, interpreting, analysing and manipulating information. Recent studies however, indicate that the nature of work performed by these categories of workers has not been well understood by many researchers and practitioners. Grusec (1985) states that "it is unfortunately true that faulty understanding of office work has bred faulty modes of office work analysis". It was noted, for example, that secretaries perform diverse activities, many of which are unstructured and self-initiated (Bullen, Bennett and Carlson, 1982). As to managers, Wynne and Otway (1983) indicate that it has been generally thought that their job is primarily an "intellectual process of gathering information and making decisions - functions which are compatible with a high degree of formalization ". In reality, a manager's job involves in addition to intellectual skills, emotional skills, such as persuading, motivating and bargaining (Long, 1987).

In analysing the nature of work performed by individuals in organizations, Frand and Charwat (1984) consider two schools of thought in their determination of 'generic computer literacy profiles', the "Work Activity School" and the "Decision Theory School".

According to the former, 'white - collar workers' may be classified into four occupational groups, all having information handling responsibilities:

1. Management
2. Text-oriented professionals
3. Data-oriented professionals
4. Clerical and secretarial support.

According to the 'Decision Theory School' four levels of organizational activity and three levels of decision making can be identified. The bottom level is termed operations and is non-managerial, whereas the succeeding levels are decision-making layers of operational, then managerial control, and finally strategic planning . Decision-making can be further classified according to its degree of structuredness, as totally structured, semi- structured or non-structured. In general, the higher the level of management, the more it has to deal with unstructured decisions. (Frand and Charwat, 1984).

From a somewhat different perspective, Long (1987) classifies office workers along two other dimensions, prime function and level of discretion. Prime function refers to whether the individual's primary function is oriented towards actually doing the work (producing) or towards co-ordinating and supervising the work of those individuals who are performing such activities. Level of discretion refers to the degree of autonomy given to the individual in performing his or her role.

The two dimensions are put together and illustrated in figure 2.1

Prime function

		Produce	Co-ordinate
Level of discretion	Low	Worker	Bureaucrat
	Iligh	Professional	Manager

Figure 2.1 - A Classification of Office Workers According to Prime Function and Level of Discretion

'Worker' refers to secretarial and clerical personnel. 'Bureaucrat' refers to supervisors responsible only for policy enforcement. To the above functional dimensions, two other behavioural dimensions need to be added: degree of influence and attitude to change. From a user involvement perspective, these two dimensions are particularly relevant. The first is a political factor, and is a function of group norms, power and politics. The latter is a function of individual beliefs, values and 'readiness' to change.

2.2.3 Identifying End-Users

Prior to the introduction of micro-computers and interactive systems, the end-users of computer technology were primarily computer professionals. Today, the new technology is within the reach of many workers in offices with little or barely any data processing background (Yaverbaum, 1988). With the proliferation of computer-based technologies in offices, and the scarcity of technical expertise, educating such potential users and enabling them to accept and participate in the introduction of technological change is not an easy task.

Since the term user or end user encompasses a number of user categories, a definition of the term will first be presented. This term refers in a broad sense to the interaction or the association of two entities, the individual and the technology. In this respect users may be classified along a number of dimensions: form of association, user category and level of interaction.

1. Form of Association

Users may be associated with the system either directly or indirectly. They may work directly with the technology performing input, output and/or processing operations, or may be associated with the system indirectly by benefitting from its output, or by participating in the preparation of its input.

2. User Caregory

Users may be classified (see, for example, Hirschheim, 1985) as follows:

* Primary users

These are the users technically involved with the technology or system. It is their responsibility to develop and/or to maintain a system in response to other users' needs. Examples of such users are programmers and analysts.

* Secondary users

These are the users who really own the system. They are either directly or indirectly associated with the technology. They are not technically involved with the system, but may influence its development and operation through primary users. Examples of secondary users are clerks, secretaries, and managers.

* Tertiary users

These are usually external users who do not interact with the system, and have no ownership in it. They do not really influence its operation but are affected by it. Examples are customers or clients.

3. Level of Interaction

In relation to those who directly interact with the technology, users may be classified according to their levels of skill or knowledge (Christie, 1985).

Based on their semantic and syntactic knowledge, Christie classifies users into four general categories, illustrated in figure 2.2 (originally adapted from Shneiderman, 1980).

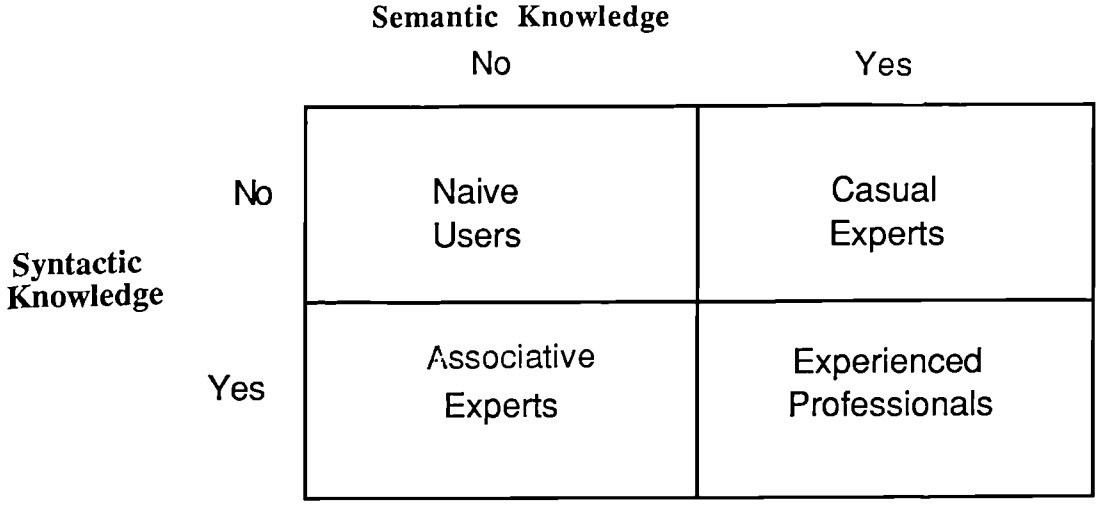


Figure 2.2 - A Classification of users according to level of interaction

Naive users have no syntactic or semantic knowledge of the system and need to be well guided.

Casual Experts have some working knowledge of the system, but due to infrequent use need an adequate explanatory dialogue.

Associative experts interact with the technology frequently, but only to achieve specific objectives. They learn limited combinations of actions and are not sufficiently knowledgeable about the system. They require the support of semantic information.

Experienced Professionals have well developed semantic and syntactic knowledge about the system.

Users can progress between these categories, as they gain knowledge, skills and experience. Systems can be designed to help users migrate from one category to the next, and to satisfy their needs at various levels.

In analysing the characteristics of present day users, Eason (1984) also lists the general types of support needed at various system development stages. These include facilities for reducing anxiety, evaluating tasks, developing operational and technical skills, assessing needs and benefits, and contributing to design.

2.3 The Office: 'The Familiar Unknown'

2.3.1 Understanding the Office

Everyone seems to know what the office is, it sounds so familiar! However, as Doswell (1983) commented, the knowledge most people have of the office, is "a poor, unthought-through kind of knowledge from which comes no real comprehension of the surrounding environment".

Panko (1984) draws an analogy between the office and the customer from a marketing perspective. Though both sound so familiar, the knowledge held about them is "hopelessly" inadequate. They are both a 'familiar unknown'!

Long (1987) argues that the office is a complex behavioural system which is only partially understood by both designers and implementers.

The most prevalent definitions of the office are based on a view of the office as 'information processor' (Christie, 1985). Offices are thus considered as "organizational units that handle the information on which the organization depends" (Newman, 1987). Such definitions, however, reveal only one aspect of office work. They miss the richness of the social and political climates that characterize offices and organizations in general. Exposure to the various ways offices are conceived provides a more comprehensive picture of the office environment and the nature of office work.

2.3.2 Office Perspectives, Views, and Models

Several conceptions or views of the office have been recorded in the literature. Hirschheim (1985) has compiled such views and grouped them under two main classifications based on the perspective through which the office is conceived. He proposes two main perspectives of the office: analytical and interpretivist. Through the former perspective the office is conceived of as an environment where people perform a variety of functions that are largely deterministic and rational, to support the achievement of agreed organizational goals. The latter perspective conceives of the office in terms of unstructured, non-deterministic and political action, involving considerable negotiation and conflicts over resources and power. Table 2.3 adapted from Hirschheim (1985) illustrates a comparison of the analytical and interpretivist perspectives, and includes the office views and models through which they are manifested.

	Analytical	**Interpretivist**
Office functions	Largely deterministic, rational, overt	Largely non-deterministic, political, covert
Office action as	Manifest Behaviour	Social meaning
Dominant issue	Economic Efficiency	Sovereignty of individuals, and social groups
Formal Model	For example, SCOOP, ICN, OPAS, OFS, OBE, OMEGA	No Formal Models
Office Views	Office Activities, Office Semantics, Office Functions	Work Roles, Decision-Taking, Transactional, Language Action

Table 2.3 - A Comparison of the Analytical and Interpretivist Perspectives

To gain a solid understanding of the office, it is necessary to consider the different views and the assumptions underlying each. For both practical reasons, and for the purpose of this research, this understanding is essential to appreciate at a subsequent stage, the significance of technology in such a context and to plan for possible disruption brought about by technological change.

1. The Office Activities view

This view conceives of the office as an environment where certain activities are carried out. What activities are performed, by whom, for how long, and following what procedures, are all critical aspects. The office activities view is very popular, because activities are observable and simpler to measure compared with other more subjective elements, such as roles and functions. Where the technology is concerned, activities are looked at in terms of their potential for formalization and automation. As a result, many office automation systems, have been, and are being, developed to support specific activities. Models based on such a view for example 'the System for Computerization of Office Processing' (SCOOP) developed by Zisman (1977), and 'Information Control Nets' (ICN) by Ellis (1979).

However, there are several problems associated with this view. Firstly, and most importantly, it is too limited in scope and does not address many important aspects of office work, such as goals, conflicts, and social interaction in general. Secondly, and as noted by Christie (1987), surveys of user activities have been based neither on adequate methodology nor on an adequate representative sample . Thirdly, as Gale and Christie (1987) indicate, studies have been undertaken at various points of time, for varying durations, using different job classifications, and employing various techniques, thus making comparisons between them very difficult. Such models are useful in the analysis of information flow but mainly, for representing structured type activities and are thus limited in orientation. Pilgrim (1984) outlines the disadvantages of such models, distinguishing between 'Information Flow Models' and

'Procedural Models'. The disadvantages are briefly: an unnecessarily high level of detail, disregard for structure, and promotion of the organizational status quo.

2. The Office Semantics View

This view is concerned with understanding office work and the reasons for performing it. It emphasizes procedures - a sequence of actions - followed in achieving some specified goals. The specification of goals may be through the user, or may be inferred from the procedures performed. Problems with this view are mainly attributed to the difficulty of describing goals, the faulty assumption that there is general consensus over organizational goals, and, finally, the misconception that goals can always be inferred from the performed procedures. Models based on such a view, for example, OMEGA (Barber, 1983) are still not very popular. Although useful in attempting to rationalise office behaviour, their deterministic orientation and narrow scope are major disadvantages.

3. The Office Functions View

This view conceives of the office in terms of a set of related functions, the realization of which satisfies various organizational goals. "Functions are interrelated and aggregated into higher level functions and larger subsystems in such a way that they instrumentally achieve some office or organizational goal" (Hirschheim, 1985). Office functions can be classified according to the nature of the decision- making involved in them, as either of a 'routine' or 'executive type' (Pilgrim, 1984). Again, according to this view, functions serve a set of predetermined organizational goals, which are presumed to be shared by members of the organization. Conceptions of offices based on this view, are extremely useful in understanding from a higher level the interrelationships between various activities, functions, and business goals (see, for example, Hammer and Zisman, 1980, Pilgrim, 1984, Lau, 1987). However, this view focuses on the deterministic and rational aspects of offices, and neglects other human, social and organizational forces and elements that impact the behaviour of office workers.

4. The Work Role View

To understand more clearly what goes on in an office, the work role view conceives of the work individuals in organizations do within a framework defined in terms of various work roles. Roles are the "sets of rights and duties relating to the performance of a function in accomplishing a task" (Weinstein and Weinstein, 1972). They define the expected behaviour of individuals in organizations. The organizational role defined for each is for the purpose of enabling organizational functions to be carried out, which in turn help the organization achieve its objectives (Christie, 1987). From a dynamic perspective, work roles can be thought of in terms of a continuum, as they may change with time and get moulded by variables such as: personality, values, beliefs, and expectations of the role holder and surrounding individuals. Among the problems associated with work roles, Christie (1987) lists: differences in role perceptions, role conflicts, role overload, and information overload. Improved communication between individuals can help alleviate or reduce many of these problems.

In contrast to the previous views, the work role view has a strong interpretivist orientation. However, it does not provide a comprehensive framework or conceptual model through which to perceive offices.

5. The Decision-Taking View

This view focuses on the decision-taking process in an office environment, and has two complementary components: 'cognitive style' and 'decision-making models' (Hirschheim, 1985).

Cognitive styles have been described in various ways (see, for example, Churchman, 1971, Mason and Mitroff, 1973, McKenney and Keen, 1974, Hunsaker and Hunsaker, 1981, Huber, 1983). The different descriptions involve the behaviour individuals exhibit in preparation for decision-making, for example, in acquiring, analyzing and interpreting

information needed for this process. Gordon (1987) indicates that the quality of the decision taken depends on the model adopted by the actors, as well as on their level of task-related, interpersonal and rational decision-making skills. Task skills refer to a knowledge of procedures and techniques; Interpersonal skills refer to how decisions are communicated and accepted; rational skills include "situational analysis, objective setting, and generation, evaluation, and selection of alternatives" (Gordon, 1987).

Decision-making models relate to the types of models adopted by individuals during the decision-making process. (See, for example, Simon (1960), Keen and Scott Morton (1978), Davis and Olson (1984)). Variables that impinge on individuals and guide their behaviour during decision-making relate to their personality, group influence, and organizational procedures.

The Decision-taking view is useful in clarifying an important and complex aspect of office work, particularly that "major decision-making in organizations is undertaken by highly paid managers and senior executives" (Pilgrim, 1984).

However, by focussing mainly on the decision-making aspect, such views offer a rather narrow perspective of the activities carried out in offices in general. They do not provide an adequate framework, through which other aspects of office work can be perceived. Moreover, the comprehension and application of such views require a certain level of expertise that is not easily available.

6. The Transactional View

Offices according to this view are conceived of as "arenas for information exchanges", or transactions based on contractual arrangements (Williamson, 1975). The transaction view notes that individuals in organizations, behave opportunistically and have bounded rationality. Transactions occur through bargaining and vary with the characteristics of the involved parties.

An important aspect of this view is its perception of goals as complex, social constructs which "are the results of negotiation and conflict between individuals and groups at different organizational levels" (Clegg and Dunkerley, 1980).

The major benefit of this view is that it illustrates the many behavioural and social aspects involved in office work, such as conflict, negotiation, bargaining, irrational behaviour, and the complexity of goals.

However, such views, although promising, lack formalism and are not easy to conceptualize. Recent soft systems approaches to office automation such as Checkland's SSM (1981) and Mumford's ETHICS (1981) include aspects of such a view.

7. The Language Action View

"This view sees offices in terms of social action where language is the mediating force and maintains the belief that office systems development is basically concerned with modelling the rules of human communication" (Hirschheim, 1985).

Office information systems are therefore "formal linguistic systems for communication between people which support their actions" (Goldkuhl and Lyytinen, 1982).

This view highlights a critical aspect of office work which is communications. However, it is still evolving, and there is no adequate knowledge about its use in office automation approaches.

2.4 Technology in the Office: Implications and Barriers

2.4.1 An Overview of New Office Technology

The advent of the microprocessor has accelerated the development of a wide array of computer-based technologies for office use. In such environments, and for the many individuals who have had little or no exposure to concepts such as Information Technology and Office Automation, this flood of tools has been overwhelming and confusing. This problem is even more traumatic in bureaucratic and governmental offices, where work is carried out according to rigid procedures, and where the attitude of workers and their culture are very difficult to change. However, the appearance of the 'intelligent workstation', and its proliferation in homes and offices, has brought with it the realization that computers are here to stay. Embracing the new technology has become a matter of business survival. Technological advances in the area of communications, and the proliferation of more and more tools, has made this realization even more pressurising.

Today, new office technology represents the convergence of three previously separate technologies: computers, telecommunications, and office machines (Long, 1987). The introduction of this new technology into offices has been geared, initially, towards secretarial and clerical tasks. Recently, however, new tools are emerging to support the less structured needs of managers and professionals, where more productivity gains are expected (Long, 1987).

To encourage the use of the new technology, many software products are emerging with 'user-friendly' interfaces. Although this is an important design consideration, other antecedent conditions need to exist to trigger users' motivation and interest. After all, the application of technology is not simply hardware and software, it also encompasses the people who will use it, and the context in which it will be employed. Both should be ready for its reception, prior to its introduction. So far, the process of introducing new technology has often been a painful

and difficult experience for many companies (Willcocks and Mason,1987). Although the technology was aimed, not only at improving the efficiency of current office procedures, but at altering the nature of office work itself (Olson and Lucas, 1982), little real effect materialized (Hirschheim, 1985).

According to the stage theories of growth (Gibson and Nolan, 1974, Zisman, 1979, and Hirschheim, 1985) users and organizations progress with time, while learning and adjusting to the new technology. The problem with such theories, is that companies do not always follow the same pattern in introducing new technology. As a result of poor planning, limited understanding of the technology, difficulty in expressing requirements, and other organizational factors, many companies do not progress beyond the initial growth stages. Technology in offices has often been underutilized, haphazardly diffused, and often confined to disjoint operational tasks such as word processing. Unless users learn how to harness its power to satisfy their individual and organizational needs, technology will not yield many of its predicted benefits.

2.4.2 Introducing New Technology into the Office

2.4.2.1 Defining Office Automation

There has been considerable controversy regarding the term 'office automation'. Other terms have been used as a substitute, though not always connoting the same meaning or implications.

Alternative terms to office automation include: the office of the future (Uhlig, Farber and Bair, 1979), office information systems (Ellis and Nutt, 1980), the paperless office (Strassman, 1985), office support (Panko and Sprague, 1982), and office information technology (Long, 1987).

Actually, what is causing the controversy is the term 'automation'. A distinction was made between this term and the term 'mechanization' (see, for example, Zisman, 1977, Pilgrim, 1984, Lau, 1987). The former is used to refer to the use of technology for the performance of an entire process - a series of tasks - without any human intervention, with the purpose of reducing the amount of human decision making involved. The latter term refers to the use of technology for the performance of separate tasks mechanically, with the purpose of reducing the amount of manual labour involved and it requires human intervention for coordination and control.

Based on such a distinction, the term 'automation' has bothered many people, as it connotes a concentration on the technology at the expense of the individual (Hirschheim, 1985). The distinction is also becoming too restrictive. As previously noted, it is increasingly being recognized that major productivity benefits will not be derived from 'automation' of support staff activities (clerical and secretarial) but from applying the technology to support and enhance the performance of knowledge workers (managers and professionals) who are more able to "shape use of the new technology in ways favourable to them" (Long, 1987).

Zuboff (1985) thus uses the term 'informate' office work rather than 'automate', on the basis of the same argument. Nonetheless, 'office automation' is still the most widespread term. It is used by many people with different implications, often not based on its literal meaning.

2.4.2.2 Problems Associated with Technological Change

Technology is not neutral. It profoundly affects the people, their jobs and relationships with one another, the organizational context within which people achieve objectives, and the very nature of the business itself (Tapscott, Henderson, and Greenberg, 1985). The introduction of new technology may cause changes to the goals, structure, individual roles and behaviour, skill requirements, shared concepts, language and 'jargon', work values and beliefs, job

satisfaction, and even layout of the workplace (Gale and Christie, 1987). Social distance between workers may also change as a result of electronic forms of communication (Sankar, 1988). Olson and Lucas (1982) further illustrate that 'employee attitudes, management processes, interpersonal relations, interdepartmental relations, and organizational structure will be altered by automated office systems'.

As a result of all the above possible changes, the 'equilibrium' of the organization may be disrupted, resulting in forces that oppose and resist such changes (Hopelain, 1982).

Human adjustment to technological change is considered one of the major obstacles to office automation (Matherly and Matherly, 1985). The inability of personnel to cope and to adapt to changes often causes resistance which may be manifested in several negative behaviours. This, as Connell (1978) notes, has often impeded the successful implementation of office systems. With insufficient training, employees often resist changes in the work environment. Lack of knowledge, or lack of experience with computers, fears of 'personal cost' as well as the forbidding reputation of new office technology for job loss, skill obsolescence and other changes, have all resulted in resistance to change (Willcocks and Mason, 1987). In referring to computer-based office technology as relatively new, risky and unproven, Keen (1984) indicates that planning for technological change must emphasize "learning and communication". Employees need to learn about the complex political, social and technical changes that can result, and how they can be managed. They need to discuss the various aspects of change with one another.Curran and Mitchell (1982) note that preparedness, understanding, motivation, involvement, and control are necessary for overcoming fear of change.

For the purpose of overcoming resistance to change, planned change approaches based on models such as the 'Leavitt Diamond' (Leavitt, 1965), the Lewin/Shein model (Schein, 1961), and its more expanded version by Kolb and Frohman (1970), as well as implementation strategies such as those outlined by Keen (1981), emphasize the involvement and education of people, and the establishing of a 'felt need' for change prior to its introduction.

To summarize, the introduction of new technology may cause changes that seriously impact the individual, the group and the organization. This impact may be positive or negative, depending on how well they have been understood and planned for. To date, most of the problems associated with technological change have resulted from too much focus on the technology to the exclusion of human and organizational considerations.

2.5 Evaluation and Conclusion

An analysis of the three entities 'people', 'office, and 'technology, was presented in the previous three sections, identifying key aspects and problematic issues. The following set of conclusions is drawn from an evaluation of this analysis for each of the three entities:

People

* The behaviour of people in organizations, and the goals they pursue need to be considered from three perspectives: as individuals, as members of a group, and as workers in a specific organizational context.

* People work in offices that need to be viewed not only as information processors but as political systems that exert power and influence, and are formed of individuals and groups who do not nccessarily share the same goals.

* Oversimplified notions of the work performed by people in offices, has often resulted in the failure of office systems to serve the needs of their intended users.. There is a growing belief now that potential users are the ones who must decide how technology can serve their needs, not the 'technical experts' (Long, 1987). Users, however, need to be educated about the technology to be able to specify the requirements it must satisfy. As a result of the

pervasiveness of computer-based technologies in organizations and the recent view of information as a strategic resource, people at all levels in the organization need to be provided with the concepts and skills that enable them to identify their requirements and make effective use of the new technology.

* In analysing the activities pertaining to various occupational levels, several empirical studies have shown that a great deal of what individuals perform is constant across organizations (see, for example, Mintzberg, 1973, Bickson and Gutek, 1983). This commonality of occupational roles and characteristics facilitates the postulation of generic profiles, which can serve as guidelines in the design of learning and orientation systems. Given, however, the diversity of the activities performed at the various levels, and the support needed for both structured and unstructured tasks, the trend now in connection to the technology is to provide office workers with a broad spectrum of tools, as well as facilities for constructing specific portfolios of such tools based on individual needs and profiles (Panko, 1985).

* The analysis and classification of office workers according to various dimensions such as job classification, nature of work, prime function, level of discretion, degree of influence, and attitude to change, has helped in identifying some dimensions - both technical and behavioural - to be addressed while formulating a user involvement strategy. For example, who should be involved, what will their roles be, what are their generic work profiles, and learning needs vis-a-vis the technology, how will they interact and communicate, and who should lead the implementation of the strategy.

* In this research, the term end user or user is used to refer to the category of secondary users, those who have ownership in systems designed for their use or benefit. They may be directly or indirectly associated with the technology or system, but ultimately, have certain interests at stake.

* Although the context of this research is an orientation and involvement mechanism, and not a specific application system, classifying users according to their semantic and syntactic knowledge was found significant in designing the user interface of the computer segment of the mechanism.

* Given the growth in the number of non-technical users, particularly in developing countries, the 'initial' target of this research is the naive users in offices, who need a mechanism to introduce them to, and involve them in planning and implementing, the new technology.

Office

* Each view of the office presented in section 2.3.2 focussed on one or more critical aspects in relation to the office and the nature of office work. Although views pertaining to the analytical perspective such as the office activities view, and the office functions view, are more susceptible to formalization and analysis, they miss many of the behavioural aspects typical of office environments. Approaches based on such views may produce sound technical systems but the implementation of such systems has too often been problematic (Hirschheim, 1985) and caused adverse effects on the quality of working life. In contrast, many recent approaches to office systems development have adopted the more interpretivist views, such as the decision taking and transactional views, which address many of the behavioural and social issues neglected by former approaches.

* To gain a coherent conception of the office, what is really needed is a model or an abstraction that reflects both the analytical and interpretivist perspectives, and synthesises the various aspects of office work manifested in the different views. This model would view the office globally, as a system formed of different interacting and interdependent components. It would provide users and designers of office systems with a conceptual framework through which to conceive offices and office work. User involvement and participation would then be based on a

clear and realistic understanding of their work environment. (A proposed model is introduced as a key ingredient of the user involvement strategy presented in chapter five.)

Technology

* Within the context of this research the term 'office automation' is used to connote varying degrees of mechanization , automation and support in the office. It incorporates within its scope, the application of technology in offices to automate and/or support structured procedural work, as well as semistructured and unstructured non-procedural work.

* It is the purpose of this research, to activate user involvement in office automation, with the understanding that 'automation' is not really the prime target, but rather the intelligent use of the technology in varying degrees based on the needs and profiles of the user and the organization.

* The introduction of new technology, may cause changes that seriously impact the individual, the group and the organization. They may disrupt the equilibrium of an organization and result in forces that resist such changes. To overcome resistance to change, learning, communication, involvement and the establishing of a 'felt need' for change prior to its introduction need to be emphasized and planned for.

CHAPTER 3

EXPLORATORY STUDIES OF THE LOCAL ENVIRONMENT

3.1 Introduction

Among the many problems facing Egyptian offices, particularly in the public and governmental sectors, is a growth in the number of office workers that has not been accompanied by an appropriate growth in productivity. A high level of bureaucracy, and a low level of awareness about, and use of, new office technology tools characterise the majority of these offices.

In Arab countries in general, two major problems face offices in various organizations (El Hady, 1982): first, the inadequate attention given to office work with respect to keeping pace with technological developments and new methods and tools; and second, the lack of emphasis placed on the subject of office automation in existing educational institutions, leading in turn to a shortage of expertise in this area.

Consultations and participation in the introduction of new technology into their working environment has resulted in frequent contact with non-technical or novice users and the opportunity to undertake a form of action research. This personal experience, in addition to experience obtained by other practitioners, provided the initial background for this research. Additional data collection, using questionnaires and interviews, was used to consolidate such background experience, and to investigate users' needs for learning and involvement mechanisms.

This chapter is structured as follows: section two, presents an overview of the cumulative observations acquired through previous experience. Section three describes related empirical findings obtained by another practitioner in the field. Section four demonstrates the results of

the analysis of the data collected from the local environment. Finally, section five summarizes the major empirical findings obtained, and illustrates their significance to this research.

3.2 Cumulative Observations

For the last six years contacts with managers and support staff in eight public sector institutions and six private sector companies in Egypt, through the provision of services such as support and guidance in the development of information systems and training programmes, feasibility studies, requests for proposals and the manipulation of new office technology tools, have revealed the following:

* Very little awareness about information technology exists among different levels of office workers, particularly in public sector offices.

* Very little benefit is derived from 'course' orientated training because it is usually conducted on a piecemeal basis and to impart technical skills and knowledge only. Moreover, users need more time to learn, and find difficulty in relating the training material to their work environment.

* More senior staff managers prefer individual self-directed training - with possibly a facilitator or consultant - that allows the learning to be done at their pace and convenience, rather than in the competitive classroom environment.

* Junior office workers are keen about learning, but display feelings of inadequacy and have many misconceptions about the technology.

* Although managers may show enthusiasm for information technology, they seek only minimal controlled changes and are more inclined to preserve the status quo, possibly due to feelings of uncertainty and lack of knowledge about the likely impact of the new technology.

* Training costs are considered to be very high, particularly for 'quality' training.

* The number of non-technical office workers in need of information technology orientation is very large.

* As a result of their inexperience, potential users rely to a great extent on vendors and external consultants for the selection of hardware and software, and for application development.

* Conflicts, lack of co-ordination and communication, and untimely dissemination of information characterise many offices, particularly in the public and governmental sectors.

3.3 Specific Case Study

An investigation of the reaction of managerial staff to changes in management techniques, procedures and tools in one of the main intercity bus companies in Egypt brought forward a number of interesting findings (Huzayin, 1986). The changes incorporated the establishment of information units in each company equipped with computers, and qualified personnel. Links were to be established between the information unit and all other departments in the company. Other changes related to policy formulation and service planning were also introduced. Resistance of top and middle management to the introduced changes was analysed using a random sample of 7 top management officials out of a total of 15 and 18 middle management staff out of a total of 42. The result of the analysis indicated that lack of knowledge was the main reason for opposing changes particularly for top management, followed in rank by other reasons such as 'not convinced', 'insufficiently trained', and 'individual job importance

threatened by change'. top management and middle management were asked later to provide suggestions for achieving staff adaptation to changes. 'Increasing knowledge and convincing company employees' were the most important suggestions given for achieving staff adaptation to changes. This of course confirmed the results obtained earlier. 'Gradual introduction of the changes' and 'training' followed next in rank.

3.4 Local Environment Scan

To consolidate the findings outlined in sections 2.2 and 2.3, a limited scan of the local office environment was next conducted. The target was twofold, firstly, to elicit users' attitudes towards information technology, and secondly, to determine the actual major needs, problems and existing technologies in Egyptian offices.

Questionnaires and informal interviews were used as the primary method of data collection. Two sets of questionnaires were designed for use in different working environments. The first set (see Appendix A.1) was used in conjunction with an experiment run with two user groups from a private academic institution. There were twenty participants in each group, representing heads of units, senior administrative assistants and executive secretaries. The two groups were asked to attend a set of information technology orientation sessions. The purpose of the sessions was to impart fundamental knowledge regarding the potential and impact of the technology as well as to provide hands-on training in word-processing, spreadsheets, and storage and retrieval of information. Some technological, human and organizational issues were also raised during the sessions.

Prior to the orientation sessions participants of the first group were requested to reply to questionnaires and were invited to informal interviews. The same process was repeated with the second group but following orientation. The same group was not interviewed twice to avoid biasing the responses of its members.

Analysis of the questionnaires indicated that participants with no orientation tended to reveal mixed and often contradictory attitudes towards new technology. For example, although 80% of the participants displayed a positive attitude towards technology, and computers in particular, 60% of them agreed at the same time with statements like, "computers are too expensive to be practical", or "an efficient worker does not need the help of computers!" Talking informally with some of the respondents, it appeared that they did not want to appear "outdated", given that so much attention is currently being paid to the use of technology in the workplace.

Another interesting observation was that the majority of the respondents of the first group, prior to the orientation sessions, would not admit that they had any fears or worries about the new technology. However, following the orientation sessions, 95% of the participants of the second group responded positively to the following question "did this course help you overcome any fears of, or misconceptions about the technology?"

Another related finding was that 89% of the respondents were more willing to be involved in the process of introducing information technology into their workplace after completion of the sessions.

Orientation definitely had a positive influence on user attitudes, and 'readiness' for involvement.

The second set of questionnaires (see Appendix A.2) was designed to reveal information about the prevailing office environment in Egypt, evaluate the usage and impact of available office technology, and assess user needs and problems.

The questionnaire was structured in six sections:

* Company profile
* Working environment
* Computers and other office equipment: availability, usage and impact
* Application development
* Information technology education
* Manager profile

A random sample of 39 managers belonging to diverse organizations from a variety of industries was collected. Data processing and information system managers were excluded , since the target were existing or potential users of new office technology . Of particular relevance to the approach presented here, two major findings have been selected from the 'application development' and the 'information technology education' sections of the questionnaires. Other findings were used at a later stage in the design of the mechanism proposed in this thesis.

With regards to application development, respondents were requested to reply as to whether they participated in systems development or not. Based on their reply, some statistics were generated illustrating the problems in relation to participation for managers who replied positively (n=18) and negatively (n=21) to this question. Participation in this context refers to any positive activity or interference made by the respondent during any of the three stages of the system development process: analysis, design and implementation. No differentiation was made as to type or degree of participation.

As to the 'information technology education' section of the questionnaire, statistics was generated for all respondents (n=39) regardless of whether they participated or not, indicating their needs in relation to information technology education facilities.

1.a) Obstacles to participation as perceived by managers who participated in the system development process :

Table 3.1 presents the results of the processed data . Note that n= 18 and represents those who participated out of the total sample of 39, of whom approximately 78% said they had an information technology background. Other variables represent the obstacles to participation as perceived by the respondents .

n= 18

VARIABLE	SUM	PERCENTAGE
Respondents with information technology background	14	77.78
Difficulty in expressing computer-based technology needs	9	50.00
Difficulty in describing office environment	8	44.44
Inadequate technological background	7	38.89
Conflict with colleagues	8	44.44

Table 3.1: Problems in relation to participation for managers who answered "YES" to the participation question

b) Obstacles to participation as perceived by managers who did not participate in the systems development process:

Table 3.2 presents the results and is similar in structure to table 3.1. Note that 'inadequate technical background' has been given by approximately 76% of non-participating respondents as an obstacle to participation. In contrast to table 3.1, only approximately 24% had an information technology background. Difficulties with identifying computer-based needs and in

describing the office environment followed next in rank. Conflict with colleagues is also significant in both tables 3.1 and 3.2

n= 21

VARIABLE	SUM	PERCENTAGE
Respondents with information technology background	5	23.81
Difficulty in expressing computer-based technology needs	15	71.43
Difficulty in describing office environment	13	61.90
Inadequate technological background	16	76.19
Conflict with colleagues	10	47.62

Table 3.2: Problems in relation to participation for managers who answered "NO" to the participation question

2) Needs of managers for information technology educational facilities:

Table 3.3 presents the needs of managers with respect to a number of educational facilities. Self-education packages are ranked highest, followed by video-films. Demand is not equally significant for 'reading' and 'regular courses', which confirmed earlier findings.

n=39

VARIABLE	SUM	PERCENTAGE
Regular courses	9	23.08
Reading	7	17.95
Video films	17	43.59
Self education packages	28	71.79
None of the above	2	5.13

Table 3.3: Needs in relation to information technology educational facilities

3.5 Summary and Conclusions

The observations and results of surveys presented in this chapter, indicate that the major obstacles impeding the introduction of information technology in Egyptian offices have both technical and behavioural implications and are related to:

* The level of awareness of individuals in offices about the potential and impact of information technology.
* Difficulty in understanding and analysing the office environment.
* Behavioural aspects such as attitudes towards new technology, conflicts of interest, lack of co-ordination and poor communication.
* Cost and quality of training

As a result of such obstacles, individuals in offices find difficulty participating in the introduction of information technology into their working environment.

Given the above findings and considering the prevailing economic conditions, shortage of expertise, high cost of quality training, and the recent interest of the Government of Egypt in adopting and spreading information technology into the various institutions, the need to develop a strategy and mechanism for user involvement to be implemented on a large scale at a relatively low cost poses a real challenge.

CHAPTER 4

A REVIEW OF PARTICIPATIVE APPROACHES TO OFFICE SYSTEMS DEVELOPMENT

4.1 Introduction

The analysis of the three entities, people, office, and technology, was presented in a previous chapter with the purpose of clarifying what may be involved in their interaction from a user-involvement perspective. A selective literature review of user-involvement themes and participative approaches is the purpose of this chapter. In developing 'participative' approaches to systems development, researchers and practitioners have attempted to overcome one or more of the obstacles previously encountered, by focussing on different themes, and by adopting different philosophies. However, as Avison and Fitzgerald (1988) point out "There is no panacea: no approach solves all the problems". Exposure though, to the different themes, ideas and philosophical strands, helps in formulating a broader conception of the problem area, and in avoiding some of the pitfalls already encountered.

This chapter comprises seven sections. The first section introduces 'user involvement' describing the key forces that led to its being advocated in many recent approaches. The second section acknowledges the present overlapping in information systems terminology between the 'involvement', 'participation' and 'influence' constructs, and provides a recent clarification of such terms. The third section then presents a review of selected approaches to systems development, illustrating the criteria for their selection and the key features of each approach. The fourth section describes forms or structures of user participation, which are an essential aspect of any involvement strategy. The fifth section examines problems associated with participation, while the sixth section, proposes possible refinements as means for overcoming such problems. The final section presents a proposed solution.

4.2 The Trend Towards User Involvement and Participation

Over the years, stories of recurring failures in the area of systems development and implementation have continued to appear. A major cause of such failures is a concentration on the technology, to the exclusion of human and organizational considerations.

The literature is rife with examples of computer based information systems that consumed considerable effort in development, yet turned out to be "technical successes and organizational failures" (Keen, 1981).

With office systems, the problem is even more serious. The complexity of the office environment, the diversity and fast evolution of the technology, and the growth in the number of users with little or no information technology background has already been noted and, the process of introducing new technology into the office has followed a rather inconsistent, 'hit or miss' technology-led pattern.

It was thus stated that "what hampers our move from the office of today to the office of tomorrow are the shackles of a machine age mentality - an inappropriate worship of technology and progress" (DataPro, December 1987). Many approaches to systems development have focused mainly on the technology, and underestimated the psychological and social implications (Blackler and Brown, 1987).

It has now been recognized, that the introduction of computer based systems involves technical, human and organizational change, which needs to be carefully managed (Eason, 1982).

Planned organizational change theory advocates the establishment of a suitable 'climate' for change prior to its introduction. A major mechanism for achieving such a climate is through the active participation of users (Middlemist and Hitt, 1981, Tait and Vessey 1988). Potential

users of new technology know most about the activities and tasks they perform and are best able to select the type of arrangements suitable for them (Hirschheim, 1985).

The involvement of people, not only in technical development, but in decisions taken over "how and why the technology is to be used and over the social structure and institutions into which it is to be placed"(Kemp, 1987), helps to dispel fears and anxieties and is conducive to better change overall. As further noted by Keen (1981), early discussions with those likely to be affected by change leads to consensus early in the planning process.

The concept and value of user involvement has for long been endorsed in the literature of various disciplines. Early studies by Roethlisberger and Dickson (1939) illustrated that employee participation in changes in work methods resulted in subsequent productivity and satisfaction.

In the area of information systems, the call for user involvement was based on a number of arguments, ranging from a 'moral' obligation to involve users in systems development, to a perception of user involvement as an important antecedent variable in relation to system quality and usage, as well as to user attitudes and satisfaction (Baroudi, Olson and Ives, 1986).

Borrowing from social psychology, Baronas and Louis (1988) consider non-technical user involvement from the aspect of "perceived control". They argue that employees' perceived control over work is threatened when a new information system is introduced, as it is usually accompanied by significant change that is seldom voluntary. Through field experiments, they found that intervention techniques such as the early facilitation of users' experience of predictability, choice and responsibility, help in "unfreezing" negative anticipations and in re-establishing perceived control over work.

User involvement in systems development is further viewed by some adherents as a means for inducing attitude changes which then facilitate organizational change (Ives and Olson, 1984). Creating the suitable climate for change however, requires the settlement of issues related to the 'group' as well as to the individual, for example, differences of interests and power, priorities for change and improvement, common acceptance of organizational change, and intra-organizational power and politics.

From this perspective a view of user participation based on political rationality is presented by Keen (1981). To cope with the pluralism in organizations and the link between information and power, an organizational mechanism is needed which enables negotiations and bargaining to take place between interested individuals and parties. Such political processes are necessary for minimizing or resolving conflicts of interests and power, building support, and creating a momentum for change.

Blackler and Brown (1987) similarly advocate a pluralist orientation whereby differences of interest can be "recognized, articulated and resolved".

A number of researchers also consider that user participation is necessary in the case of complex and unstructured tasks, owing to the increased knowledge and flexibility required in decision-making (Tait and Vessey, 1988). This concept, referred to as participative decision-making is gaining considerable attention, given the growing and pressing need for support of unstructured, non-procedural activities in the office.

Most of the above benefits are incorporated in a review of the research by Ives and Olson (1984) where user involvement is predicted to improve system quality, and increase user acceptance by:

* Providing a more accurate and complete assessment of user information requirements, and the organization the system is to support;

* Avoiding development of unacceptable or unimportant features;
* Improving user understanding of the system and developing realistic expectations about its capabilities;
* Providing an arena for bargaining and conflict resolution;
* Leading to system ownership by users;
* Decreasing resistance to change and committing users to the system.

There may be other benefits associated with user-involvement. However, those already cited are sufficient to illustrate the value of user involvement to the individual, the group, and the organization.

4.3 Involvement, Participation and Influence?

Although the value of user involvement was illustrated in the previous section, what this term really means is rather vague. 'User involvement' often connotes different implications to different people. It is important at this stage to clarify what this term signifies in this research.

Although, 'user involvement' and 'user participation', have been often used synonymously in the information systems literature, a distinction was recently made by Barki and Hartwick (1989), based on a study of the use of the involvement construct in other disciplines. Its use in information system research will first be examined, followed by a presentation of an alternative definition based on its conceptualization in other disciplines.

In information system research, user involvement is used to refer to a "set of behaviours or activities performed by users in the systems development process" (Barki and Hartwick, 1989). Swanson (1974) distinguishes between "inquiry involvement" and "a priori involvement". The former refers to system usage, whereas the latter refers to changes or activities that affect the development and/or implementation of the system.

The term 'influence' was also used in close connection with the involvement construction. Franz and Robey (1986) conceptualize involvement as user influence, whereby users perform a set of activities that influence the system development process.

In information system research in general, no distinction is clearly made between user involvement and user participation. They are both used to refer to a set of activities or operations performed by potential users during system development and implementation.

In other disciplines, such as psychology, marketing and organizational behaviour, Barki and Hartwick indicate that the involvement construct is more associated with attitudes, and refers to the degree to which individuals identify psychologically with their work. User involvement is used to refer to a subjective psychological state reflecting the importance and personal relevance of a system to a user. According to this definition, activities or operations performed by users in relation to an information system, do not necessarily imply their commitment to it.

Barki and Hartwick call for a separation of the involvement and participation constructs, based on the experience and empirical evidence obtained in other disciplines. They attribute the major weakness of information system user involvement research to the lack of a solid conceptual foundation.

The distinction between user involvement and participation outlined above, begs the question of what degree or level of each is to be considered significant to the systems development process.

In this research, the concepts of involvement, participation and influence are perceived as complementary and interrelated. They depend on, and can be induced by, early learning, communication and interaction processes. The degree of involvement, participation, and influence may vary from one individual and from one situation to another; however, a minimum level is essential to ensure user commitment and support.

In reviewing some selected approaches to systems development in the next section, the separation of the two constructs, involvement and participation is not very clear, as they are often used interchangeably by the developers of such approaches.

4.4 An Overview of Selected Methodologies

The conventional or traditional approach to systems development, often referred to as the 'systems development life cycle', has been criticized by a number of researchers, although it was very popular for many years, and is still being used by some practitioners who are familiar with it, and have experience in its application. A common criticism directed towards this approach, (see, for example, Hirschheim, 1985, Avison and Fitzgerald, 1988), is its major reliance on systems analysts or computer professionals. Although the need for user input is emphasized, the development process is usually inflexible, time-consuming and driven mainly by technical and economic criteria. Little attention is paid to behavioural considerations, resulting in problems during the system implementation stage, when it is often too late or too costly to rectify them.

The conventional approach was also found inappropriate in the development of office systems, which are smaller and more personalized in comparison to the more large-scale systems to which it had usually been applied.

More recent approaches have attempted to overcome the human, organizational and technical problems previously encountered. User needs and problems, are receiving more attention; and the role played by users at various stages of the systems development process is considered crucial to the success of the application.

The selection of the approaches was based on the following criteria:

* The user-involvement potential of the approach

* The theme upon which the approach is based and its relevance to this research

* The evaluation of the approach on behavioural criteria

* The contribution of the approach to user involvement research in comparison to other system development approaches

* The applicability of the approach to the office environment

An overview of the approaches will be presented, highlighting their key features. Negative aspects will be evaluated in section 4.6 which discusses 'difficulties associated with user involvement and participation '.

The first approach is known as ETHICS, a meaningful acronym that stands for 'Effective Technical and Human .Implementation of Computer-based Systems'. ETHICS is a systems design methodology, devised by Mumford (Mumford and Weir, 1979). It is based on a view of the user environment as a socio-technical system. Mumford (1981) describes socio-technical systems as "an approach to work design which recognizes the interaction of technology and the people, and produces work systems which are both technically efficient and have social characteristics which lead to high job satisfaction".

In ETHICS, user participation is one of its basic philosophical strands. Users are asked to take part in the decisions concerning how the technology will impact the work process as well as their job satisfaction.

The introduction of computer-based systems is also regarded by ETHICS as a change process which involves conflicts of interest between those participating in the process. To resolve such conflicts, confrontation and negotiation between interested parties are called upon.

The implementation of ETHICS involves setting up a steering committee and a design group. The steering committee is formed of senior managers and trade union officials (if any). It sets the guidelines for the design group which includes representatives from the areas of the organization affected, as well as systems analysts. The responsibilities of the design group include: choice of hardware and software, human-computer interaction, workplace re-organization, and allocation of responsibilities. The appointment of a facilitator is considered necessary to educate the design group in ETHICS, and to enhance their motivation and confidence. It is usually recommended that the facilitator be external, if not to the organization, then to the department or unit in question, so as to be neutral.

Another approach to systems development based on socio-technical system theory is that of Pava (1983). The methodology of Pava however, is specifically applied to office work, particularly its unstructured, non-routine elements. Pava considers that traditional socio-technical analysis, though suitable for routine office work, requires new analytic methods to handle its non-routine aspects. The approach Pava uses is based on an early identification of 'deliberations' or patterns of communications and exchange between people in the organization. The critical topics discussed, forums of exchange, participants interdependencies, and coalitions, constitute the basic and effective units of analysis in this approach. As in ETHICS, Pava recommends the establishment of a steering group, design group, and facilitator to monitor and carry-out the implementation of the methodology.

The next approach to be presented is based on the tenets of 'Systems Theory', and is known as Checkland's 'Soft Systems Methodology'. The methodology was originally developed for use in broad problem-solving situations, but was found relevant to information systems analysis, and applicable as well to office systems. In contrast to scientific reductionist approaches based

on 'hard systems thinking', the soft systems approach is more concerned with the study of 'wholes' rather than 'parts', where the whole is considered to be different than the sum of its parts. It views information systems as 'Human Activity Systems', formed of people with different and conflicting objectives, perceptions and attitudes. The nature of human activity systems is unpredictable, and involves problems that are poorly structured, 'fuzzy' or 'soft'. Checkland's soft system methodology therefore is directed towards analysing and understanding complex, poorly structured situations through carrying out debates with the involved actors in the organization. Early emphasis is placed on the formulation of a 'rich' picture of the problem situation. This is carried out in collaboration between the problem solver and problem owner. The former is normally the analyst or project team, whereas the latter includes those on whose behalf the analysis has been launched. The rich picture will usually reveal information about the people involved, problem areas, controlling bodies, and sources of conflict. Based on this picture, several 'relevant systems' will be proposed by the participants to relieve the perceived problems. 'Root definitions' will then be proposed for the relevant systems, using a checklist technique.

When consensus is reached regarding the root definition, a conceptual model is developed illustrating what the system described by the root definition will do. This model is then compared with the problem situation analysed in the initial stages, resulting in a set of recommendations regarding change. What is considered feasible and reliable is then debated and hopefully agreed upon by the people in the problem situation. Action is then initiated, based on the approved recommendations. Checkland's methodology is expressed in seven stages, and involves considerable backtracking and iteration, particularly during the analysis and design stages.

Other approaches to systems development designed specifically for the office, such as Tapscott's (1982) User Driven Design, and Office Analysis and Diagnosis Methodology (Sutherland, 1983) are based on a functional view of the office. Although, permitting user participation in the development, they generally score lower than the above mentioned

methodologies on other behavioural criteria, for example, job design, social action, multiple problem perceptions, implementation, primary focus, and office view.

An approach worthwhile mentioning briefly in this section is ISAC by Lundeberg, Godkhull and Nilsson (1981). Although ISAC uses reductionism in its analysis, and is therefore more appropriate for structured type activities, its major strength is derived from the heavy user input associated with the development of its different specifications. An interesting aspect of the methodology is its initiation at an earlier stage than most methodologies, allowing users to express their problems and to determine whether an information system is needed at all.

A last approach worth looking at is 'Multiview', a hybrid process that combines ideas from the work of Checkland, Mumford, and from other 'hard' methodologies. The name 'Multiview' does not only reflect this hybrid aspect, but is further derived from its consideration of various organizational, technical, and human perspectives or views. Multiview is also characterized by its flexibility and its contingent orientation with respect to different situations and people.

There are five stages in the Multiview methodology . The *first* stage, based on Checkland's methodology, places early emphasis on the analysis and understanding of the problem context. The *second* stage is concerned with information modelling and uses 'traditional techniques' such as functional charts and data flow diagrams. An analysis and design of the socio-technical system is then carried out in the *third* stage employing Mumford's ETHICS. The *fourth* stage focuses on the design of the human - computer interface. At this stage the possibility of employing packaged-software and prototypes is considered. Finally, the *last* stage is concerned with the design of the technical sub-systems using the specifications output from stages two and four.

Multiview has mainly been applied to the computerization of small scale projects using microcomputers and software packages.

4.5 Forms of User Participation

A variety of terms have been used in the information system literature to refer to the way a participative approach can be implemented. Thus, the terms 'forms', 'types', 'facets', 'categories', 'degree', 'levels', and 'structures', have all been used with overlapping descriptions.

Hirschheim (1985) identifies two forms of participation: the direct form is when users participate personally in discussions, whereas the indirect form is when a representative is participating on their behalf.

Hirschheim also uses both the terms, 'categories' and 'degree' of participation to refer to the classification offered by Land (1982) and described as:

1. Consultative: when participants - often certain interest groups - provide input that is usually limited to social system considerations such as job satisfaction. Although users are consulted about the change, through discussions and exchange of ideas and opinions, design tasks and decisions are taken by another group, normally systems analysts.

2. Democratic: in this case all participants have an equal voice in the decisions taken during the systems development process. The approval and implementation of the decisions however, is left to another group with authority, for example, senior management, and systems analysts.

3. Responsible: this is the ideal form, where participants are fully responsible for making as well as implementing the decisions. This approach is user-driven, because the design and implementation of the system become the responsibility of the users.

A somewhat similar classification is proposed by Mumford (1979), and referred to by Ives and Olson (1984) as 'facets of user involvement', or 'type of participation'; and by Avison and Fitzgerald (1988) as 'levels of participation'. The three types proposed are classified from least to most direct as 'consultative', 'representative', and 'consensus'.

Ives and Olson further discuss a related concept, which is the 'degree of involvement', defining it as 'the amount of influence the user has over the final product'. They provide the following six categories, based on a review of the literature, to illustrate varying degrees of user involvement: no involvement, symbolic involvement, involvement by advice, involvement by weak control, involvement by doing, and involvement by strong control.

Eason (1983) recognizes that involvement of all users is often impractical, and proposes a differentiated structure, whereby certain groups of users who have knowledge to contribute, and have vital interests at stake, become involved in system decisions. If the group is large, representatives are more involved at the strategic level of decision-making, while all other users are consulted, and educated, as well as being involved at the more operational levels, for example, what facilities they will use and who will be responsible for different aspects of the system.

What form and degree of participation takes place, may be dependent on a set of contextual determinants, which are described by Hirschheim (1985) as follows:

1. Participation potential of the organization: acceptance and implementation of participation may be dependent on organizational issues such as the size, structure and technical system, as well as on environmental issues such as the social, political, psychological, and economic structures.

2. User propensity to participation: individual characteristics such as attitudes, capabilities, perceived power, and stakes involved, determine the willingness of workers to participate.

3. Management acceptance of participation: the willingness of management to participate will also depend on their attitudes, values and philosophies. A catalyst or a sponsor may facilitate management acceptance by invoking the process and following it up.

Involvement mechanisms, therefore, need to consider contextual determinants at the working environment level, as well as user-readiness at the individual, group, and managerial levels, if they are to operate effectively.

4.6 Difficulties Associated with User Involvement and Participation

Despite the many theoretical advantages of user involvement in systems development, its implementation has been to a large extent problematic. The following are among the major difficulties reported by various researchers and practitioners:

* Inability of users to contribute meaningfully, due to their inadequate technical knowledge (Hirschheim, 1985, Blacker and Brown, 1987, Long, 1987).

* Lack of mechanisms and techniques for the effective implementation of user involvement (Bronsema and Keen, 1982).

* Inadequate description of mechanisms of control and feedback between individuals and groups (Nurminen, 1988).

* Reluctance of systems designers to include users (Long, 1987).

* Conflicts of interests between participants (Mumford, 1983; Long, 1987).

* Design delays caused by participation (Hirschheim, 1985), which can be time-consuming (Willcocks and Mason, 1987) and quite costly (Baroudi, Olson and Ives, 1986).

* Difficulty of locating a facilitator to foster the participation process (Hirschheim, 1985).

* Users' suspicion of management's reason for encouraging participation (Mumford, 1983, Willcocks and Mason, 1987).

In actual practice, user-involvement has in fact received little attention during the design and implementation process (Willcocks and Mason, 1988). Rarely do users report that they had been meaningfully involved (Long, 1987). The fact that participation is carried-out under the guidance of computer professionals is causing doubts as to its effectiveness (Nurminen, 1988). Thus, even an approach such as ETHICS, which has been highly evaluated in the research, has been rarely used in practice (Willcocks and Mason, 1987).

In general, an evaluation of the systems development approaches examined in section 4.4, reveals the following:

* Despite the emphasis placed by participative approaches on user involvement, particularly during the analysis and design stages, the 'professionals' are still relied upon heavily due to their expertise and experience. This may result in a low level of user involvement and influence.

* The education of users is advocated by almost all approaches, but mechanisms that specify what users should learn, when, and how are not adequately specified.

* A comprehensive model of the office environment, illustrating its human, organizational and technical constituents is not adequately provided by any of the approaches. Without

such a conceptual framework, users may find it difficult to analyse their working environment, and to appreciate the need for, and significance of technological change.

* Although conflicts of interests and power are acknowledged by the different approaches, mechanisms that enable negotiation, confrontation, and bargaining to be carried-out as part of the systems development effort have not been clearly specified.

4.7 Possible Refinements

The theoretical analysis of 'people' in offices presented in chapter 2 has indicated that many potential users of office technology have no previous computer background. This was also considered one of the difficulties associated with participation. Exploratory studies of the Egyptian office environment has further provided empirical evidence indicating that an inadequate information technology background was considered a major obstacle to participation by many existing and potential users of office technology. To enable users to contribute meaningful input during systems development, they need to be educated about the new technology, and about how to go about analysing their environment and introducing technological change. Without such education, design decisions are usually made by the 'professionals', with users only superficially involved.

Education of users however, is time-consuming, and may not keep pace with the design and development process. This problem has been recognized by Eason (1982), who proposed an evolutionary design approach, whereby system design and user learning proceed in parallel. To foster learning, a limited computer system is first introduced for user experimentation and testing. The system becomes more sophisticated as users become more informed and experienced about the technology. The problem with this approach is that the limited system initially introduced, may not be reflecting the basic or essential requirements of the users who may not at this stage have contributed much in its analysis and design. This might cause

adverse consequences such as disappointment and lack of enthusiasm. Another problem is that the learning acquired by users is related to a specific system, which limits users to a narrow scope of the technology in relation to their working environment . User analysis of the environment prior to the initiation of any change is in fact not conducted. A third problem results from a view of the design-process as open ended. Although flexibility is desirable, users must feel responsible for a specific completed product, otherwise changes that are costly and time-consuming will continue forever. This may cause instability and possibly conflict. A fourth problem stems from the reliance on system professionals for the initial design and for subsequent development.

Willcocks and Mason (1987) suggest that 'prototyping' may be a solution to the problem of users' lack of technical expertise. Although prototyping is useful in many ways, for example, in providing technical know-how and experience, in fact finding and system enhancement, and in fostering participation, it is again restricted in scope to the system under development. Prototyping may be most effective when combined with broader systems development approaches.

Bronsema and Keen (1982) indicate that an education intervention with both behavioural and technical objectives is an important vehicle for change, and an essential component of any user involvement strategy. Education is distinguished from training, as being broader in scope. Education in this context however, was aimed at facilitating the implementation of a system that had already been designed and developed. Users had no say in its selection.

4.8 A Proposed Solution

What is really needed at this stage, is an approach that combines different concepts, dimensions and techniques from other approaches, but with, possibly, a different strategy, and additional

tools, to overcome the obstacles previously outlined. A hybrid approach like 'Multiview' is a good potential candidate, but requires to be more 'hybrid', than it presently is!

A different perspective to user involvement and participation is also needed, whereby users are perceived to be leading the development process, and computer professionals participating, possibly as facilitators and technical consultants. For this to happen, an early start is necessary, whereby the involvement of both individuals and groups in the analysis of their working environment and the need for change, is 'meshed-in' with a learning and guiding process that has a number of dimensions. See figure 4.1 .

The strategy and mechanism designed for this purpose are the focus of this research.

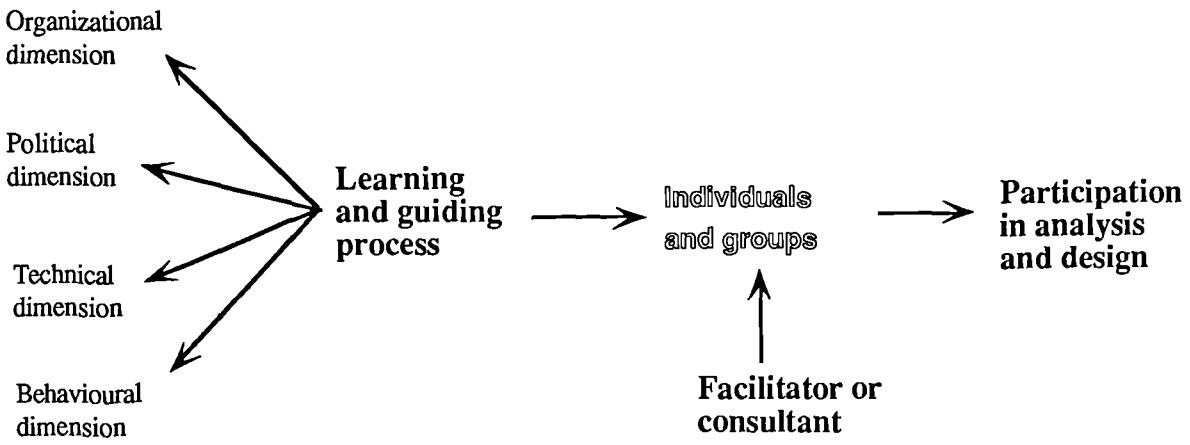


Figure 4.1 - A New Perspective to User Involvement and Participation

CHAPTER 5

A STRATEGY FOR ACTIVATING USER INVOLVEMENT AND PARTICIPATION

5.1 Introduction

As illustrated in previous chapters, the major obstacles impeding the effective implementation of user involvement are related to individual 'readiness', group behaviour and faulty understanding of the office environment. The purpose of this chapter is to present a strategy and appropriate tools designed to overcome these obstacles, while keeping pace with, and capable of contributing to, the system development process. The strategy has a number of distinct aspects: *first*, it focuses on the problem of user acceptance of new technology prior to its introduction; *second*, it proposes a comprehensive approach which tackles issues at both micro and macro levels manifested in individuals, groups, and their organizational context; *third*, it views learning and participation at the early stages as enabling vehicles for enhancing users' predisposition to involvement; *fourth*, contingencies are incorporated to allow for differences in organisational and political climates, and to enhance the flexibility of the strategy; *fifth*, it views the office as an open system and provides a global, conceptual model of its environment; and *sixth*, it proposes a user learning and participation methodology, and illustrates how it interfaces with other system development methodologies.

The sections in this chapter, are designed to provide information about the different aspects and ingredients of the proposed strategy. Section two presents the objectives and outcome of the strategy. Section three then introduces the learning and participation process which is designed to activate user involvement. To communicate the philosophy of the strategy, section four presents the key elements and underlying concepts on which it is based. Section five describes the learning and participation methodology, illustrating the steps involved from the moment it is activated until it terminates or interfaces with other system development methodologies. To illustrate the interface, links to two selected approaches are briefly described.

5.2 Objectives and Outcome of the Strategy

The three major complementary aspects emphasized by the strategy, are 'learning', 'participation' and 'group interaction'. The main objective of the strategy is to orientate non-technical office workers about information technology and office automation, and to enable them to participate effectively in the introduction of technological change.

In accordance with theories of organizational change and participative decision making, more detailed objectives of this strategy encompass many previously acknowledged benefits associated with user involvement, for example:

* decreasing resistance and changing attitudes (Lucas, 1974,Bronsema and Keen, 1982).

* assessing user requirements more accurately (Robey and Farrow, 1982).

* leading to system ownership by users (Robey and Farrow,1982) and enhancing perceived control over work (Baronas and Louis,1988).

* transferring information, creating common vocabulary and building skills (Bronsema and Keen, 1982).

* providing a forum for open expression of concerns, and an arena for bargaining and conflict resolution (Keen, 1981, Bronsema and Keen, 1982).

Designed to keep pace with, and to contribute to, the system development process, the strategy is also geared towards the generation of specific outcomes. In addition to orientated and mobilised users, other tangible outputs in the form of assessment documents are generated and reflect users':

* analysis of their working environment.

* assessment of needs and required resources with respect to information technology.

* vision of a future office automation plan.

By reflecting users' real needs and perceptions, such documents contribute valuable input to the system development process. They make user participation real, effective and influential.

5.3 The Learning and Participation Process

To achieve the objectives of the strategy, a learning and participation process is implemented and involves the interaction of individuals with the technology and with one another as a group, within a working context that is identified and analysed as part of the process, (Figure 5.1 is a diagrammatic illustration of the process).

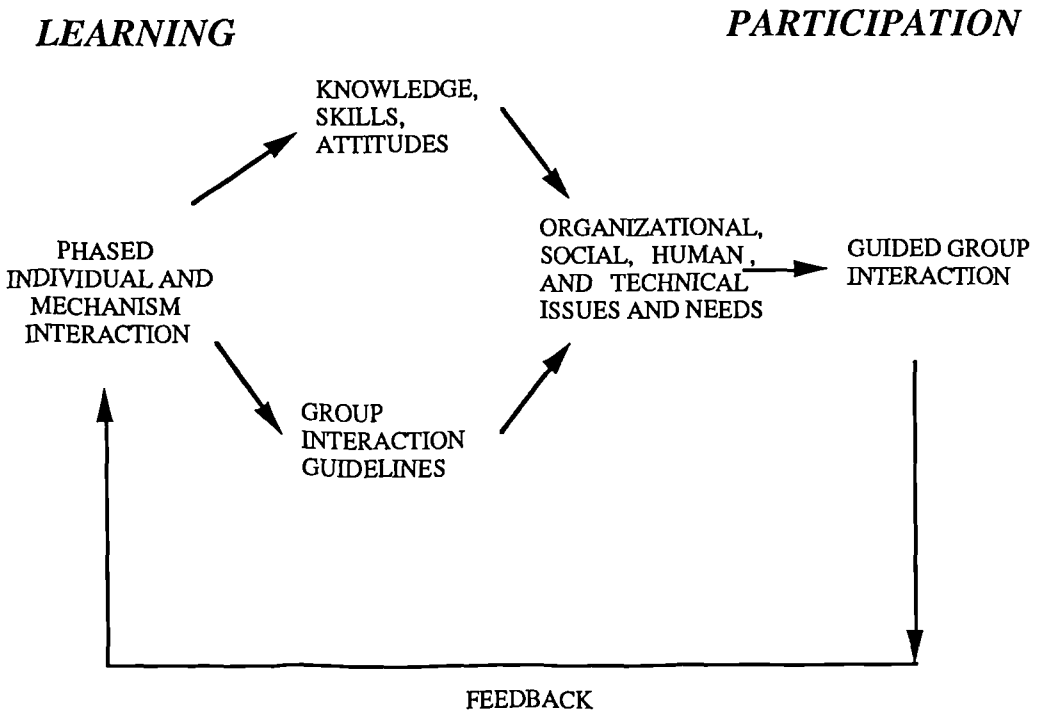


Figure 5.1 The Learning And Participation Process

To activate user involvement, learning and participation supplement one another through a feedback process, based on a phased and evolutionary approach. Simply stated, users interact individually with a computer-aided orientation mechanism designed to generate knowledge and skills, and to shape attitudes. The mechanism operates in four phases and provides guidelines for group interaction following each phase. The knowledge and guidelines provided to users in turn generate a new set of perceived issues and needs that require group investigation and consensus. Group interaction therefore takes place after each phase to relate what individual users have acquired to their own specific environment, given the guidelines generated by the mechanism. During such group interactions (possibly with the help of a facilitator), individual differences of competence and of interest are recognized and - hopefully - resolved or minimized, and efforts are co-ordinated. The outcome of group interactions is a document that reflects users' responses to the various issues and an assessment of their needs. The content of this document is fed back into the mechanism for subsequent retrieval, and, if necessary, updating by users whose experience and awareness evolve from one phase to the next. This process is repeated for each of the four phases of the mechanism.

The main purpose of each phase is as follows:

The *first* phase is about the office and enables users to analyse and form a conception of their own working environment. The *second* phase is about the technology and enables users to assess their individual and organizational needs with respect to information technology. The *third* phase enables users to form a vision of a future office automation plan. The *fourth* and last phase is designed for intermittent use. Users can 'navigate' to it whenever they wish to store, retrieve or update assessment documents prepared following each of the first three phases.

5.4 Key Elements and Underlying Concepts

5.4.1 Learning Dimensions and Tools

The philosophy of this approach is based upon the perception of 'learning' as a necessary vehicle for activating user involvement. The learning objectives, the dimensions to be addressed in selecting the knowledge to be conveyed to users, and the structure of the communication process, are therefore, key considerations.

Theories of learning that describe a hierarchical acquisition of knowledge and that identify the dimensions that reflect cognitive development were instrumental in addressing these critical issues (Bloom, 1956). Three related dimensions have been identified: a cognitive dimension, a manipulative or motor-skill dimension and an affective dimension, the outcomes of which are new and/or modified knowledge, skills and attitudes. Based on the existence of the three dimensions, Frand and Charwat (1984) have developed a computer literacy framework for non-technical workers, at various levels of an organization. Attributes along each dimension have been identified, indicating different 'levels' of cognition. Figure 5.2 illustrates the computer literacy framework incorporating the three dimensions referred to as 'concept usage', 'data usage' and 'affective', and the attributes of each. The framework was found useful in analysing and describing desirable levels of cognition, attitudes and perceptions for individuals based on their role in the organization.

In this research, the framework and, specifically, the attributes along each dimension were helpful in determining the 'minimum' technical orientation needed by workers in offices. From a user involvement perspective, however, such an orientation is too narrow in scope. 'Computer Literacy' is only one component among others. Users first need to become aware of the dynamics of their working context, at the individual, group and organizational level, so as to appreciate the significance of technology in such a context. Users also need to learn about how to manage the technology, on both technical and behavioural grounds.

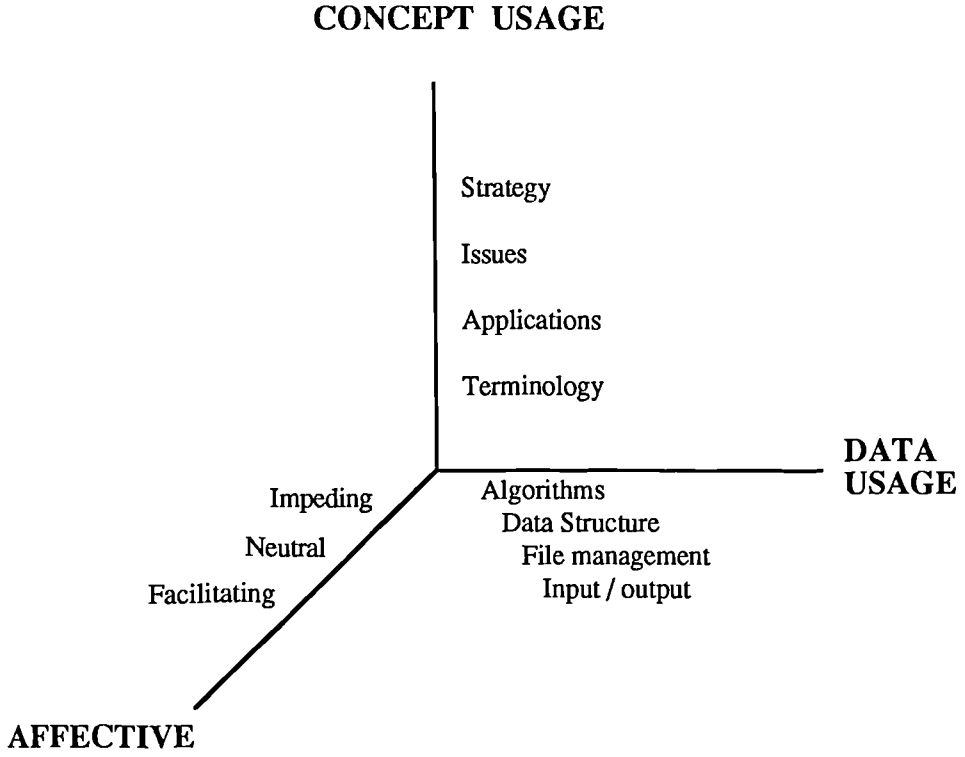


Figure 5.2 A Computer Literacy Framework

To provide such facilities a mechanism has been designed to support the technical and organizational learning process. Based on evidence that attitudes change with direct experience of the technology (Kemp, 1987), the mechanism is computer-aided to provide the necessary interaction and skill-acquisition capabilities.

Finally, since learning in this context is perceived to be a vehicle for activating user involvement, it is 'meshed-in' with other processes involving group interaction, and early progressive participation in the analysis of problems and needs.

5.4.2 A Conceptual Model of the Office

As previously illustrated in chapter two, the office is a domain that has not been well understood by designers or users. A conception of the office that embraces both analytic and interpretivist views has not been adequately described, thus posing an obstacle to the effective design of office systems.

One of the key concerns of the proposed user involvement strategy, has been to overcome this obstacle. A conceptual model of the office has been constructed, loosely based on Checkland's methodology (Checkland, 1972 and 1981), to describe the office in its totality and to provide end-users with a means of understanding the relationships between components of the office and between the office and its environment.

The design philosophy of the model has been based on a number of factors, derived from the different conceptions of the office presented in chapter two:

Office view: The model postulates the existence of both rational and irrational elements in relation to the behaviour of people in offices and the work they perform. The model therefore embraces both interpretivist and analytical perspectives.

Focus: People in offices at the level of individuals and groups are considered the key ingredient in the model. They are the driving force and accordingly the target for transformation. The successful introduction of technology into the office is based on their understanding of their work environment and the capabilities of the technology, as well as on their effective involvement.

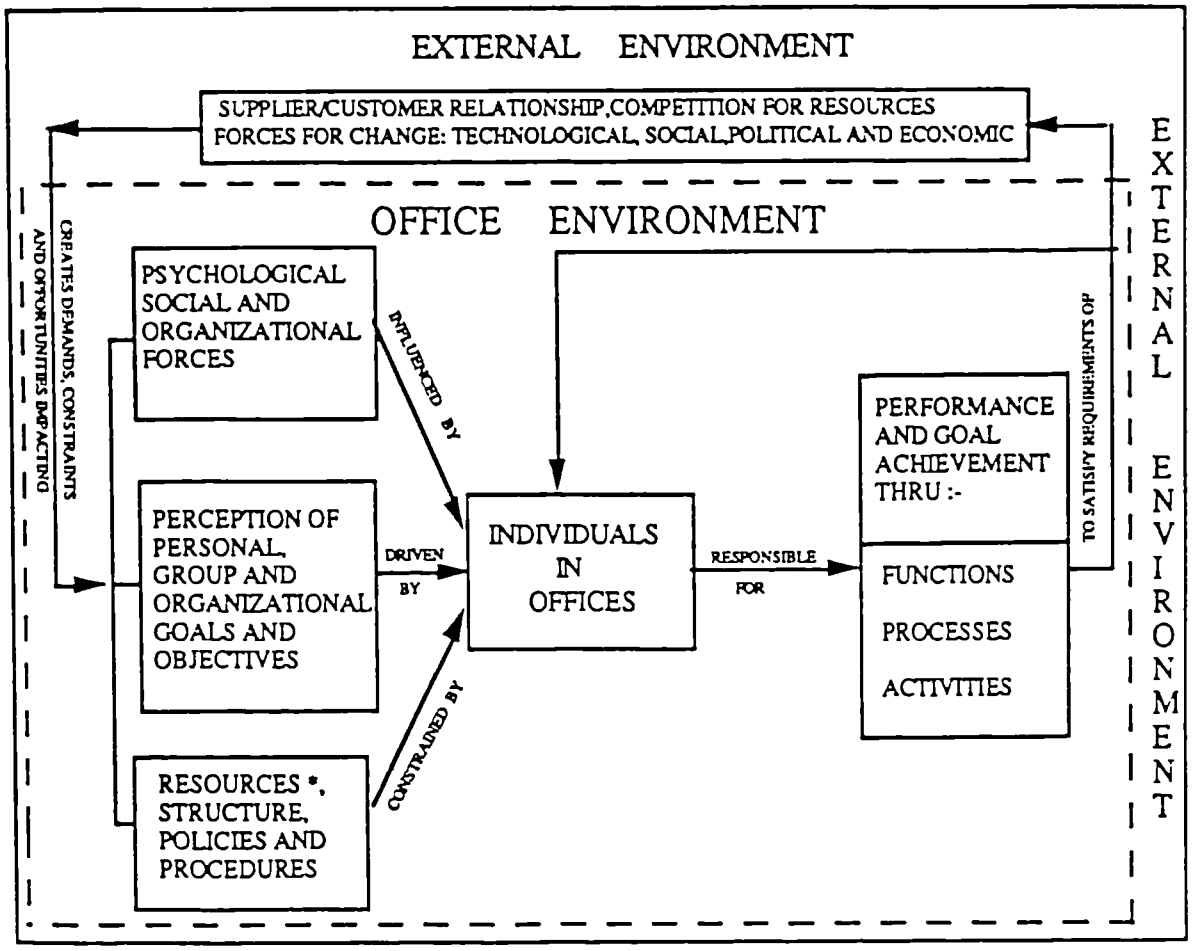
Target Office: The model is not targeted towards a specific office, it is a general framework designed to convey a global picture of the different components that constitute any office.

Purpose: The model is intended to help individuals view their office environment from a wide and comprehensive scope, and to guide them in the collection and analysis of relevant data at the individual, group, and organizational level.

Approach: The design of the model is based on systems theory and the concept of an open system. The office is viewed as a complex system formed of a set of interrelated components. It is also part of a wider system, the external environment with which it interacts, manifested in other units within the same organization or outside of it, such as customers, suppliers, and government agencies.

Figure 5.3 illustrates the proposed conceptual model of the office. As can be seen, individuals form the core of the office and are influenced, driven, and constrained by various internal and external forces, perceptions, and structural variables. Individuals are responsible for a certain level

of performance and goal-achievement through the fulfillment of functions, processes and activities. These are carried out to satisfy the needs and requirements of other individuals in the office and/or the needs and requirements of the external environment. This in turn exerts forces in the form of new input, demands and constraints which impact the behaviour of individuals and groups in the office. By understanding this dynamic aspect of their working environment and by identifying the different variables that impact their behaviour, individuals can adapt more efficiently and prepare for change in advance.



* Includes Technology and Information

Figure 5.3 A Conceptual Model of The Office

To guide users in the analysis of their work environment and to help them plan ahead for possible disruption, users are provided, through the first phase of the mechanism, with this rich model of

the office. Based on this model and prior to the first group interaction session, guidelines are provided to users to direct their discussions and to contribute to their awareness of the various constituents of their working environment. The outcome of the first phase is therefore an 'office environment assessment document' describing the working environment as perceived by users and indicating problem areas. This document is used as a reference base for any material prepared by users during subsequent phases.

5.4.3 Skill Acquisition

A key aspect of the mechanism is to provide users with what Eason (1984) refers to as a "risk-free, non-threatening environment", in the context of which they become familiar with some of the most pervasive office tools, for example, word processing and spreadsheets. Phase 2 of the computer-aided mechanism introduces users to information technology and office automation and provides them with some office tools. Based on their profile, users can select one of the tools, and use it to different levels of depth depending on their need.

Before any tool is invoked, users are provided with simplified information about the functions supported by the tool as well as some operational information. As the office tools provided have not been developed specifically for the mechanism but have been selected from what has been available locally, screen dialogue and formatting varies from one tool to another. To avoid confusing users during the operation of the tools, background help as well as 'hot' help is provided through a window that accompanies each screen to clarify its purpose. This feature is designed to simulate to a certain extent the support provided by a facilitator or technical expert and to enable users to proceed somewhat independently along the learning process.

Each screen has been assigned a number, and users are urged to make remarks and recommend changes to any screen by identifying its number. The changes are usually handled by the facilitator. This method increases the users' sense of choice, responsibility and control over the application tool. Further, it has a prototyping flavour, in the sense that users are allowed to express how the

tool should be 'moulded' to satisfy their cognitive, technical and, possibly, affective requirements. As users become more experienced, they can create their own prototypes for experimentation purposes. This can help them identify applications appropriate to their working environment and the kind of interface needed.

5.4.4 Group Interaction

In recognition of the political and social aspects of organizations and information systems (Keen, 1981), this research focuses on the behaviour and needs of people in offices at both the individual and group level. The 'guided group interaction' component of the strategy is a technique designed to elicit individual and organizational needs, and to address conflicts of interest and power, individual differences, and group behaviour in general.

Robey and Farrow (1982) through a model of 'constructive conflict ' indicate that user participation should lead to conflicts which need to be resolved. Team problem solving, open communications and confrontation of differences were cited by Lawrence and Lorsch (1967), Maier (1967) and Boland (1978), as effective approaches to conflict resolution. The guided group interaction component of the mechanism is designed to address individual differences and conflicts of interest and power. It enables users to share the knowledge they have acquired and to relate it to their working environment. To keep users on 'track', guidelines are provided as 'openers ' for discussion. The group response to the guidelines represents a valuable user assessment document.

Group interaction sessions do not take place once but at the various stages of orientation, to minimize the complexity and overlap of issues connected with the office and information technology. They begin by introducing users during Phase 1 to an environment with which they are familiar. This provides them with an opportunity to relate their knowledge and experience to what is then newly presented. As an illustration, users discuss in their first sessions, objectives and goals, functions, activities, procedures, resources, and structure, and identify each according to its attributes, interrelationships and problem areas. In the second phase, knowledge about the potential

and impact of the technology is provided and users are required to discuss areas where office systems may improve the effectiveness of the organization, for example, job satisfaction, communications, administrative support, and decision making, and to relate all this to the reference base established during phase 1. (See Appendix B for an illustration of the group interaction guidelines)

This is not to contend that the 'Guided Group Interaction' technique proposed in this research represents the ultimate solution, for as Hirschheim (1985) concludes from the 'Hermeneutic Role Playing Exercises', conflicts inevitably arise as a result of the various goals and needs of different individuals and groups. However, as Baecker and Buxton (1987) note, if players in the role-playing exercise are "well trained and imaginative, the exercise will bring to light potential problems, conflicts and benefits while there is still time to correct them." This is even more true of the 'guided group interaction' sessions as the players are themselves the 'stakeholders', are playing their own role and not that of others, have been subjected to common orientation and experience, and have some guidelines to begin with.

5.4.5 Self - Evaluation

In each of the first three phases, a self-evaluation module is incorporated to reinforce the knowledge acquisition process and to enable users to gain confidence and acquire a sense of achievement and satisfaction. Users are allowed to navigate back and forth from the self evaluation module to the other modules to enhance their understanding of topics.

All questions for self evaluation are stored on external files and are loaded when the self evaluation module is invoked. Questions are divided into three sessions, to allow users to pace themselves. During the testing period of phase 1, the questions were refined several times, in terms both of contents and presentation, based on users' reaction.

When the self evaluation module is invoked, two operations take place, parsing and evaluation. Based on the user's choice of a particular session, the appropriate question file is selected. Questions are then parsed based on their type (multiple-choice,fill-in blanks or true and false) and communicated to the evaluation module. For each question the user is allowed two attempts, after which the correct reply is displayed. (A sample of this module is included in Appendix C) .

5.5 A Learning and Participation Methodology

5.5.1 Description of the Methodology

To implement the proposed user involvement strategy, a learning and participation methodology is outlined in this section. It illustrates all the steps involved from the moment it is activated until it terminates or interfaces with other systems development methodologies. Figure 5.4 illustrates the logical flow of the methodology. As shown, it can be divided into three broad stages :

Stage 1 : Establish initial contact , assess climate and identify participants.

Stage 2 : Initiate the learning and participation process.

Stage 3: Formulate philosophy for orientation diffusion / proceed along development path / terminate

The first step in stage 1, establishing initial contact, will take place either through :

1. An internal trigger from within the user organization, by a member of management or staff, who is aware of the methodology and mechanism, or is seeking facilities for orientation and involvement; or through

2. An external trigger, through vendors, agents or facilitators assigned the task of providing orientation and/or introducing new technology.

In recognition of the differences between one organization and another, the next step in the methodology is to assess, in general, the working environment and to identify major participants, all or some of whom can become change agents during subsequent stages. The outcome of this step is dependent on a number of situational variables such as the size of the organization, culture, structure, and power distribution. For example, in a small organization with a culture that encourages its members to look positively upon technology, and where there are no significant discrepancies between its formal and informal structure, the outcome may be a clear image of the working environment , priorities and potential participants. The more complex the environment , the less clear the image, and, possibly, the fewer the number of participants. This may also mean that more iterations are needed for diffusing the orientation process. The quality of the assessment is also dependent on the insight of the external facilitator and the co-operation of the user(s). Based on this preliminary assessment of the organization, participants - potential change agents - are identified.

By the conclusion of stage 1, the learning and participation process is now ready to start. This is the main concern of stage 2, and the core of the methodology. A phased approach is used whereby individuals interact with the technology and the group in four phases which proceed methodically to enable users: in phase 1 to learn about and explore their office environment, individually and with the group, and generate with the help of guidelines an assessment document about their working environment; in phase 2, to learn about and explore the new technology, individually and with the help of guidelines and the document output from phase 1, to generate a technology needs assessment document; in phase 3, to learn about and from a vision of a future office automation plan, individually and with the help of guidelines and the two documents output from phases 1 and 2, to generate a document outlining a future office automation vision; in phase 4, through group negotiations, users evaluate and refine the contents of all the documents generated during the

previous phases. A final document is produced reflecting an analysis of the user environment and an assessment of needs. The learning and participation process now ends and concludes stage 2.

During the third stage, users may proceed in different directions depending on various situational variables. If more users need to undergo the same iteration, a decision has to be taken by management or someone with authority - preferably from those who already participated - about the approach to be used in diffusing this process and involving more users, and to determine for example, what are the priorities, the number of individuals or groups, the need for the facilitator in further iterations. The vision formed in the first iteration is often helpful in guiding this decision. Once these issues are decided, new participants are selected, and the process is initiated once again. If there are no more users, then a decision to proceed along the path of introducing new technology, or to terminate has to be taken. If the organization decides to proceed, then the outputs from the learning and participation process in the form of assessment documents, and more importantly, orientated and involved users, are input to the next stages of the system development cycle. It is at this point that the learning and participation methodology needs to be interfaced with other system development methodologies. This will depend on a number of variables, which will be discussed in more detail in section 5.5.3. Finally, if the organization decided to terminate or postpone any decision at the present moment, then the process stops.

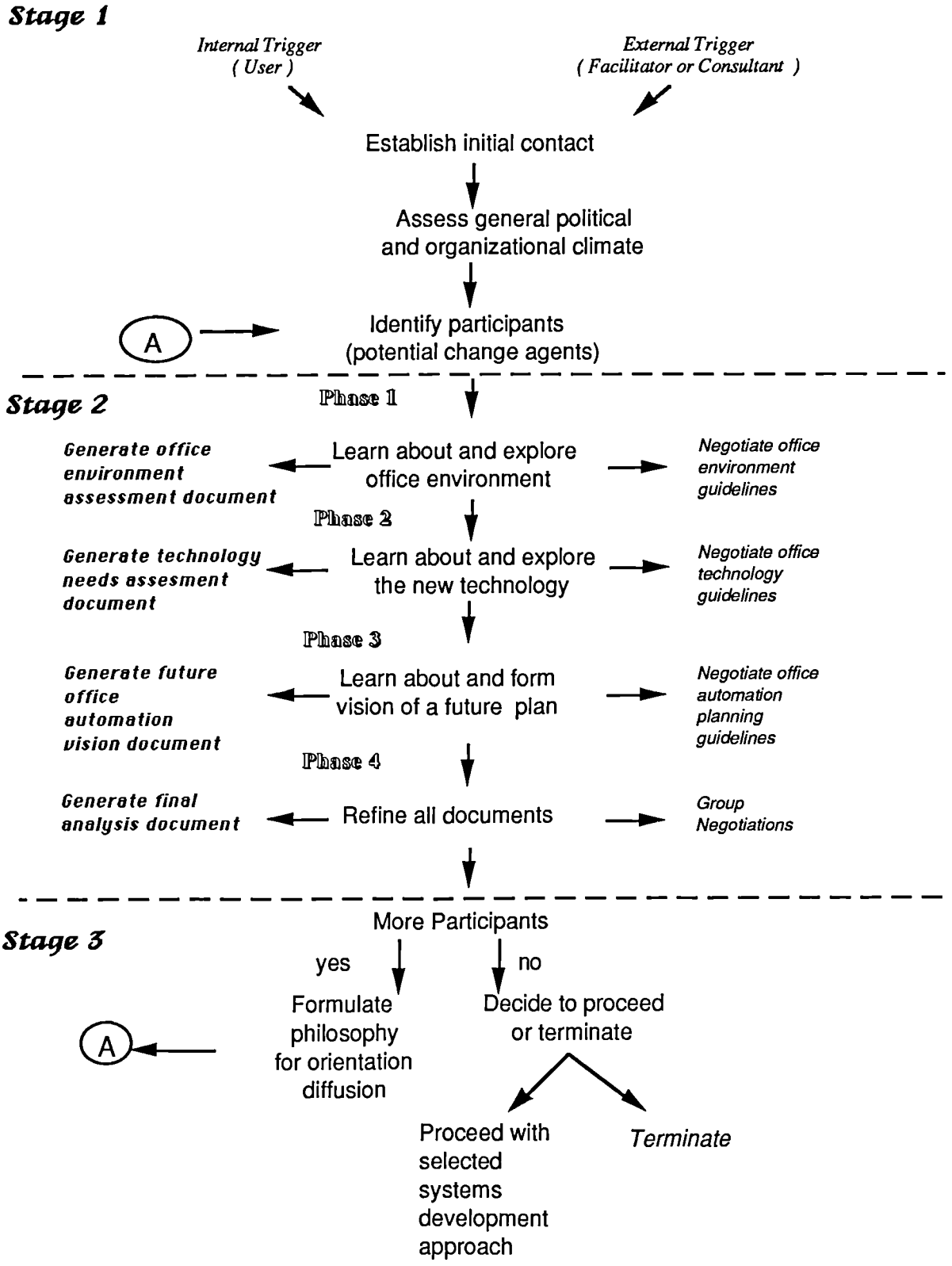


Figure 5.4 A Learning and Participation Methodology

5.5.2 Phases of Orientation and Involvement

The knowledge base, a critical component of the mechanism, is divided into four 'phases'. Each phase is divided into 'modules' which in turn are divided into 'topics'. The first module of each phase presents the learning objectives for that phase. Each phase also includes a self-evaluation module for the reinforcement of the knowledge acquisition process. Group interaction occurs at the end of each phase and a module is dedicated to group interaction guidelines and feedback. A brief overview of the phases follows:

Phase 1 'The Office Environment'

Realizing the importance of developing a clear conceptual model of the office (Christie and Gardiner, 1987) and of understanding the nature of office work, the first phase is not about technology at all but about the "office environment". A conceptual model of the office designed to guide users in their analysis of their work environment is presented in this phase. The model has been previously described in section 5.4.2. During subsequent phases, the significance and impact of technology is visualized through this conceptual framework. With the assistance of guidelines, users are encouraged to investigate their own working environment and to identify problems and needs.

Phase 2 'Information Technology and The Office'

This is an exciting phase for users because it draws them closer to the technology. Having gained a broad perspective of the office and nature of office work in phase 1, users become aware of the ways technology can be used to increase the productivity and effectiveness of an organization. Through hands-on training, users become familiar with popular office automation tools like word processing packages and spreadsheets.

Phase 3 'Planning and Developing Office Systems'

This phase familiarizes users with the process of planning, developing, and implementing office systems. It enables them to develop a preliminary vision of the process and of their roles as participants in the introduction of new technology into their workplace.

Phase 4 'Getting Ready For Participation'

This phase enables users to store, modify and retrieve the initial documents that they have developed during the previous three phases and subsequent group discussions. They finish the orientation package with a valuable analysis document on how office automation might best be applied in their own organizations.

5.5.3 Methodology Interface

The choice of an appropriate system development methodology is not always a rational process. It depends on many variables, such as the state of awareness of the users about existing methodologies, the prejudice of available analysts and consultants, the methodology already in use (if any), the type of application and the degree of urgency.

Two system development approaches have been selected to illustrate briefly how the learning and participation methodology can be interfaced to each. The first methodology is a modified version of the traditional system development life cycle approach (Long, 1987), as this is still frequently used locally in Egypt, (and elsewhere) and users may prefer to use a modified version of it than to adopt an altogether new approach. The second methodology is Multiview, a relatively new approach, described in detail by Wood-Harper, Antill and Avison (1985), which combines a number of techniques that are considered key features of other methodologies and its flexible, hybrid and contingent orientation is in line with the philosophy of the proposed user involvement strategy.

In practice, it is anticipated that linking the learning and participation methodology to other system development methodologies will not pose any problems. The link will most probably take place at the analysis stages, prior to the design stage. The contribution of orientated and involved users is expected, however, to extend beyond the initial stages. Having experienced the learning and participation process, users become familiar with basic terminology, concepts and issues related to the technology and the analysis of their environment. Some users may become more technically sophisticated, and in turn more capable of contributing to the systems development process.

Modified System Development Life Cycle Approach

In recognition of the major deficiencies associated with the life cycle approach, mainly its rigid and technical orientation, and its tendency to disregard human and organizational issues, Long (1987) proposes a modified version designed to overcome such deficiencies. A checklist of major human resource and organizational issues is incorporated into the various phases of the systems development life-cycle. Realistic responses to the questions included in the checklist necessitate the active participation of users. However, users need to be motivated, orientated and willing to be involved, to be able to participate during the different phases. This is the main concern of the learning and participation methodology.

Prior to the initiation of the life cycle approach, the learning and participation methodology can be activated. Its outcome in the form of user assessment documents covers many of the issues raised during phase 1 of the life cycle approach, concerned with conducting a feasibility study and identifying needs. Orientated and involved users are also able to contribute to initial and possibly more advanced phases of the life cycle approach to different degrees.

Multiview

Despite the hybrid orientation of Multiview and its concern with 'human activity systems' and socio-technical aspects, it has been criticised for its reliance to a great extent on 'professionals'

rather than users. By interfacing the learning and participation methodology with Multiview, this problem can be alleviated. For example, the first stage of Multiview, 'Analysis of Human Activity Systems' is concerned with analysing and identifying the purpose, problems and information needs of the organization and non-technical workers would certainly find difficulty conducting such activities, and contributing meaningful input. Not to mention other difficulties resulting from group conflicts, and lack of mechanisms and guidelines for group negotiation.

Moreover, another aspect of Multiview is its exploratory and contingent orientation. Unless users are adequately orientated and involved, they would not be in a position to decide or participate in determining whether a particular aspect or technique of Multiview is appropriate to their environment. The professionals will prescribe specific aspects and users will remain inactive. By implementing the learning and participation methodology prior to Multiview such obstacles can be to a great extent alleviated.

To conclude, the learning and participation methodology can be prescribed as a pre-requisite to systems development approaches that call for user involvement and participation and that emphasize human and organizational issues.

CHAPTER 6

THE COMPUTER MECHANISM

6.1 Introduction

The user-involvement strategy outlined in the previous chapter has two major ingredients: a management ingredient in the form of a methodology, procedures and intervention techniques, to control the learning and participation process and outcome; and a technology ingredient in the form of the computer mechanism, to provide the tools to be manipulated by the process. This second ingredient, the computer mechanism, is the focus of this chapter. The mechanism is designed to facilitate the learning and participation process, and to provide non-technical office workers with the necessary interaction with, and exposure to, the technology. To achieve its purpose, the mechanism comprises a set of facilities that provide users with: conceptual knowledge about the office environment , information technology and office automation; hands-on experience with computer-based office tools; a means for self-evaluation; a forum for group interaction; and analysis guidelines.

This chapter comprises eight sections. Section two presents the objectives of the mechanism. The principles upon which the design of the mechanism has been based are then presented in section three. The methodology used in building, testing, and implementing the mechanism is described in section four, which first introduces the factors influencing the choice of the methodology, and, second, the stages of development and the steps included in each. The structure of the mechanism illustrating its key components is described in section five. Section six presents the tools and techniques used in its design and development, and includes a reasonably detailed description of the user interface. The logical flow of the mechanism is then presented in chapter seven. Finally, section eight is about the methods used in propagating the mechanism, in illustrating its capabilities, and in motivating people to use it.

6.2 Objectives of the Mechanism

The design of the computer mechanism has been driven by the requirement to address the needs of people in offices in terms of their understanding of, and attitudes to, the introduction of information technology into their workplace. The mechanism is designed to provide a learning and participation environment free from the anxieties which usually accompany the introduction of any new system on the successful use of which, their future status or employment prospects may depend. (For a discussion of such anxieties, see, for example, Mumford and Banks, 1967, and Eason, 1982).

The main concern of the mechanism is to enable the two processes, learning and participation, to take place. Within this context, its main objectives are:

* To provide non-technical office workers with an accessible easy-to-use learning device which operates incrementally within the framework of an evolutionary information systems strategy.

* To provide users with the 'flavour'of hands-on experience and facilities for skill acquisition.

* To provide end-users with a conceptual framework that enables them to share a common foundation of knowledge about the office and information technology.

* To educate users in systems development and to enable them to analyse their organizational context and to define their needs vis-a-vis the technology.

* To promote comprehension of both individual roles and their interrelationships as part of a whole, and to enhance group consensus on human, technical and organizational issues.

* To enable users to lead the learning and participation process and to reduce the need for expert intervention.

* An additional objective was that the mechanism should be readily usable in the local Egyptian environment.

6.3 Design Principles

The general principles on which the design of the mechanism was based were:

* 'Novices' or non-technical office users, were designated as the target of the mechanism. An appealing user interface with adequate syntactic and semantic knowledge was needed for this category of users.

* The mechanism was to operate in 'phases', providing users with incremental and progressive doses of knowledge and skills.

* Users were to be able to advance at their own pace, navigate back and forth between different phases, modules and topics, correct their own mistakes, and develop their own understanding.

* Facilities were to be provided to enable users to select, and acquire hands-on experience with a variety of skills based on their needs and profiles.

* The knowledge base incorporated into the mechanism had to address both technical and behavioural needs.

* Participants were to be able to identify, collect and analyse, pertinent data from their working environment, within a given conceptual framework, so as to conceive the significance of technology through this concrete contextual base.

* The mechanism was to facilitate the development and generation of a user-assessment document to be used as input to subsequent system development activities.

* A forum and guidelines were to be provided to enable participants to assemble as a group to:
    - discuss progress and responses to guidelines
    - express needs and concerns
    - address conflicts of interests and power over human, technical and organizational issues
    - negotiate objectives, plans and commitments.

* Participants were to feel they are spearheading the process. Professionals or external specialists were to be regarded as facilitators or advisors.

* Facilities were to be provided to assist participants in evaluating their own progress.

* For practical purposes, the mechanism was to be portable, with minimum overhead in cost and storage requirements.

6.4 Approach to Development

6.4.1 Choice of approach

The choice of approach for the design and development of the mechanism was influenced by a number of factors among which were:

1. Nature of 'target' user: the intended users of the mechanism are non-technical office personnel, with a variety of profiles, needs, and anxieties. The design and development of the mechanism for use by such users involved both technical and human considerations during each of the following processes:

- The selection of the content of the knowledge base
- The construction of the user interface
- The choice of tools and facilities for skill acquisition

2. Nature of Task: to the author's knowledge, there was neither evidence in the information system literature nor in practice that there had been previous attempts at constructing a similar mechanism. The task of developing a computer-aided mechanism to facilitate and support learning and participation in systems development, while providing facilities aimed at maintaining the equilibrium of the individual, the group, and the organization, may be considered by both researchers and practitioners as novel and complex. It was therefore necessary that components of the mechanism be tested at different stages during development. Early feedback on the usability of each of the components: the user interface, the knowledge base, the tools and guidelines, was critical. Several scenarios were developed to determine how the mechanism might evolve as it is experienced by users. Experimentation using each of these scenarios was important. For example, as users advance and gain experience in using the mechanism, what menu facilities, what knowledge, and what skills should be provided.

3. Constraints: the design of the mechanism and the choice of tools has been constrained by the need to develop a product that is not costly, not too demanding in terms of equipment, and portable, as it is designed for use in a developing country and by a large number of users in many offices. Limited local availability of, and familiarity with, system development software, and office tools have been also a constraining factor.

In consequence, it was anticipated that during the initial period the design and development of the mechanism would undergo extensive modification and refinement through testing and experience in its use.

Experimentation was, therefore, required from the outset, and subsequently, before any significant investment in time and effort was expended. There was a need for an environment in which the mechanism could be developed, tested, modified and remodified in an iterative process. Prototyping and an incremental approach were found to be most appropriate for this kind of application.

6.4.2 Stages of Development

The approach employed for the design, development and testing of the mechanism may be considered as a series of stages:

Stage I Assessment of needs and establishment of a framework for the mechanism :

1. An overview of the local office environment, focusing on non-technical office workers - secretaries and managers - in a number of administrative offices in both private and public sector institutions in Egypt, was first formulated. (Observations, interviews, group discussions and questionnaires, have been presented in chapter 3). The results have shown that obstacles impeding the introduction of information technology in Egyptian offices have technical, behavioural and economic implications, and are related to individual 'readiness', inadequate understanding of the office environment, group behaviour, shortage of expertise, and the cost and quality of training.

2. A literature survey of available material on user involvement, system development methodologies, learning theories, and other related topics, was next conducted. The purpose of the survey was to search for approaches and/or mechanisms that address the contextual

challenges outlined in step 1. The outcome of the survey pointed to a growing need for more theoretical and empirical research in this area.

3. A survey of office tools in common use in the local environment, or for which need has been expressed was also carried out (Section III of one of the questionnaires used in step 1 was designed for this purpose, see Appendix A.2). The results indicated that there is high demand for skills and tools to enable activities such as word-processing, filing, accounting, and electronic mail to be implemented.

4. An overall framework for the mechanism was then established, based on the previous findings. The mechanism was to be computer-mediated, 'phased', and incorporate facilities for learning and participation. A preliminary identification of the 'phases' was made at this stage.

Stage II. Selection of, and experimentation with, development tools

5. Specifications for appropriate hardware were established based on a number of requirements (see section 6.6).

6. A search for, and experimentation with, software tools capable of providing the facilities to be incorporated into the mechanism was then conducted. (see section 6.6)

Stage III Development and refinement of a prototype for Phase 1 of the mechanism

7. An early computerized prototype of the first Phase of the mechanism was developed for experimentation purposes. The prototype included a knowledge base about the office environment incorporating a preliminary conceptual office model.

8. The prototype was field-tested in one of the administrative offices previously explored, by a manager, a senior executive secretary, and a junior secretary. The prototype was also

demonstrated to a number of information system professionals - consultants and systems analysts - for their comments and evaluation.

9. Refinement of the prototype next took place in response to user reactions and professionals' comments. Steps 8 and 9 were repeated until positive user feedback was obtained and the prototype found suitable. It is interesting to note that out of the refinement process came an additional enhancement to make the mechanism more powerful. Based on user reactions and an enthusiastic demand for group discussions, the guided group interaction approach was developed and incorporated into the mechanism. A self-evaluation module was also incorporated at this point to reinforce the knowledge acquisition process.

Stage IV Preparation for, and development of, Phase 2

10. Preparation for the development of Phase 2 of the mechanism began by studying the experiment conducted during Stage I in the form of general orientation and hands-on sessions. The sessions had been provided to non-technical office users in a private institution to study their attitudes, reactions and needs vis-a-vis the technology.

A study of their reactions following the sessions was compared to the reactions of another group for whom sessions had not been provided. (The questionnaire used for this purpose is included in Appendix A.1, and a more detailed analysis of this study is in chapter 3). The observation of users during hands-on sessions was also helpful in identifying the type of support needed for skill acquisition purposes.

11. Development of Phase 2 next took place, based on the findings from step 10, and to a large extent on the material that had been prepared for the orientation sessions.

12. Testing and refinement of Phase 2 was carried out iteratively, until positive user feedback was obtained. Non-technical office workers as well as information system professionals from an academic and a governmental institution were involved in the testing process.

Stage V Development and testing of Phases 3 and 4 and tuning of the complete mechanism

13. The pattern established for Phases 1 and 2 was repeated in the development of Phases 3 and 4 of the mechanism.

14. Testing, refinement and 'tuning' of the complete mechanism was carried out after all Phases had been completed.

6.5 Structure of The Mechanism

The mechanism is hierarchically structured in four Phases, as already noted and each Phase is composed of a set of modules, and each module of a set of topics. Figure 6.1 illustrates a phase-module-topic tree menu.

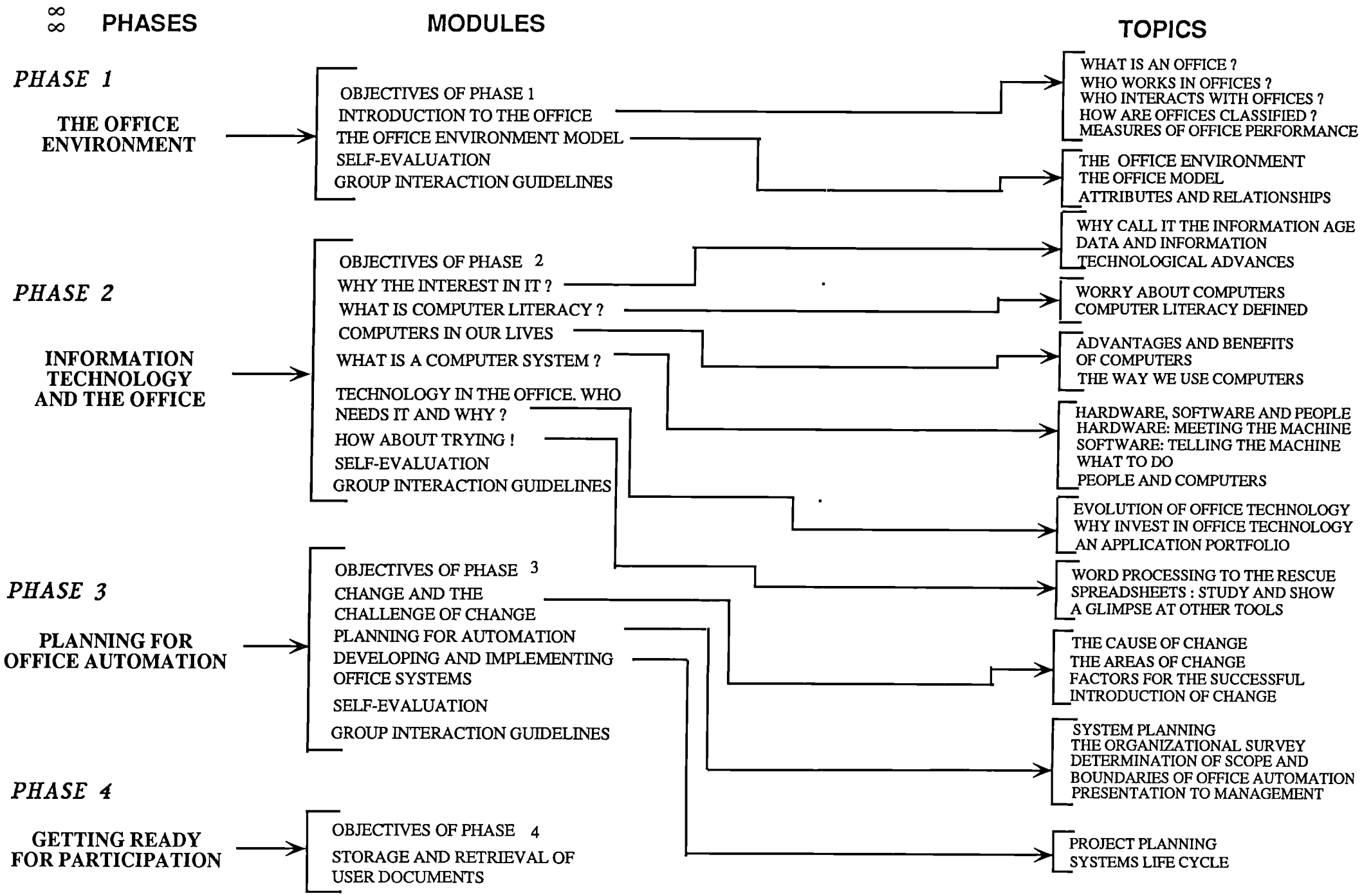


Figure 6.1 Tree Diagram For Phase - Module - Topic Menus

A module, or a topic, may refer to one of four types of structures:

* A conceptual knowledge base segment
* A tool for skill acquisition and hands-on experience
* A facility for self-evaluation of progress
* A group interaction session

Users can navigate back and forth between structures using menu selection and direct command facilities.

6.6 Design Tools and Techniques

6.6.1 Choice of programming and display tools

The need for a prototyping environment in which continuous refinement of the mechanism is carried out has to a large extent influenced the choice of programming and display tools. The following set of requirements was set down to guide the search for appropriate software:

1. Easy to use tool for the development of screens and menus.
2. Graphic capability for effective visual communication.
3. Cut and paste capability of images and text captured from other 'libraries' and the display of such images.
4. Display in both colour and monochrome modes.
5. Forward and backward navigation, direct manipulation, help and other screen manipulation facilities.
6. Pull-down menus for direct access of menu items, and chained command facilities for more advanced users.

7. Interface capability with other office tools and 'special' programs.
8. Storage of screens, menus, self-evaluation exercises, group interaction guidelines and user feedback on external files for fast prototyping and refinement purposes.
9. Minimum storage requirement for screens, tools and programs.

6.6.2 Hardware and software specifications

Following a survey of available software and hardware facilities in the local market (Egypt), it was decided that the package be developed on an IBM compatible microcomputer using the following software:

1. A driver program for controlling and monitoring the operation of the package, written in Turbo Pascal.
2. The 'STORYBOARD' tool mainly for developing the user interface.
3. Special-purpose programs written in Turbo Pascal for the self-evaluation exercises and group interaction guidelines.
4. Office tools that are relatively easy to use, such as 'WRITING ASSISTANT' and Lotus 1-2-3.
5. Special programs written in Pascal and Assembly language for displaying 'background' and 'hot' help when office tools are invoked to clarify ambiguous screens and maintain a 'user friendly' interface.

The minimum configuration needed to accommodate the completed package is:

* A 'DOS' operating environment
* 3.5 megabytes of disk storage
* A graphics adaptor (CGA, but preferably EGA for better resolution)
* A printing device for the generation of guidelines and assessment documents.

6.6.3 The user interface

A great deal of emphasis was placed on the design of the user interface of the mechanism, considering that its intended users are mostly non-technical personnel, for whom the interface may be a critical success or failure factor. Considerable experimentation was carried out during the development of the different components of the mechanism, to observe how 'naive' users interact with, and react to, the interface.

Two key elements influenced the design of the user interface of the mechanism: screen and dialogue design, and mental models.

1. Screen and Dialogue Design

The design of screens and the selection of appropriate dialogue style has been determined by the following factors:

* Type of user: the intended users have been classified as 'naive' with no knowledge of the mechanism, in terms of the facilities, functions and commands offered. They needed screen facilities to lead them effectively through the mechanism. However, it must be pointed out that features such as pull-down-menus and chained commands, have been incorporated into the interface to enable moderately experienced users, or naive users who have gained experience, to use the mechanism without feeling bored or frustrated.

* Structure of the knowledge base: the knowledge presented to users has been organized hierarchically, to enable users to relate different topics and concepts. Hierarchical menus are considered appropriate for 'naive' users (Christie, 1987).

* Structure of skill acquisition tools: office tools incorporated into the mechanism, such as wordprocessing and spreadsheet, have structures that required some integration with other components of the package.

* Functional requirements: in addition to basic screen functions, other specific requirements such as the generation of printouts for guidelines and trial and error feedback for self-evaluation exercises, had to be accommodated.

Having considered the above factors, the chosen dialogue style and screen layout were as follows:

Dialogue Type: A'hybrid dialogue' or a mix of dialogue styles was used to enable users to interact with the mechanism, depending on the segment they were using and the required task:

1. *Menu selection* has been chosen to control the manipulation of the knowledge base, on the basis of its hierarchical structure, and the simplicity of the menu method. Based on previous studies and recommendations (see, for example, Christie, 1987) the number of levels of selection did not exceed three (phase, module, topic) and the number of options per level did not exceed eight. The menu method has also been used for the selection of appropriate commands which enable users to:

- Move forward to the next screen
- Move backward to the previous screen
- Jump to the main menu
- Return to the last menu
- Print (if necessary)
- Seek help and pull-down menus
- Quit

2. *Question and answer* has been chosen specifically for the self-evaluation module. For each question the user is allowed two attempts after which the correct reply is displayed. For 'multiple choice' and 'true and false' types, possible answers are randomized, to encourage users to 'recognize' the correct reply without paying attention to its position on the screen.

3. *Function keys* are used in association with skill acquisition tools such as wordprocessing and spreadsheets to invoke 'hot help' whenever users feel 'lost'.

4. *Form filling* has been chosen for entering users' responses to group interaction guidelines, but not according to the traditional style. A form is generated by the system indicating the guidelines and required input. Prior and following group interaction, users may enter their responses to the guidelines in free text form, not as fixed 'fields' as in most forms. An easy-to-use wordprocessor is used for this purpose.

5. *Direct commands* are used to invoke certain tools or to access portions of the knowledge base without proceeding through the hierarchy of menus. Chaining of commands is also possible. This style of dialogue is appropriate for users who have gained experience using the mechanism

Screen Layout

The layout of screens has been associated with the structure of each component of the mechanism and the kind of interaction needed. Except for skill acquisition tools, which have their own layout, a common feature is the organization of screens. At the top of the screen headers indicating the phase and, if necessary, module and topic are displayed; at the bottom of the screen, possible commands are listed; and in the middle of the screen, either selection menus, text, questions, or guidelines appear. The screen layout of tools is dependent on the tool itself, and that is why background help and 'hot help' are provided to guide users and maintain a consistent interface.

2. Mental Models

The user interface is not merely a communication link between the user and the computer, it can influence user behaviour and attitudes either positively or negatively, and it can develop or sustain the user's level of expertise. The influence of the interface upon the user will depend on the mental model that the user induces while interacting with it. This is an important design consideration (see, for example, Christie, 1987, Willcocks and Mason, 1987).

As illustrated in chapter two, the behaviour of people in offices and the goals they pursue need to be considered from a broad multi-level perspective. In designing the user interface of the mechanism, an important consideration has been to communicate a generalized model that matches the user's needs both as a human being and as a member within a certain organizational context. For example, users may have motivational and cognitive needs, as well as interpersonal and organizational needs, that influence their responsiveness to the mechanism while interacting with it.

To allow for varying and conflicting needs, the interface does not impose a specific mental model upon the user but is designed to provide a general conceptual framework, through which users can derive a specific mental model that matches their human and organizational needs. In addition to screen design and dialogue styles (described in the previous section) major aspects of the interface that have enabled the provision of such a framework are the following:

* The sequence of knowledge communicated through the interface:

Users are first presented with simplified information about the purpose, structure and method of use of the mechanism to establish an early mental model of its capabilities and ease-of-use. Next, users are introduced to the office environment and are encouraged and guided to analyse their own working context. By associating the learning process at its initial stage with an

environment with which users are familiar and about which they can contribute input, feelings of interest and self-confidence are activated in users. The knowledge presented in subsequent phases about the technology is more easily conceptualized by users in terms of its significance and usefulness to their own work and to their working environment as a whole.

* The representation of knowledge:

Wherever possible, knowledge provided through the interface has been accompanied by images of people and machines to facilitate the formation of clear mental models. Different processes and conceptions have also been displayed in diagrammatic form, for example, the conceptual model of the office, and the system development life cycle.

* Features that allow for user skill migration:

To allow for changes in user skill levels, features such as pull down menus and chained commands have been provided to speed up the selection of knowledge and the execution of commands.

* Skill facilities that allow for a variation in profiles:

One of the key facilities provided to users is to become familiar with some of the frequently requested office tools. Users at various occupational levels can determine the portfolio of tools appropriate to their profiles and the level of familiarity needed for a specific tool. For example, a manager may simply need to become familiar with a wordprocessor and its basic capabilities, whereas a secretary would need a higher skill level in manipulating this tool.

* Features that allow for group interaction:

To satisfy a basic human and organizational need, guidelines are displayed to users following each phase to allow them to communicate with one another and to share the mental models they have induced.

6.7 Logical Flow of the Mechanism

The logic flow for the mechanism is presented in figure 6.2

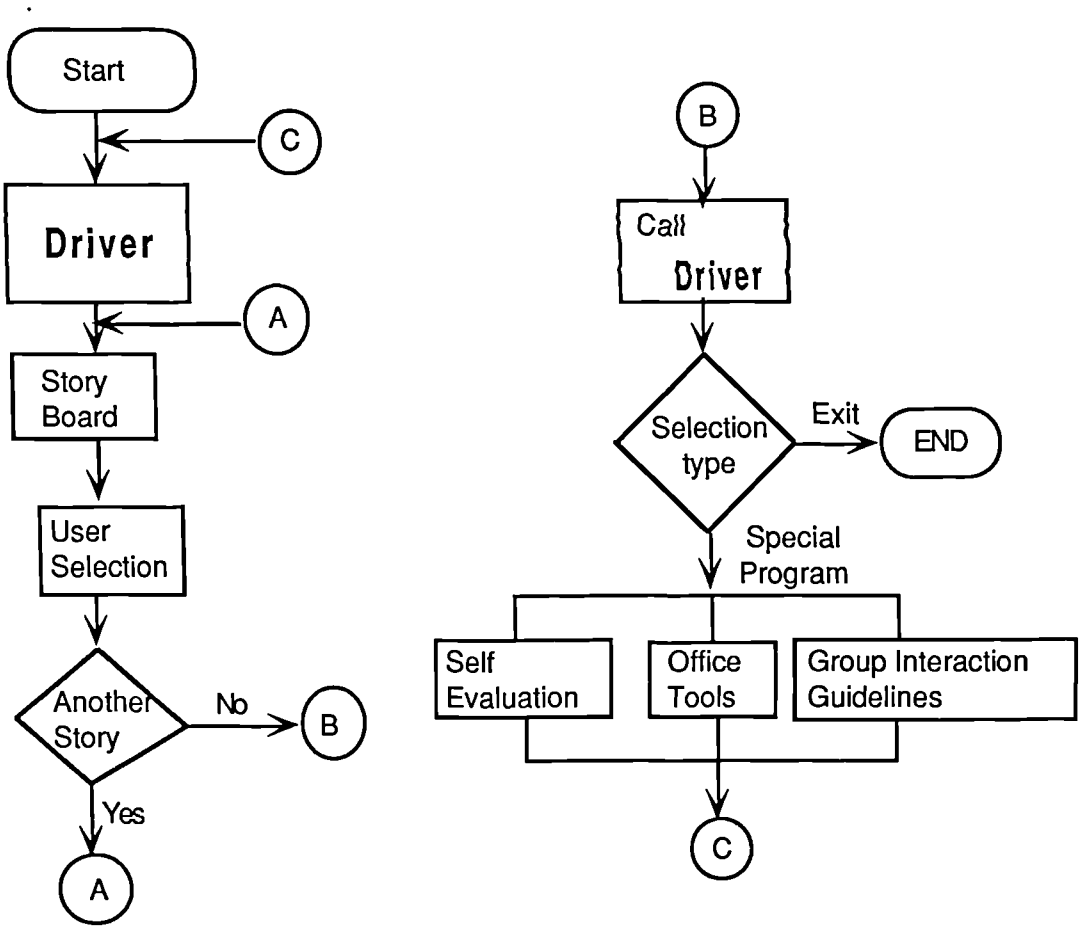


Figure 6.2 - Logical Flow of the Mechanism

The flow starts, by a call to the package which immediately invokes the driver program. This is a Pascal program which controls the whole operation of the package but is transparent to the

user. The driver program invokes Storyboard which is the user's interface with the package. Inside Storyboard the user has to make a selection at several points, based on which any one of the following takes place:

* Storyboard remains in operation and displays the desired 'story' (a related sequence of screens) based on the menu item selected by the user.

* An exit from Storyboard is made, and the driver program is reinvoked and given parameters indicating the user's choice. Based on such parameters, the driver performs any of the following:

. Terminates the operation of the package, if the user wishes to quit.

. Invokes: 1. An office tool

2. The self-evaluation module

3. A group interaction session

When the user terminates any of these activities, the driver takes responsibility and returns control back to Storyboard, which displays to the user the same menu from which the user had made the last selection.

6.8 Propagation of the Mechanism

When the process of developing, testing, and tuning the mechanism was complete, there was a need for making people in offices aware of its existence and capabilities. Two methods were used to propagate the mechanism:

1. An article was published in a popular local periodical called 'Computer User' (Kaddah 1989). The article appeared in two versions, one English and another Arabic. A copy of the English version of the article is presented in Appendix D.1.

2. A brochure was developed and distributed to a large number of managers in offices. The brochure was developed in both the English and Arabic languages. For the purpose of appealing to potential non-technical users of the mechanism, the brochure was characterized by its:
   - compact size
   - use of images and graphic printouts; and
   - avoidance of technical jargon.

A copy of the contents of the brochure appears in Appendix D.2.

The response to this awareness campaign was encouraging. Some users called asking about the terms and conditions involved in acquiring the package. An interesting call was made by a manager of a shipping company in Alexandria (Egypt), inquiring about how this 'office automation mechanism' would benefit his business. Another user who had no microcomputers, investigated the possibility of either leasing equipment or running the mechanism 'off-premises'.

CHAPTER 7

IMPLEMENTATION: EMPIRICAL FINDINGS TO DATE

7.1 Introduction

This chapter is concerned with the implementation of the mechanism, not only after its completion, but during the early stages of its development. Since the ultimate purpose of this research is to activate user involvement and participation in systems development, users' acceptance of the mechanism designed for this purpose was crucial to its success. Implementation activities, therefore, began early in the development process, from the moment users were exposed to partial prototypes of the mechanism until they experienced a complete refined version of it.

Implementation activities that have taken place in parallel with the development process, *mainly* using a prototyping approach, are described in section two. The implementation of the complete mechanism is then illustrated through three example cases described in sections three, four and five. The cases demonstrate the applicability of the approach and mechanism in different organizational contexts. These sections have a similar structure, such that for each application the following key aspects are highlighted: the organizational context of the user, the background with respect to computing and information systems, the strategy introduced for activating user learning and participation, the achievements, and, finally, the difficulties encountered during implementation and the corresponding remedial action taken. Section six presents an application different in context and in scope from the previous three. In this case, the mechanism is being considered for use in a national campaign aiming at the introduction of office automation systems and tools in all government offices.

7.2 User Evaluation of Prototypes

As previously indicated in chapter 6, a prototyping approach was used for the development of each phase of the mechanism to elicit the reaction of users and to improve the usability of each component. Two types of users were involved, non-technical office workers, and information system professionals. To test the applicability of the approach in more than one context, the mechanism was installed in two different office environments, one pertaining to a private sector academic institution, the other to a governmental institution.

Once the first operational prototype of phase 1 was complete, it was field-tested in one of the administrative offices of the academic institution by three people, a manager, a senior administrative assistant, and a secretary, with the help of a facilitator. A meeting was first held with these users to define the purpose of the approach and mechanism, and to request their co-operation. Their response was positive and the mechanism was well received. The users were asked to write down their comments with respect to, ease of use, clarity, relevance and comprehensiveness. To facilitate this process, each screen was assigned an identification number. Based on users' comments and perceived requirements, several modifications were made (by the author) to the prototype, particularly to the knowledge base, screen layout and screen functions. Towards the end of phase 1, a number of issues had been raised by the users in connection with their jobs and with various aspects of the institution. For example, a clarification of, and consensus about, the overall objectives of the institution and the specific goals of the office were needed. Another common issue raised, was related to the definition of measures of efficiency and effectiveness, by which the performance of individuals can be measured and the success of the office evaluated. Users needed to discuss these issues together in light of the knowledge they have acquired. They needed to share their findings and their concerns. Organizational learning involved issues that could not be solved individually. It was at this point that a major enhancement to the mechanism was considered. A provision for group interaction was found necessary. The guided group interaction intervention following each phase was designed as an appropriate forum for group discussions. It enabled users to carry-out brainstorming sessions that helped them articulate their needs and interests and

settle their differences. The guidelines served to keep users 'on track' and as openers for discussions.

Testing was carried-out in a similar way for the other phases of the mechanism. Phase 2 has undergone several modifications, specifically, module seven concerned with skill acquisition. Owing to their inexperience, users encountered many difficulties in learning to use different office tools. For example, while experiencing the use of word processing and spreadsheets, they would often come to a standstill and stare at the screen, not understanding what was going on. Locating the problem, and identifying the type of help needed, was not always easy, as users often made keystrokes at random to avoid displaying their inadequacy, thereby passing the stage at which the problem had occurred. To support users as effectively as possibly, both background help (displayed with every screen), and hot help (displayed when needed) were refined iteratively to match users' skill levels.

The different phases of the mechanism were tested in parallel in another governmental institution by two managers and a librarian. Information system professionals were also called upon from the computer center of both institutions for their comments and evaluation of the completed phases of the mechanism. To obtain as much feedback as possible, a presentation including a demonstration of a 'mini' version of the mechanism, was made to twenty staff members from the governmental institution (managers, systems analysts and senior programmers). Many issues were raised and discussed by the different members. The discussions were particularly useful in refining the conceptual model of the office and the contents of guidelines.

The mechanism was also demonstrated at different stages to two faculty members from the School of Computer Studies in Leeds University (one of whom is supervising this research), for their evaluation and comments.

The testing period of the mechanism lasted for almost one year, and many changes were made (by the author) to accommodate the basic needs of users with various profiles. When the mechanism

was ready for use, it was installed at a number of user sites. The case for each user site is described in the following sections.

7.3 Case 1: Activating Top Management Involvement

User organization

The context of this application is an Egyptian governmental institution responsible for planning and follow-up, on the macro level, of: for example, production, national income, consumption, exports and imports. The institution consists of two key divisions and several sectorial divisions. A number of departments is affiliated to each division. The sectorial divisions are responsible for gathering data from external sources, processing it, and feeding it to the two key divisions, one responsible for follow-up, and the other for preparation of the plan. The managers of those two divisions are the key-decision makers. They are a little over middle age and perform work that is largely unstructured using their intuition and judgement that had evolved out of long experience. They have had no previous computer orientation and were inclined to believe that new technology could not contribute much in their line of work (planning and decision-making). They also displayed resentment to any external interference in what they considered confidential processes.

Background

Prior to the introduction of the mechanism, two trials had taken place to introduce information systems into the institution:

* In 1985, an external group was assigned by the chief of the institution the task of developing an integrated computer-based system to support the operational and decision-making activities of all divisions. Systems analysis was conducted in the traditional way and a proposal was prepared.

No action has been taken, as a result of users' lack of enthusiasm. No attempts had been made to activate users' motivation regarding the new system.

* In 1987, another external group from an institution (described in section 7.5) whose mission is to support the establishment of information and decision support systems in existing governmental organizations had attempted to introduce another system to support the managers responsible for the two key divisions. The design of the system was based mainly on the expertise of the external group and their previous experience in similar areas. The users were scarcely involved. This attempt failed for obvious reasons.

A strategy for user involvement and participation

Two years later another group from the same institution was assigned the task of developing an information and decision support system for the two key divisions. Having been informed about the previous attempts, this group decided to pay more attention to human factors from the very start. The first step taken had been to establish good relations with the top managers in the two key divisions. Issues that previously caused worries and concerns such as the confidentiality and ownership of data, and the flexibility of systems in allowing for judgement in decision making, were brought out in the open and discussed. This approach mobilized the top managers' interest and they expressed their willingness to participate in the development of a new system. However, considerable difficulty was encountered in eliciting the required information from them. This may have been due to their lack of orientation about information technology or to a combination of other factors. For example, the processes and procedures connected with many functions were not clear and were not documented; and the relation of the offices in the two key divisions to other offices in the same institution, and to offices in external organisations was not clearly specified. The two top managers were reluctant to show that they lacked adequate knowledge. It was clear that the effective participation of the two managers necessitated that they become better orientated in the area of information technology and systems development. They also needed to perceive their working environment from a more global perspective, and to prepare an appropriate infrastructure in the

institution for the introduction of new technology and new systems. This required, for example, organizational restructuring, manpower development, and equipment acquisition.

The two managers were told about the mechanism by the external systems analyst and they agreed that an intervention to the planned flow of systems development activities take place. Two microcomputers were installed in the offices of the top managers and the mechanism was demonstrated. With the help of the external systems analyst, who was the major facilitator, the two managers were led through the different phases of the mechanism. Key members from different divisions were then asked to go through the same experience. One of the two top managers became himself a facilitator for the other members. The user assessment document prepared jointly by all members in response to the guidelines generated by the mechanism was considered an excellent analysis document by the external systems analyst. It was used during a subsequent stage in the development of the required information and decision support system.

Achievements

* One of the two managers asked for more intensive training in some areas, for example, more sophisticated use of spreadsheets in 'what if' type of analysis for planning and decision- making. Training in the 'DOS' operating system, data base management, and spreadsheets was requested for other staff members from the sectorial divisions.

* A team consisting of representatives from each sectorial division, and supervised by one of the top managers, was set up with the purpose of participating in the development of the information and decision support system, previously initiated.

* A better and closer relation was established between the external systems analysts and the internal participants (managers and representatives).

* An analysis of the working environment was carried out during group interaction, resulting in a clearer outline of the functions performed by the divisions in relation to one another and to the two key divisions.

* Participants subjected to more intensive training, joined in the development of the new system. Some participants made excellent suggestions for the design of data gathering forms.

* Most of the participants agreed to work after regular hours to complete the system in a short period of time.

Difficulties and remedial action

* The language was a barrier to some of the participants,particularly the non-managerial staff members (The Arabic version of the mechanism is still being developed). The external facilitator had to exert extra effort to overcome this obstacle. He made a presentation in Arabic and a demonstration of the mechanism explaining its purpose and philosophy, before the learning process started. The guidelines generated by the mechanism were also translated into Arabic.

* The concept of computer processing was not clear to some participants. They could not get a 'feel' of the processing capability of computers in terms of its significance to their own work. To overcome this obstacle, the facilitator demonstrated to the participants, two previously developed systems, related to their line of work. They discussed at length, the relation of the input to the output, and the processing operations performed by computers. This was definitely helpful.

7.4 Case 2: Preparing the User for the Role of Change Agent

User organization

The context of this application is a public research institution in Sudan. The main objective of this institution is to conduct research and to provide technical assistance in the area of renewable energy. One of the important activities performed by the institution is to raise the level of awareness of the public about energy problems, applications, and uses through the dissemination of information using different communication media (for example, pamphlets, demonstrations, seminars). The institution is divided into three main divisions, each responsible for a specific project. In one of the divisions, a dissemination department had been established to serve the needs of all divisions in the institution. The department is divided into three units, a dissemination unit, a computer unit and a library. The computer unit has only been recently established, and some of the staff need to be trained to be able to manage it. None of the staff members in the institution has any computer background.

Background

A senior research assistant working in the dissemination department had become enthusiastic about computers, particularly when the equipment obtained through grants to the institution was installed in the department and a new computer unit was established. Although, the researcher had no previous computer background, she was particularly active and enthusiastic about the introduction of new technology into her workplace. However, in spite of her good relations with her colleagues and influence with her supervisor she could not induce other members in the institution to participate in the introduction of technological change. Their lack of enthusiasm and preoccupation with other activities was a major problem she was facing.

The researcher accompanied by a potential analyst travelled to Egypt to receive education in the area of information dissemination and office automation. The analyst received only technical training in specific products, such as database management systems and spreadsheets.

A strategy for user involvement and participation

Based on the previous background and the difficulty of gaining access to other key members in the institution, an appropriate strategy was formulated. With the support of the mechanism, the researcher was to become orientated in the area of information technology and office automation and was to be involved in the analysis of her working environment and in the assessment of problems and needs. Emphasis was to be placed on preparing the researcher for the role of change agent in her institution. Although she was to undergo this experience individually, the same process would be repeated in her institution with other concerned colleagues and supervisors. She would be then playing the role of change agent and facilitator.

A demonstration of the mechanism was made to the researcher and she was thrilled to discover how easy it is to operate. She responded to the guidelines of each phase as the representative of the dissemination group. During phase 2 she raised many questions about various hardware devices and software tools. She was particularly interested in networking technologies and in the application of spreadsheets and graphics. Having acquired a broad perspective of what office automation encompasses, she was encouraged to think of the application of new technology within her specific work context. In addition to the tools displayed through the mechanism, ready-made packages (financial and library) were obtained by the facilitator and demonstrated to the researcher. This was definitely helpful in stimulating the imagination of the researcher and enabling her to think of other relevant applications. The document she produced at the end of the orientation process was extremely impressive, particularly the section connected with phase 2 where she outlined four main applications: a library system, a projects information system, a renewable energy data bank, and a networking system. For each application she indicated the main goals to be satisfied and the functions to be supported.

After returning to the Sudan, the researcher displayed the output documents she had prepared, as well as a brochure of the mechanism, to her management and colleagues. She then asked for copies of the mechanism to be installed at her institution for use by other colleagues, who found the idea of using it at their own place, time and pace very inviting. Although the document she produced was considered tentative, it was very useful as a 'starter' in group discussions.

Finally, the user involvement strategy employed in this case did not start with top management, but with the researcher who displayed a willingness to participate and had access to key members in her institution.

Achievements

* The user assessment document prepared by the researcher stimulated the interest of her colleagues and facilitated the process of group interaction, because it was something concrete to work on.

* Soon after her return, an automated library system was ordered and preparations for its implementation were made according to a plan made by concerned members of the institution. An incremental plan was developed for other applications.

Difficulties and remedial action

* The time that the researcher could spend in Egypt and receive education was not adequate. More training was needed, particularly in using some office tools, for example, spreadsheets. More time was also needed for discussions between the researcher and the facilitator. Correspondence through mail and telephone alleviated the problem somewhat.

7.5 Case 3: Planning and Implementing a Global Office Automation Strategy

User organization

The context of this application is another Egyptian governmental institution consisting of 150 employees. This institution will be referred to as 'INFODS'. The main objective of INFODS is to support the establishment of information and decision support centers in existing governmental institutions and make more efficient and effective use of available information resources.

To carry out its main mission, several projects tackling a variety of issues and cutting across different sectors have been launched. The responsibility for developing and implementing the different projects at user sites (referred to as nodes) is assigned to a group of project managers. Many of the project managers have management experience but very little computer background. In addition to the units in INFODS headed by project managers, an information resource management unit has been set up and includes systems analysts and programmers, and appropriate hardware and software. The purpose of this unit is to provide technical services to all other units in INFODS.

Background

To carry out its obligations more efficiently, several efforts have been made to establish an internal office automation system within the different units of INFODS, so that project managers and the administration can share data and resources. Unfortunately, such efforts failed to induce many of the project managers to learn and use the new technological tools. They felt such tools should be left to the senior administrators, or to the pool of professionals, responsible for the development of computerized applications and for the provision of technical assistance when needed. A microcomputer was provided to each project manager, together with a set of office tools and user manuals. The computers were hardly used, and no one was interested in the office tools. Resistance to the technology may have been attributed to several factors, for example, the

managers' lack of technical background, and fear of showing incompetence leading to a reduction in prestige. A misconception of office automation as incorporating only a few tools such as word processing and electronic mail was also a major reason why the managers' interest and motivation was not stimulated. They could not see any concrete benefit resulting from their use of these tools, as other junior staff members were already performing the required word processing and mailing tasks.

A strategy for user involvement and participation

A committee was established by the director of INFODS with the authority and purpose of establishing and monitoring the implementation of an office automation plan throughout its internal units. A staged approach was used. User orientation and early involvement using the different 'Phases' of the mechanism represented the first stage. The output documents developed during this stage were used as input to the subsequent stages. Through orientation, skill acquisition and early participation, users' disposition to become involved has become enhanced. The two stages following orientation and involvement, ran in parallel and made use of the user assessment documents prepared during stage 1. The purpose of stage two was to provide users with intensive on the-job training in selected office tools. The purpose of stage 3 was to plan, develop, implement and monitor the institutionalization of an integrated office automation system at INFODS. Links have been established between the two stages to evaluate user feedback and make appropriate changes. A diagram of the office automation plan at INFODS is illustrated in figure 7.1

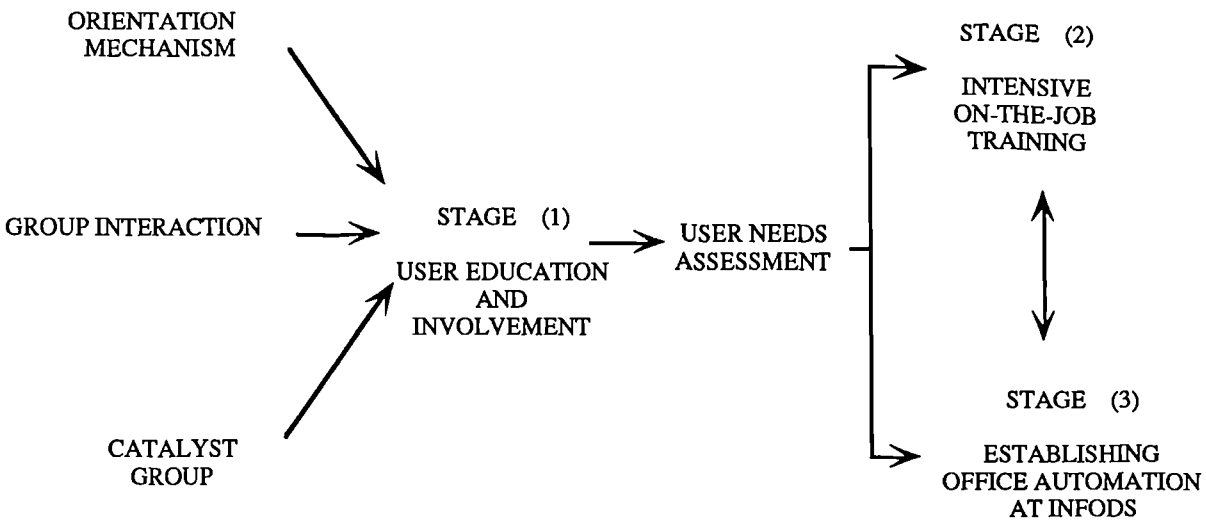


Figure 7.1 - Office Automation Plan at INFODS

It is interesting to note that during the first stage, many project managers were at first reluctant to use the mechanism. They did not like to show their incompetence in front of the facilitator, who happened to be an information center consultant working for INFODS, and other members of the committee who were considered their colleagues. The facilitator could not also support all the project managers (twenty four) simultaneously. It was decided then that a group of six junior professionals from the information resource management unit receive adequate training in using the mechanism and in learning about the approach. The group of juniors, given the name of 'catalyst group', was assigned the task of serving and supporting the project managers. The juniors were to be on call any time during working hours. The managers were told that the members of the catalyst group were at their disposal and service. This method succeeded in retaining the managers' sense of authority and prestige, because they felt they were 'bossing' those juniors, rather than receiving assistance from, and showing their incompetence to, colleagues with equal or higher status. They also needed to learn at their own time and pace, and therefore found the 'on-call' system quite convenient. This would not have been possible with the facilitator.

During group interaction meetings, the facilitator was present only to reply to investigations and to give an unbiased opinion regarding various issues.

Owing to the various profiles of the project managers, their problems with respect to the working environment and their needs with respect to the technology, were quite different from one another. This was clearly reflected in the assessment documents they have prepared during stage 1. It is interesting to note, however, that one of their major and common needs was to gain access to the data bases created and maintained by the different projects. Access to office tools such as electronic mail, spreadsheets, and document creation software, came second in priority.

Achievements

* By the end of Stage 1, the project managers' conception of office automation became much broader in scope than it had previously been. They had considered that office automation was confined to the use of the straightforward office tools, for example, electronic mail and word processing, and did not feel a pressing need for its implementation. After experiencing the mechanism, and understanding that the scope of office automation encompassed data processing and information system applications in addition to office tools, most of the managers requested access to data bases created by other projects in INFODS. This was made possible through a local area network that had been set up by the pool of professionals, but was hardly made use of.

* Project managers were shown how to store and maintain their project budget using the spreadsheet tool provided by the mechanism. Until the integrated office automation system was completed in Stage 3, this budget exercise was refined and became an indispensable operational prototype used by most of the managers.

* The user assessment documents generated by the users in Stage 1 were useful in identifying the type of intensive training needed, and the facilities to be incorporated in the integrated office automation system.

Difficulties and remedial action

* The main difficulty encountered was the resistance to the technology displayed by the user. One of the more senior project managers considered that the operation of a computer was a rather degrading task. He claimed that he was quite happy with his secretary doing this kind of work, so why waste his time! Exposure to the capabilities of the new technology and its significance to the manager's actual work has had a positive influence on his beliefs and attitudes.

7.6 Establishing Office Automation on a National Level

The context of this application is the group of nodes - governmental and public sector organizations - serviced by INFODS (the governmental institution referred to in section 7.5). Several projects sponsored by INFODS are multi-sectorial. For example, one such project is concerned with the collection, storage and dissemination of information about studies conducted for the benefit of the Egyptian government, locally by the nodes and jointly with some foreign institutions. This project uses a task force for this purpose and to date has established a 'studies information system' in eleven governmental nodes in different sectors. Through such projects, the staff members of INFODS involved have gained experience in working with this task force strategy in various nodes.

One of the new projects recently sponsored by INFODS is concerned with the introduction of new office technology into the key offices of these nodes. This was considered an extremely difficult task considering the rigid bureaucratic mode of operation of the nodes, and more importantly the low level of awareness of the workers in such offices about new technology, and their reluctance to change. A new task force was set up in INFODS to study the situation in some of these offices. Establishing a minimum appropriate infrastructure for technological change was identified by the task force as a necessary prerequisite. Individuals constituted the most critical component of this infrastructure. A mechanism was needed to motivate users and to orientate them about the potential

and likely impact of new office technology. Organizational restructuring was also necessary in terms, for example, of redesign of jobs, reassignment of responsibilities and the establishment of appropriate communication channels between individuals, different offices and the external environment. In planning for this new project, the experience acquired by INFODS while introducing office automation internally into its own units was found very useful (see section 7.5). The experience acquired through other multi-sectorial projects has also provided considerable insight regarding the situation and the people at different nodes. A task force consisting of the facilitator, two members from the committee previously established in INFODS (see section 7.5) and the catalyst group was formed to carry out this project. The task force would start by installing the mechanism into the key offices of one governmental node, and, as it gains experience, it would increase the number of nodes it can handle concurrently. Preparation for this national campaign is presently taking place.

CHAPTER 8

APPRAISAL

8.1 Introduction

An evaluation of the learning and participation methodology outlined in this research, is the main theme of this chapter. In attempting this task, two types of problems were encountered. The first type relates to difficulties associated with methodology appraisal in general, whereas the second type relates to inherent difficulties associated with this specific methodology.

General problems associated with methodology appraisal: Several frameworks have been developed for the evaluation of system development methodologies - whether for information systems or office automation systems - (see, for example, Olle, Sol and Verrijn-Stuart 1982, Hirschheim, 1985, Tully, 1985, Avison and Fitzgerald, 1988, each of whom identifies areas of concern and features that need to be satisfied by the evaluated methodology). None of these frameworks, however, has been universally accepted. Identifying a single set of criteria for the evaluation of different system development methodologies has proved to be a difficult task. One of the major problems is to specify what the term 'methodology' should encompass in the first place. A methodology may simply involve a series of steps and procedures, or it may include other aspects, such as, philosophy, techniques, documentation and training facilities. In terms of scope it may encompass all stages of the systems development life cycle, or it may concentrate on one or more stages. Other problems associated with methodology appraisal are, for example, the difficulty of attributing the success or failure of an information system to the methodology in use, and not, for example, to the designer's skill level; subjective bias in the choice of features that a methodology must satisfy; or the instability of methodologies resulting from changes in technology. The selection of a specific set of features to establish criteria for evaluation is therefore problematic. Setting scores for each criterion based on how well it is

satisfied by the methodology in use is even more problematic. To overcome the latter problem, scoring has either been avoided, or has been set according to the assessor's own situation (Maddison, 1983).

Problems associated with the appraisal of the learning and participation methodology

Frameworks that have been developed for the appraisal and comparison of system methodologies have been found in some aspects inappropriate for the evaluation of the methodology outlined in this research. This is attributed to differences in objectives, scope, outcome, tools, and techniques. For example, the main objective of a system development methodology is a specific information or office system, whereas the application of the learning and participation methodology should lead to orientated and involved users in the area of office automation and a preliminary specification of problems and needs. In contrast to system development methodologies, the scope of the learning and participation methodology is concerned with the early stages prior to the investigation and analysis of a specific information system.

Given the above problems, a framework has been established for the evaluation of the learning and participation methodology, reflecting some of the features associated with methodologies in general, as well as other features related to the main areas of concern, user learning and participation.

The framework serves two purposes: firstly, to match the different characteristics and aspects of the methodology against a set of criteria to identify or highlight strengths and weaknesses; and secondly, to establish standards on the basis of which similar methodologies (or those that incorporate similar aspects) may be evaluated and compared.

Section two presents the appraisal framework, criteria and assessment. This section is divided into three subsections. The first subsection presents the structure of the appraisal framework. The second subsection evaluates the effectiveness of the methodology by checking to see

whether its use has resulted in the achievement of its main objectives. The third subsection introduces a relevant set of features adapted from standard appraisal frameworks for a more general evaluation of the methodology (and other similar methodologies).

8.2 Appraisal Framework and Methodology Assessment

8.2.1 Structure of the framework

Given the differences between the learning and participation methodology and other system development methodologies, an appropriate framework had to be developed for the appraisal task. The framework is structured in two sections. The evaluation carried-out in the first section was based on a pragmatic approach, and included the following activities:

* The objectives of the methodology were clearly stated as a first step;
* A set of features derived from the objectives of the methodology was then established;
* The results accruing from the application of the methodology to date were compared against the established criteria to check whether the objectives have been met or not.

In the second section, the methodology was evaluated in terms of standard criteria derived from appraisal frameworks set forth by Hirschheim (1985), Tully (1985), Avison and Fitzgerald (1988). The steps involved in the second section were as follows:

* A comparison of a number of frameworks was carried-out by mapping the different dimensions and criteria.
* Relevant features were selected from the different frameworks and evaluation criteria were established.

* Characteristics and aspects of the methodology were then matched against the established criteria illustrating areas that require further enhancement.

8.2.2 Effectiveness criteria

The main objective associated with the learning and participation methodology is to orientate non-technical office workers about information technology and office automation, and to enable them to participate and become involved in the introduction of technological change.

In establishing evaluation criteria related to this objective, a distinction was made between participation and involvement (as previously illustrated in chapter four). More detailed objectives associated with user involvement (outlined in chapter five) have been taken into consideration in setting the criteria. A measure of expected tangible outputs (user assessment documents) has also been included.

The selected criteria, designed to evaluate the effectiveness of the methodology in relation to its objectives, were partly based on research conducted by Swanson (1974), Franz and Robey (1986), and Barki and Hartwick (1989), in the area of user involvement, and partly from experience in using the methodology and observing its outcomes. Measurement against the selected criteria is based on the case studies presented in chapter seven.

Effectiveness Criteria

User participation, manifested in the activities performed, and the behaviours exhibited by the target users during the learning and participation process. Possible measures of user participation are:

* **A priori involvement**, or the extent to which users request frequent changes or initiate activities in relation to their particular environment and the technology.

During the learning and participation process, and following its completion, users showed obvious signs of being a priori involved, for example, by calling for the participation of other users, by asking for exposure to additional tools and packages, and by requesting more intensive training.

* **Inquiry involvement**, or the extent to which users make use of the mechanism for knowledge assimilation, skill acquisition, self-evaluation and other facilities.

Although users were 'inquiry involved' during all phases of the mechanism, they showed particular interest in phase two, in learning about the new technology and acquiring skills using office tools.

* **User influence**, or the extent to which users perform activities that are influential in leading and managing the participation process.

Not all involved users showed signs of being influential. This may be associated with other personality and contextual variables. However, in each of the cases, there was at least one influential user, who became subsequently an internal change agent.

User involvement, defined as "the importance and personal relevance that users attach either to a particular system or to IS in general, depending on the users' focus" (Barki and Hartwick, 1989). In this case the focus is information technology and the significance of technological change. Barki and Hartwick further indicate that it is possible for users to become involved with the activities associated with the area of concern. The area of concern here is learning and participation as a process leading to the desired target.

Although concrete measures of user involvement reflecting this definition have not been developed, remarks made by some of the users involved, reflected their attitudes and their

personal thoughts about the importance of new technology to their own work and the relevance of the knowledge and skills acquired.

Group interaction is evaluated by checking to what extent the methodology has succeeded in practice in encouraging group interaction to take place.

During the application of the methodology, group meetings took place following each phase to discuss the guidelines, share information and negotiate on a multitude of issues. In one of the cases (section 7.3.2), additional meetings took place to discuss some pressing issues. These meetings helped in transferring information and creating a common vocabulary among users.

Cognitive and skill level is evaluated by checking the extent to which the application of the methodology has helped in raising the cognitive and skill levels of the users.

The ability of users to view their working environment from a global perspective and to participate in the analysis of its constituents was one indication of the success of the learning process in satisfying its objectives. Moreover, the ability to use new terminology and the interest taken in various aspects of the technology was another success indicator.

Tangible user outputs refer to the extent to which the application of the methodology results in the generation of concrete outcomes, that are considered an initial contribution to the system development process.

In three of the cases illustrated in chapter seven, the users - with some help from the facilitator - succeeded in formulating three documents reflecting: an analysis of their working environment, an assessment of needs and required resources with respect to the technology, and a vision of a future office automation plan. It should be pointed out that other practitioners interested in the mechanism may wish to modify and to adapt the format and contents of the documents to

satisfy the requirements of, and to facilitate the interface with, other system development methodologies.

8.2.3 General methodology appraisal

An appropriate framework for the general appraisal of the methodology was formed by combining relevant dimensions and features from more than one evaluation framework. First, the four sets of criteria proposed by Hirschheim (1985) - technical, usage, economic and behavioural - were examined, some features were omitted, some were modified, and a few were added. The selection of features was based on their appropriateness to the methodology being evaluated. To these four sets of criteria, a fifth was added at the beginning of the framework and was given the title 'conceptual base'. This set of criteria incorporated aspects that reveal the general orientation of the methodology and its underlying concepts, for example, its style, approach and philosophy. The criteria associated with this dimension was derived from the frameworks proposed by Tully (1985) and Avison and Fitzgerald (1988). Whenever different terminology was used to refer to the same feature (a source of confusion!), either one of the terms was selected at random, or the one that sounded most familiar.

General Appraisal Framework

Conceptual base

* **Style** or the extent to which the methodology is more liberal than authoritarian. Tully (1985) notes that a methodology needs to be authoritarian on one aspect, and that is its conceptual framework, otherwise it should seek to be liberal.

Although the learning and participation methodology takes a liberal orientation by allowing users considerable flexibility in assessing their working environment and their needs, it nontheless provides them with a framework that keeps them on track, manifested in a logical

progression of phases, a conceptual model of the office environment, and group interaction guidelines.

* **Approach**, or the extent to which the methodology allows for different approaches to systems development. Tully identifies four approaches: conjectural, observation, analytical, and experimental.

Although the learning and participation methodology covers an early exploratory stage of the systems development cycle, multiple approaches are followed by the users in assessing their problems and needs. The approach(es) used depend(s) on the context and the cognitive and skill levels of the users. (Additional techniques and tools may be incorporated in future versions of the mechanism to help users build better analytical skills).

* **Philosophy** or "the set of principles that underly the methodology" (Avison and Fitzgerald, 1988). Four factors are identified in relation to philosophy: paradigm, objectives, domain, and target.

- **Paradigm** or the specific way of thinking about problems. Two paradigms are identified: the science paradigm and the systems paradigm.

Acknowledging the unpredictable nature of 'human activity systems' (Checkland, 1981), the learning and participation methodology is based on the systems paradigm.

- **Objectives** help in understanding the philosophy of the methodology. For example, the ultimate objective of a methodology may be the development of a computerized system, there may be interest only in 'computerizable' aspects or the methodology may take a wider view. (Avison and Fitzgerald, 1988).

A distinct aspect of the learning and participation methodology is its exploratory orientation and its emphasis on user understanding, learning and participation as a prime objective, rather than being concerned only with computerization or automation.

- **Domain** is closely related to the objectives and indicates whether a methodology concerns itself with a specific problem area or with an overall information systems strategy, using, for example, a top-down analysis of the organization.

Although the latter domain of concern may be recommended, the learning and participation methodology may be applied to either a narrow or wide domain. This will depend on political, economic and organizational factors.

- **Target** or the applicability of the methodology, whether targeted at particular types of problems or organizations or general purpose.

The learning and participation methodology is concerned with non-technical workers in offices in general.

* **Model** or "the basis of the methodology's view of reality" (Avison and Fitzgerald, 1988).

The learning and participation methodology provides users with a conceptual model that enables them to perceive the office in its totality. Other types of models such as mathematical or analytic models were not used as non-professional users would not comprehend them. The advantage of conceptual models is that they can be used as a means for communication between users and professionals.

Technical criteria

Many of the technical features of a methodology outlined by Hirschheim (1985) are not applicable to the learning and participation methodology, as they relate to the later stages of systems analysis and design. Only one technical feature has been selected, comprehensiveness, and three new features have been included.

* **Abstraction** or the ability to form a conception of the different elements that constitute the users' working environment and their interrelationships. For example, the relation between objectives, functions, procedures and activities.

The conceptual model, information and guidelines provided to users help them formulate such a conception.

* **Representation of technical requirements** or the ability of users to specify and represent their requirements vis-a-vis the technology.

The methodology is designed to enable users to express their requirements and provides them with guidelines to follow.

* **Comprehensiveness** or the extent to which the vast array of functions, procedures, and office characteristics can be represented. (Hirschheim, 1985).

The methodology enables users to represent individual functions and activities and to group them all in one comprehensive document after group interaction.

* **Prototyping** or the ability of users to experiment with office tools and acquire a flavour of 'real' applications.

The methodology provides users with a variety of tools which can be manipulated - with the help of a facilitator if needed - to form prototypes that provide a flavour of actual applications and facilitate the specification of requirements.

Usage criteria

This set of criteria was adapted to the methodology being evaluated. The source of quotations used below is Hirschheim (1985).

* **Understandability** or the ease with which specialists and non-specialists can understand how to use the methodology.

The methodology is very easy to understand by both specialists and users, and the terminology, tools and techniques included are all user-oriented.

* **Computer support** or the availability of computer-aided facilities for the use of the methodology.

The methodology is computer-aided through the use of the mechanism and interactive tools. The user interface is one of its powerful features (described in detail in chapter 6).

* **Project range** or the ability of the methodology to handle different projects.

The methodology is designed to explore the whole of users' environment, though it can be used to represent subsets as well, and so more than one project may be incorporated by users.

* **Ease of phase transition** or the ease with which users can progress from one stage to another of the methodology.

The methodology is divided into three stages, where Stage 2, concerned with learning and participation represents the core of the methodology and is carried out through the use of the mechanism, which in turn moves users through a set of four Phases.

* **Extent of usage** or "the extent to which the methodology has been applied in real world settings".

The methodology has been successfully applied in three different organizational settings. (It is presently being studied for further applications, see the four cases presented in chapter 7).

* **Controllability** or "the degree to which the methodology's user(s) can control the choice of tools and techniques rather than having to follow some pre-ordained sequence".

The methodology provides users with various tools and facilities which can be used at the user's choice and pace. Navigation to any facility is possible.

* **Relevance** or "the general ability of the methodology to handle problems in the office domain".

The design of the methodology and mechanism has been directed towards the office environment and office users.

* **Consistency** or "the extent to which the results of the methodology's application are similar when applied to similar situations".

Situations are rarely similar, there are always individual and contextual differences. However, the methodology is consistent in performance in the sense of satisfying its objectives - producing orientated and involved users - but the degree of similarity between one situation and another will vary.

* **Modifiability** or "the ease with which the results of prior stages of the methodology can be modified in light of the results of later stages".

Users are provided with facilities that enable them to store, retrieve and modify their assessment documents at various stages.

* **Self-evaluation** or the ability of users to evaluate their own progress.

Users are provided with a self-evaluation module, that enables them to reinforce their knowledge and to evaluate their progress. This module however, may be subjected to further enhancement to provide users with additional information about their performance.

* **Team work** or "the extent to which the methodology supports team work".

Group interaction is one of the key features of the methodology and is designed to encourage and support team work.

* **Interface to system development methodologies.**

The output of the methodology - orientated users and assessment documents - can be input to subsequent stages of system development methodologies. The possibility of interfacing with the system development life cycle approach and Multiview are illustrated in chapter 5. More work is needed in this area.

Economic criteria

The source of the first two features below - and accompanying quotes - is Hirschheim (1985). The third feature has been added to this set from Avison and Fitzgerald (1988).

* **Cost of use** or "the extent to which the operating costs of using the methodology are not prohibitive".

The methodology and mechanism are being used at a low cost and with minimum resources. They are designed to be used to meet cost and resource constraints of the local environment (see chapter 6).

* **Cost-benefit analysis** or "the degree to which the methodology can be used to generate cost-benefit information to help analyse the work of a proposed office system".

The methodology encourages users to identify their needs vis-a-vis the technology, the benefits envisaged and the resources required. This information can be used to generate a preliminary cost benefit analysis.

* **Product** or "what purchasers actually get for their money" (Avison and Fitzgerald, 1988).

With the methodology, users are provided with the computer-aided mechanism, a software package, which includes a knowledge base, guidelines, self-evaluation facilities and office tools with tutorials.

Behavioural criteria

The learning and participation methodology rates higher on behavioural criteria than on any other criteria, as it places considerable emphasis on human factors and addresses contextual variables at the individual, group and organizational level. The source of features in this set of criteria (and quotations) is Hirschheim (1985).

* **Structured and unstructured task capabilities** or the ability of the methodology to handle deterministic, rational office functions, as well as non-deterministic, political office functions.

The conceptual model of the office provided to users embraces both analytic and interpretivist perspectives and helps users perceive structured and unstructured elements in their work.

* **Social action** or "the capability of the methodology to consider the social action that occurs in offices".

In recognition of the political and social aspects of organizations and information systems, the methodology focuses on the behaviour and needs of office workers at both the individual and group level.

* **Job design** or "the extent to which the methodology can influence job design particularly the social component".

Users are requested through the mechanism to analyse their organizational context and to plan ahead for possible disruption brought about by the introduction of new technology. Through group interaction they discuss their jobs in relation to one another; and to the technology.

* **Multiple problem perceptions** or "the ability of the methodology to handle multiple perceptions and formulations of the problem situation".

The methodology enables users to form their individual perceptions at first and then through group interaction such perceptions are discussed and a consensus reached.

*** User participation**

This, as they say, is the 'raison d'etre' of the methodology.

8.3 Conclusion

The appraisal conducted in the previous section, has revealed the following:

* Although the methodology rates well on most features of the effectiveness criteria in general , more thorough measures of user participation and involvement are needed.

* Additional techniques and tools may be incorporated in future versions of the mechanism to help users build better analytical skills, for the purpose of exploring their environment and identifying problems and needs.

* Further refinement of the group interaction guidelines is needed to provide a smoother link between the learning and participation methodology and other system development methodologies.

* The self-evaluation module needs additional capabilities to monitor and evaluate the performance of users.

* Finally, it may be concluded that with the addition of more concrete measures of user involvement and participation, the appraisal framework presented in this chapter can serve as a standard for the evaluation and comparison of similar methodologies.

CHAPTER 9

CONCLUSIONS

9.1 Review

Driven by an infatuation with technology and progress, the introduction of information technology into the office has met with many of the obstacles previously encountered during the development and implementation of computer-based information systems. The difficulty of implementing office systems effectively has further been compounded by several obstacles : an incomplete - often faulty- understanding of the complex office environment and the nature of office work, the diversity and fast evolution of the technology, the growth in the number of potential users with little or no information technology background, and the pluralism in organizations manifested in conflicts of interest and power.

Recent approaches have attempted to overcome the human, organizational and technical problems obstructing systems development and implementation. User needs are receiving more attention and the role played by users at various stages of the systems development process is considered crucial to the success of the application. There is also a growing belief that vendors and technical specialists are not in a position to handle human and organizational problems effectively. User involvement was therefore called upon to supplement the quality of technical design and to facilitate the acceptance of technological change.

The effective implementation of user involvement and participation, however, has proved to be quite difficult. The inability of users to contribute meaningfully, due to their inadequate technical background and to their fears and misconceptions, was among the major difficulties reported by practitioners and researchers. The issue of user 'readiness' or predisposition to

become involved prior to the initiation of any system development effort has not received adequate attention.

A review of participative approaches to systems development has further revealed the following:

* Despite the emphasis placed on user involvement, particularly during the analysis and design stages, the 'professionals' are still relied upon heavily due to their expertise and experience.

* The education of users is advocated by almost all approaches, but mechanisms that specify what users should learn, when, and how are not adequately specified.

* A comprehensive model of the office environment, illustrating its human, organizational and technical constituents is not adequately provided by any of the approaches. Without such a conceptual framework, users may find it difficult to analyse their working environment, and to appreciate the need for, and the significance of, technological change.

* Although conflicts of interest and power are acknowledged by the different approaches, mechanisms that enable negotiation, confrontation, and bargaining to be carried out as part of the systems development effort have not been clearly specified.

Triggered initially by problems experienced by offices in general - and in Egypt specifically - when introducing new computer-based technologies, this research was conducted to develop a realistic approach to user involvement, and to make progress towards overcoming the challenging problems outlined above.

The user involvement strategy presented in this thesis has two major ingredients: a management ingredient in the form of a methodology, procedures and intervention techniques to control the learning and participation process and outcome; and a technology ingredient in the

form of a computer mechanism to provide the tools to be manipulated by the process and to provide the necessary interaction with, and exposure to, the technology.

Designed to keep pace with, and to contribute to, the systems development process, the strategy is geared towards the generation of specific outcomes. In addition to orientated, mobilized and involved users, other tangible outputs in the form of assessment documents are generated reflecting users' analysis of their working environment, an assessment of needs and required resources with respect to information technology, and a vision of a future office automation plan.

Prior to the design of the strategy and mechanism, three tasks were performed with the purpose of establishing a solid foundation for this research:

1. Effort was exerted to gain a better understanding of the three entities: people, office and technology, on the basis that the formulation of a user involvement strategy is not possible without a clear understanding of its interacting components.

2. An analysis of cumulative experiences and exploratory studies of the Egyptian office environment was then conducted to identify problems and needs and to illustrate the contextual challenges that motivated this research.

3. A literature review of user-involvement themes and participative approaches was then conducted, to gain exposure to different ideas, techniques and philosophical strands, and to avoid some of the pitfalls already encountered.

Based on this empirical and theoretical foundation, a strategy and a mechanism for activating user involvement and participation was then established. The strategy has a number of distinct aspects: *first*, it focuses on the problem of user acceptance of new technology prior to its introduction; *second*, it proposes a comprehensive approach which takes issues at both micro

and macro levels manifested in individuals, groups, and their organizational context; *third*, it views learning and participation at the early stages as enabling vehicles for enhancing users' predisposition to involvement; *fourth*, contingencies are incorporated to allow for differences in organizational and political climates, and to enhance the flexibility of the strategy; *fifth*, it views the office as an open system and provides a global, conceptual model of its environment; *sixth*, it proposes a user learning and participation methodology, and illustrates how it interfaces with other systems development methodologies.

The computer mechanism or the key tool of the strategy was developed and refined over a period of one year using a prototyping approach and a wide audience base.

The strategy was successfully implemented at three user sites and is about to be implemented at a fourth site. Documentation of the four cases was presented in this thesis (in chapter 7) to be able to draw on such experience in future implementations, and to illustrate the applicability of the approach and mechanism in different organizational contexts.

Finally, an appraisal framework was developed to evaluate the learning and participation methodology and its associated components.

9.2 Research Contributions

The learning and participation methodology is a key contribution of this research. As an essential vehicle for the implementation of the methodology, the computer mechanism has been developed to facilitate the learning and participation process, and to provide non-technical office workers with the necessary interaction with, and exposure to, the technology. To achieve its purpose, the mechanism comprises a set of elements and facilities, each addressing one aspect of the methodology:

* A knowledge base that addresses both technical and behavioural needs, and fundamental ideas and concepts compiled from many sources;

* A rich conceptual model of the office environment that describes the office in its totality and provides a framework through which users can understand the relationships between components of the office and between the office and its environment;

* A set of tools that provide users with the 'flavour' of hands-on experience, and that enable them to acquire different skills based on their needs and profiles;

* A forum and guidelines for group interaction that enable users to assemble as a group to discuss and negotiate on human, technical and organizational issues;

* A means for self-evaluation designed to reinforce the knowledge acquisition process, and to enable users to gain confidence and acquire a sense of achievement and satisfaction;

* A computer package comprising the necessary software for the user interface and for the provision and monitoring of the above facilities.

In addition to the above, the philosophy underlying the methodology may also be considered an important contribution. At the core of the philosophy is a view that learning and participation at the early stages is an enabling vehicle for the enhancement of users' predisposition to involvement.

9.3 Risks and Recommendations

The approach presented in this thesis is both innovative and risky. It is innovative because in contrast to other participative approaches, it places considerable emphasis on learning and

participation that are initiated well in advance of any technology decision being taken. Moreover, by focusing on the provision of implementation facilities in the form of a concrete mechanism comprising a knowledge base, a conccptual model of the office, tools, intervention techniques and guidelines; the call for user involvement is based on more realistic grounds.

Elements of risk in the approach are related to the complexity of, and variation in 'human activity systems'. People differ in a variety of ways, for example, in educational level, psychological state, status and influence, and attitude to technology; which makes their behaviour and their reaction to change difficult to predict. Risk is also associated with the nature of the organization's internal and external environment, manifested in, for example, its culture, its political climate, its economic conditions and its state of technology. All these forces exert pressures that determine to a large extent the degree of success - or failure - of the strategy.

Realistically, risk in dealing with human activity systems can never be eliminated. Optimistically, however, it can be minimized. This can be achieved by more analysis and obviously more understanding.

Further research is therefore recommended:

* To determine appropriate approaches for the introduction of the mechanism in view of different user characteristics and organizational contexts. The approach used in the first three cases illustrated in chapter 7, was to a certain extent dependent on the skill and insight of the facilitator in charge.

* To explore the possibility of making the mechanism more adaptive to the needs of office workers with various profiles and skill levels. The knowledge base and office tools need to be further customized to satisfy the needs of the various categories of office workers. Additional

enhancement of the user interface is recommended to make it more adaptive to changes in user skill levels.

* To assess the effectiveness of the mechanism in influencing user involvement and participation, and the need for appropriate modifications and enhancements. Measures of user involvement and participation for the purpose of evaluating the effectiveness of the mechanism need to be developed.

* Finally, for those researchers and practitioners in search of total solutions, a challenging task would be to conduct a more intensive study of the interface with other system development methodologies. Although, possible links have been illustrated in chapter 5, further work is needed to develop for example, better guidelines with the purpose of producing more effective user assessment documents.

At present, the development of an Arabized version of the mechanism is in process. It is expected that the Arabic version will be more widely used in the Egyptian office environment, particularly in the public and governmental sectors.

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THE AMERICAN UNIVERSITY IN CAIRO

COMPUTER CENTER

Appendix A.1

INTRODUCING INFORMATION TECHNOLOGY
ORIENTATION SESSIONS QUESTIONNAIRE

Please mark the appropriate answer:

1/ Did you derive any benefit from this course?

Considerable _____ Average _____

Little _____ No _____

2/ To what extent was this course relevant to your work?

Extremely ___ Somewhat ___ Hardly ___

3/ Does this course encourage you to plan for, or participate in, introducing information technology into your work environment?

Yes ___ No ___

4/ In what way(s) can this course be improved?

Better organization _____
More time _____
More material _____
More hands-on training _____

5/ Would you recommend this course to others?

Colleagues ___ Supervisors ___

Subordinates ___ None ___

6/ Did this course help you overcome any fears of or misconceptions about the technology?

Extremely _____ Somewhat _____ Hardly _____

7/ Assign a value from 1 to 3 (Excellent, Good, Poor) to each of the items shown below for every topic.

TOPIC TITLE	LEVEL OF INSTRUCTION	QUALITY OF MATERIAL	RELEVANCE OF TOPIC	LEVEL OF DETAIL
1. Information Technology - An overview	___	___	___	___
2. Computer Literacy	___	___	___	___
3. History and Industry: The continuing story of computer ages.	___	___	___	___
4. Input and Output: Data Given, Information received.	___	___	___	___
5. The Central Processing Unit	___	___	___	___
6. Storage Devices and File Processing	___	___	___	___
7. Communications: Reaching Out To Touch A Computer	___	___	___	___
8. Beginning Programming: Getting Started	___	___	___	___
9. Computer Languages	___	___	___	___

10. Operating Systems ___ ___ ___ ___

11. Systems Analysis and Design ___ ___ ___ ___

12. Personal Computers, in the Home, in Schools and in Business. ___ ___ ___ ___

8/ Please indicate any topic(s) that should have been addressed and were missing

_____

_____

_____

_____

Appendix A.2

OFFICE ENVIRONMENT AND TECHNOLOGY QUESTIONNAIRE

OVERVIEW

The main objective of this questionnaire is to cast a light on the environment and the available technology in Egyptian offices.

The outcome of this research will assist in developing a realistic assessment of the prevailing office environment in Egypt, and an understanding of existing needs and problems as conceived by office managers.

I appreciate taking your time in filling out the attached questionnaire, however it should be stressed that it is not intended for you to spend too much of your time on any specific item, and should any of the questions not be applicable to your environment, or would touch on what you would consider sensitive or confidential information, then please do not hesitate to skip to the next question.

Again my appreciation for taking your time.

I - COMPANY PROFILE

What type of organization do you work in?

(Name is optional) .....

( ) Government or Public sector

( ) Private sector

( ) joint

Indicate main activity:

( ) Banking/ Finance/ Insurance.

( ) Commercial/ Trading.

( ) Construction.

( ) Manufacturing.

( ) Consulting Services.

( ) Petroleum.

( ) Airlines.

( ) Tourism/ Hotels.

( ) Computer-related work.

( ) Advertising.

OTHER (Please specify) .....

How many persons are employed in your organization?

1-19 20-49 50-199 200-499 500-999

( ) ( ) ( ) ( ) ( )

1000-1499 1500 or more

( ) ( )

Indicate your domain of responsibility:

( ) Organization/Company ( ) Division/Branch

( ) Department ( ) Unit

Other (Please specify) .....

Indicate the main function of your own office:

( ) Personnel

( ) Financial

( ) Planning & Scheduling

( ) Training & Education

( ) Engineering

( ) Research & Development

( ) Marketing

( ) Others (indicate) .....

How many persons are employed in your office?

1-9	10-19	20-29	30-39	40 or more
( )	( )	( )	( )	( )

II - WORKING ENVIRONMENT

Indicate the time in % spent daily by you and your secretaries and staff on the following activities:

ACTIVITIES	YOURSELF AS MANAGER %	YOUR SECRETARIES AND CLERKS %
Writing	( )	( )
Mail handling	( )	( )
Proofreading	( )	( )
Searching	( )	( )
Reading	( )	( )

Filing	( )	( )
Retrieving filed information	( )	( )
Dictating to secretary/ manager/machine	( )	( )
Telephone	( )	( )
Calculating	( )	( )
Conferring with secretary	( )	( )
Scheduled meetings	( )	( )
Unscheduled meetings	( )	( )
Planning or scheduling	( )	( )
Travelling	( )	( )
Copying or duplication	( )	( )
Keeping calendars	( )	( )

Other (Please specify) .....

Indicate communication problems faced by your office:

( ) Difficulty in reaching others by telephone.

( ) loss of time due to sending documents to other locations.

( ) loss of opportunities due to bad communication.

( ) Others, indicate .....

Indicate the problems faced by your office in handling information:

( ) Difficulty in accessing information from files

( ) Limited staff

( ) Difficulty in processing large volumes of data

( ) Limited time frame

( ) Inaccurate results

( ) Poor formatting & presentation

( ) Not well established manual system (forms, procedures)

( ) Others, indicate .....

What language is USUALLY used for written communication

( ) Arabic ( ) English

( ) Other (Please Specify) .....

III - COMPUTERS AND OTHER OFFICE EQUIPMENT
AVAILABILITY, USAGE AND IMPACT

Do you have computers in your office?

YES
( )

if yes
indicate how many of each type:

( ) Mainframe computer
( ) Medium sized mini-computer
( ) Single-user Personal/micro
( ) Terminal
( ) Dedicated word-processor

For what use?

( ) Day-to-day activities: inventory, Payroll, etc.

( ) Online-use eg. bank-tellers

( ) Decision support: Financial, Forecasting, etc.

( ) Spreadsheets

( ) Wordprocessing

( ) Transmitting messages

( ) Personal Computing

( ) Others indicate
.....

NO
( )

if no
Is your office considering using computers

YES ( ) NO ( )

If the answer is NO, is the reason:

( ) Cost
( ) No present need
( ) No future need

If the answer is YES, what applications would the computer be used for

.....

.....

.....

.....

Please fill the following:

EQUIPMENT IN OFFICE	AVAILABILITY (YES/NO)	USE (frequently used: F, moderatly used: M, not used: N)
Telephone	( )	( )
Calculator	( )	( )
Typewriter	( )	( )
Photocopier	( )	( )
Terminal	( )	( )
Microcomputer	( )	( )
Wordprocessor	( )	( )
Telex	( )	( )
Electronic mail	( )	( )
facsimile	( )	( )
Others (specify)	( )	( )
.....	( )	( )
.....	( )	( )
.....	( )	( )

Indicate whether in your opinion, usage of computers has a positive, negative or neutral impact on the following:

	IMPACT (Positive:P, Negative:N, Neutral:U)
- Job satisfaction	( )
- Individual well-being	( )
- Relation with colleagues	( )
- Communication with supervisors	( )
- Efficiency	( )
- Co-ordination	( )
- Problem-solving	( )
- Support in decision-making	( )

IV - APPLICATION DEVELOPMENT

- Were your computerized applications (if any):

  Developed in-house ( ) Purchased ready-made packages ( )

- Who developed or adapted the chosen software (if any):

  Data processing dept. ( ) External consultants ( )

  Others: specify .....

- Did you participate in the development or adaptation process?

YES	NO
( )	( )

- If YES, at what stage(s)?

Analysis	Design	implementation
( )	( )	( )

- Do you find difficulty expressing your needs with respect to computer-based technologies?

YES	NO
( )	( )

- Do you find difficulty describing your office environment?

YES	NO
( )	( )

- Do other colleagues and staff participate in the process of application development?

YES	NO
( )	( )

- What are in your opinion obstacles to your effective participation?

Inadequate technical background ( )

Conflicts with other colleagues ( )

Others, indicate .....

V - INFORMATION TECHNOLOGY (IT) EDUCATION

- Do you have an IT background?

YES ( ) NO ( )

- If yes, how did you acquire your IT background:

Self-study ( ) Courses ( ) Others,indicate .....

- If no, or if you need more, what type of educational facilities would you prefer?

Regular courses ( ) Reading ( ) Videofilms ( )

Self-education packages ( ) None ( )

Others, indicate:.....

- How many persons in your office have an IT background
( )

- How many persons in your office need to be educated in this area? ( )

VI - MANAGER PROFILE

Job title (optional) .....

- Please indicate your age category:

Less than 30 ( ) 30-39 ( ) 40-49 ( ) 50 and above ( )

- How many hours do you spend in your office per working day?

less than 4 ( ) 4 -8 ( ) more than 8 ( )

PHASE 1 Appendix B

Group Interaction Guidelines

(Analysis Document)

While responding to the following guidelines, it is very important that you identify problems associated with any of the entries (for example, limited storage space, delays, inaccuracies, bad communication ...).

Leave any entry blank, if you cannot respond to it, or if you find it inappropriate.

* Identification

* Organizational objectives
    . Long/-term / strategic (Primary, secondary)
    . Medium to short-term (Primary, secondary)

* Your specific office goals (Primary, secondary)

* Policies

* Structure
    . Location (Centralized, decentralized)
    . Hierarchy (Subdivisions, units)
    . Level of authority
    . Reporting and feedback mechanism

. Communication system (Interpersonal, Interdepartmental, Interorganizational)

. Job specifications and career progressions

. Payment system

Identify the main functions of your office indicating all related activities, procedures and resources. Repeat the entries as many times as necessary.

For each activity, show what information is needed and what information is generated, its source and destination, the media used, decisions taken, reports prepared, services given...

* Function

. Activities

. Procedures

. Resources

Do you have any specific criteria for performance evaluation?

If yes, please indicate.

If no, how about setting criteria for evaluation now?

* Performance evaluation criteria

* End of Module *

Group Interaction Guidelines

(Analysis Document)

Identify applications in priority sequence, that will assist your organization in realizing its goals, repeating the entries as many times as needed for each application.

During group interaction, when all suggestions have been discussed, try to establish an agreed set of goals for the introduction of new technology into your workplace.

* For each application, please repeat the following:

  Application number and description

  . Goals it will satisfy

  - Business

  - Personal

  . Functions it will support

  - Activities it will replace or enhance

* Please list the resources to be allocated for the above applications

  . Human resources

  . Information

  . Equipment

  . Space

  . Finance

* End of Module *

Module 6: Group Interaction Guidelines

(Analysis Document)

Reply to the guidelines below as best as you can and discuss them with your colleagues during group interaction sessions.

* Change and the challenge of change

- To justify the introduction of new technology, you should identify the causes of changes in view of:
  - . Internal causes, pressures and trends
  - . External causes, pressures and trends

- To plan and cater for possible disruptions and changes in the workplace, caused by the introduction of new technology, you should identify the areas of change, for example:
  - . Changes to organizational structure:
    - . Job specifications
    - . Career paths
    - . Payment system
    - . Location
    - . Communication channels
  - . Possible conflicts with other units, groups or individuals
  - . Possible disruption to social relations (decrease personal contact, understanding, sharing of problems and views...)

. Personal problems (loss of status, job satisfaction, skill level..)

. Other important human, organizational or technical considerations.

* Planning for automation

- In view of the organization's overall mission, plans, and resources, planning for office systems entails the specification of:

. A long-range plan that addresses on a broad perspective the results of office automation, looking at the entire organization and covering a relatively long period, five to ten years.

. Short-range plans, that are considered subsets of the long-range plan, and address activities necessary to develop and implement specific office systems at the individual project level on a priority basis.

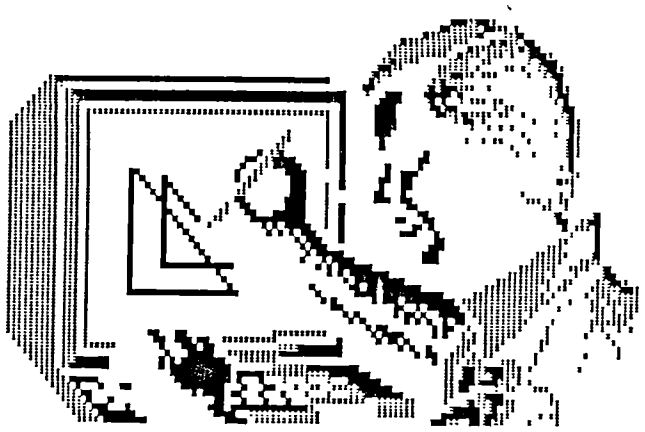
* Developing and implementing office systems

- Once you have considered all the above points, you are now ready to contribute positively to the development and implementation process of office systems. This is carried out in conjunction with specialists such as system analysts, designers and programmers.

* End of Module *

THE OFFICE & INFORMATION TECHNOLOGY

Computerized office tools have since then been evolving very rapidly & becoming more pervasive.

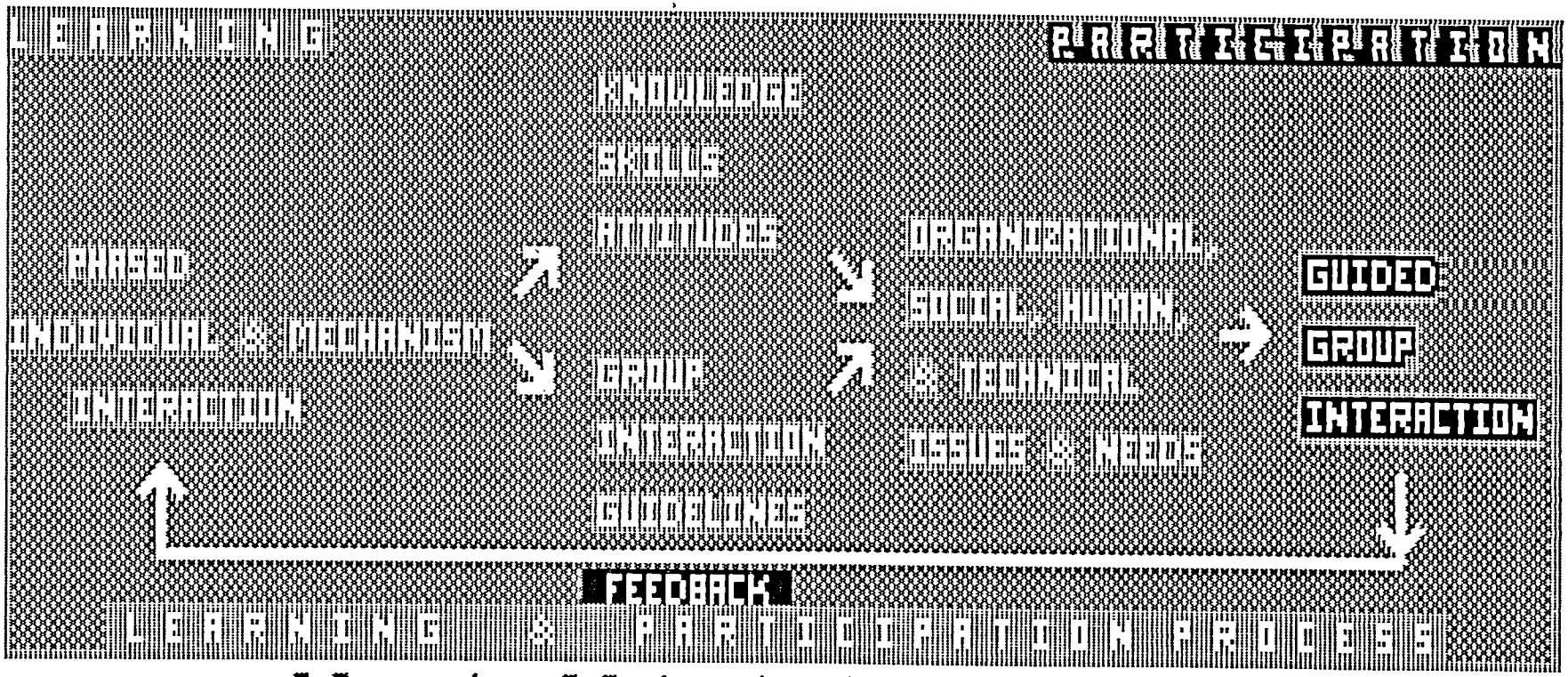


OF&IT

THE OFFICE & INFORMATION TECHNOLOGY

Learning and Participation Process (cont.)

This is a diagram showing the learning & participation process.



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PHASE 1:

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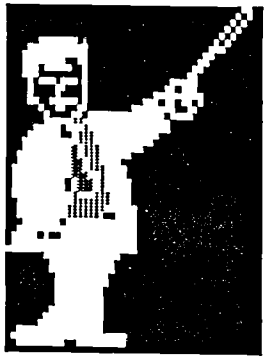


Module 1: Objectives of this phase

* To introduce users to the office.
* To provide a global view of the office environment introducing its human, organizational & technical constituents.
* To help users recognize & define their own environment.
* To provide users with facilities for self-evaluation & participation in group discussions.

* End of Module *

M Main Menu L Last Menu H Help Q Quit

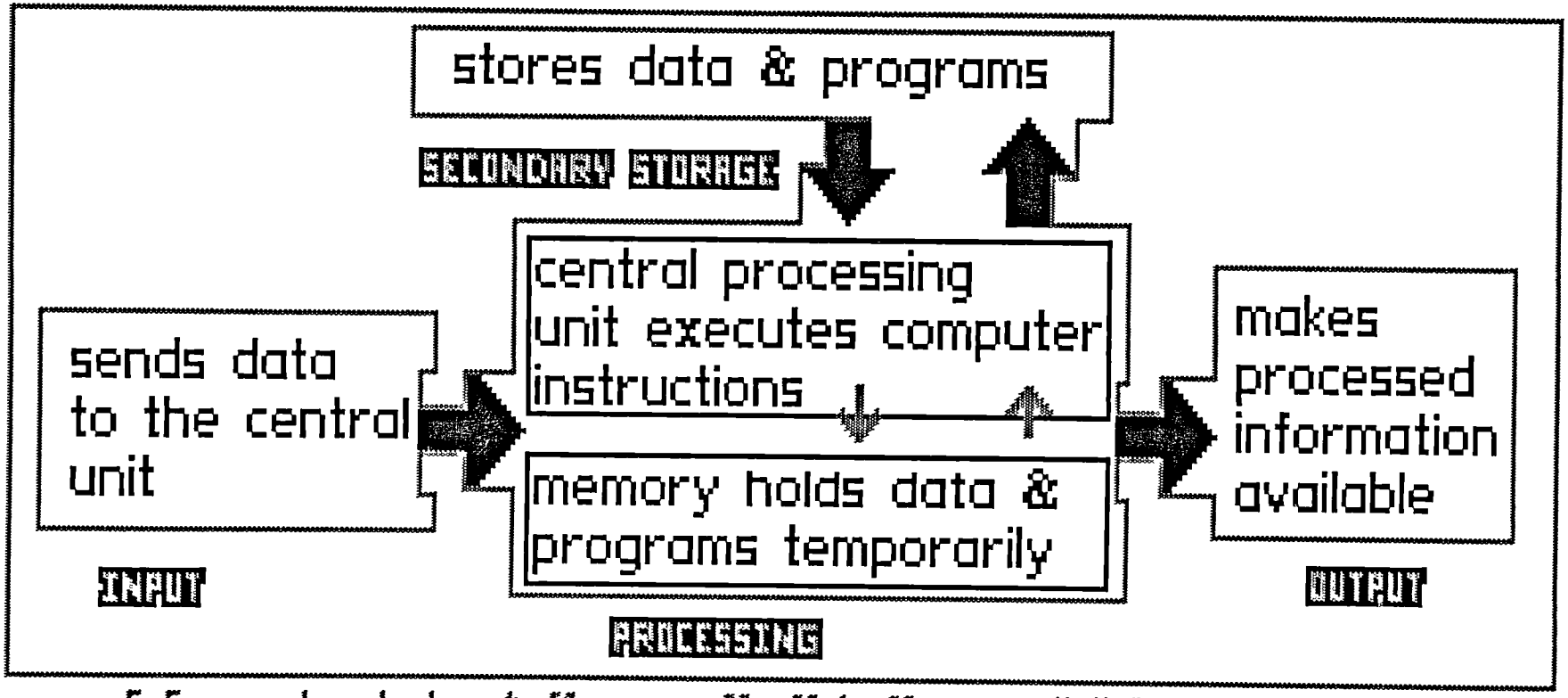
PHASE 2:

OF&IT

Module 5 : What is a Computer System?

2. Hardware : Meeting the Machine

* A computer system consists of 3 main areas of data handling - INPUT, PROCESSING, & OUTPUT- & is backed by a fourth, STORAGE.



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PHASE 2:

OF&IT

Module 5 : What is a Computer System?

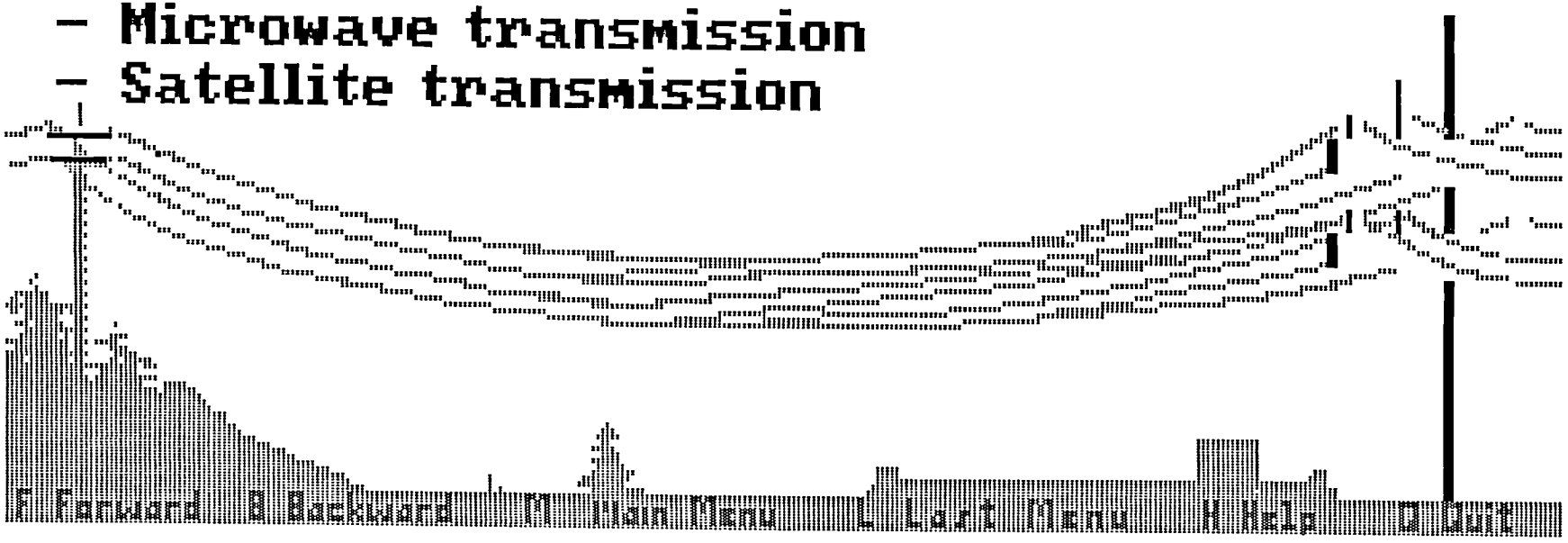
2. Hardware : Meeting the Machine

Communications : reaching out to touch a Computer ! (cont.)

* A communication link is a physical medium used for transmitting information.

  Types of communication links are:-

  - Coaxial cables
  - Telephone lines
  - Microwave transmission
  - Satellite transmission



PHASE 2:

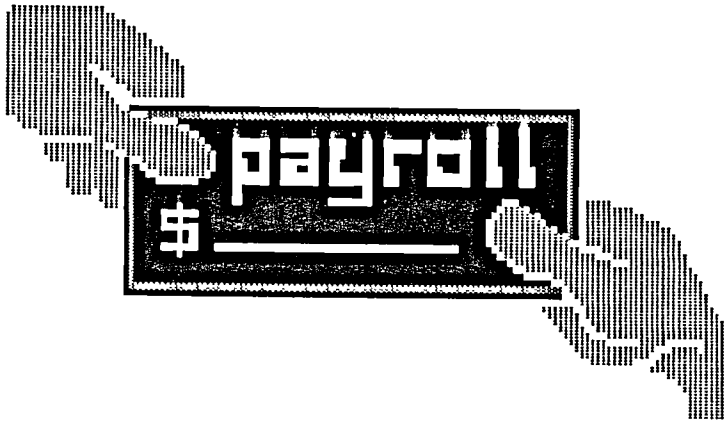
OF&IT

Module 5 : What is a Computer System?

3. Software: Telling the machine what to do

* We use the term software to refer to the programs that direct the activities of the computer system.

* All software falls into 2 general categories:-
  - Application sofware is designed and written to perform specific business or scientific tasks, such as payroll, word-processing and statistical analysis.



PHASE 3 :

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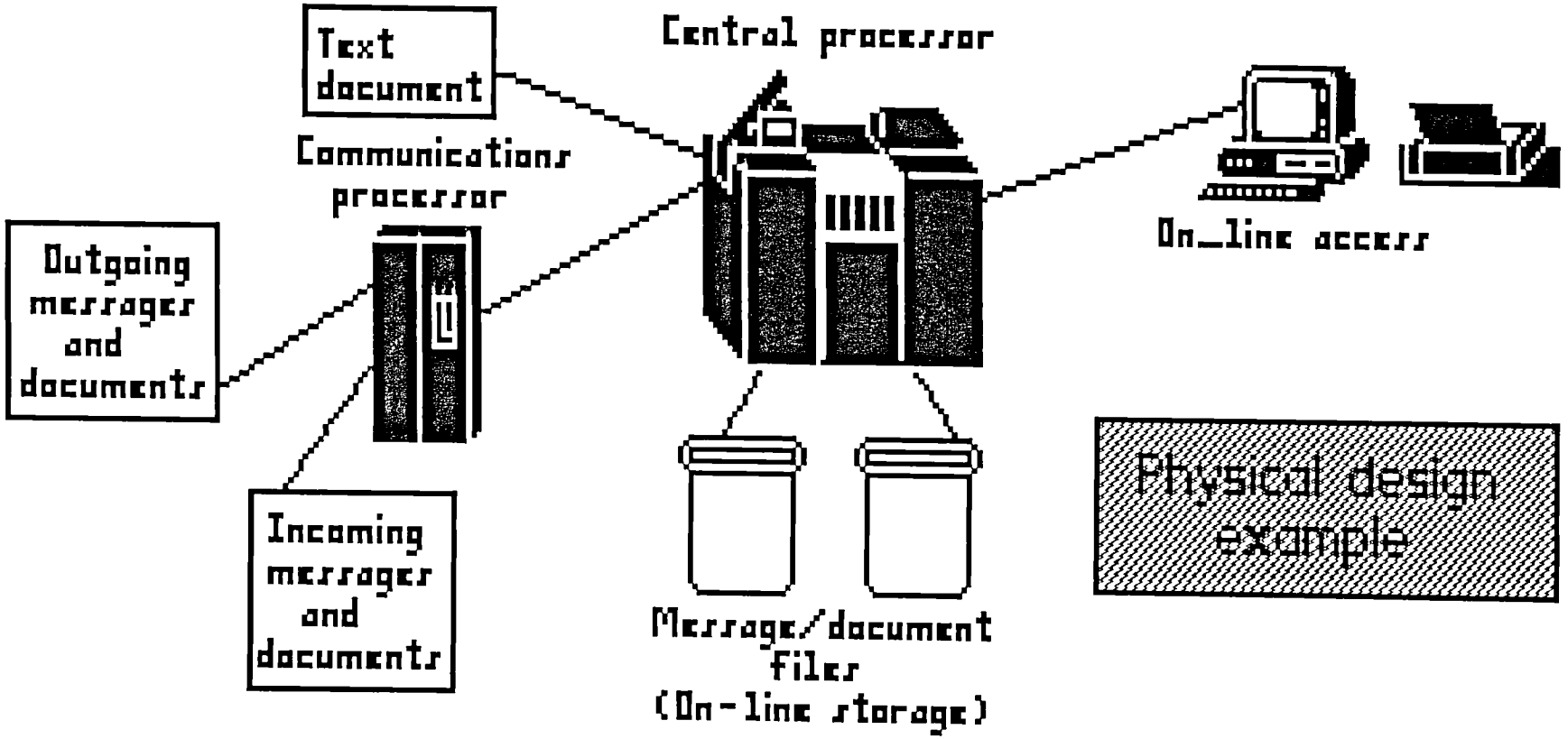
Module 4: Developing & Implementing Office Systems

2. Systems Life Cycle

4. System Design (cont.)



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PHASE 2:

OF&IT

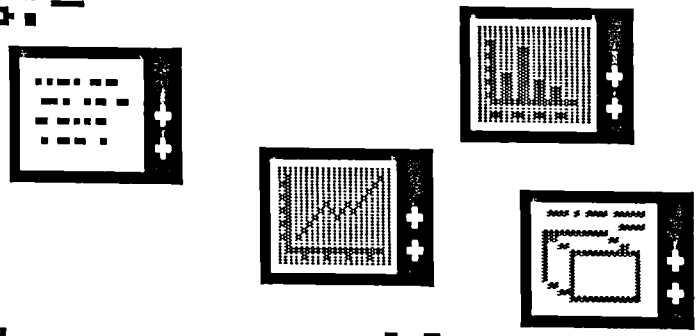
MODULE 6: Technology in the office: Who needs it and why ?

3. An Application Portfolio

1. Personal services

* Document Creation (continued)

- New office technology is more readily suited to handling all the various forms of information such as:-



Text
Data
Graphs
Images
Moving pictures, or video
Audio (voice recording)

PHASE 2:

OF&IT

MODULE 6: Technology in the office: Who needs it and why ?

3. An Application Portfolio

1. Personal services (continued)

* Selected Communication Services

The nature of office work creates a constant need for people to communicate: to delegate tasks, to pass information, to check on work progress, to discuss new plans, & to maintain social relationships with coworkers.

In addition to electronic message and mail systems (illustrated above), other common communication services include:

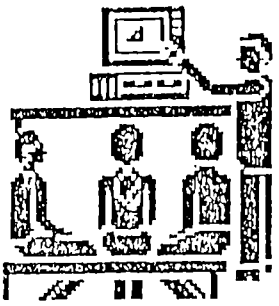
- Bulletin-Board systems
- Teleconferencing systems

& Facsimile devices

Are You Ready for Office Automation?

Do you want to introduce new technology into your office?
Can you specify your needs and requirements?
Are you aware of the capabilities and impact of new office technology?
Do you have a clear perception of your working environment?
Do you know what planning, developing and implementing office automation systems involve?

A new software package developed in Egypt is designed to help.



We are living in what has been coined "the information age" and are witnessing an accelerating growth in the number of services, occupations and technologies that are highly information-intensive.

Improved productivity in the office has become the goal of more and more organizations, since the office is the prime point of contact in any business and is, itself, information-dependent.

Information technology was thus introduced into the office to address the needs of organizations for better information management, improved communications, and more effective office administration.

But the adoption of new technology--or what we call "office automation"--in the office has met with many obstacles. In Egypt, and in many offices around the world, the implementation of office automation has been impeded by individuals who have had little or no exposure to the rapidly evolving technology, and who have often displayed active resistance to change.

Nonetheless, many organizations realize that to maintain a competitive edge, they need to embrace the new tools and pursue technological opportunities for cost reductions and increased productivity. Unfortunately, though, the application of office automation has often been "technology-driven" rather than "user-driven." New technology has been purchased without first assessing what users need. The result has been that many systems have failed to meet their intended goals.

Fortunately, more recent approaches to systems development advocate user involvement and participation. But the effective implementation of such approaches has been hindered, partly by users who are ill-equipped technically and psychologically to handle the new systems, and partly by organizational climates that lack an effective medium for user participation.

Paving the Way for Users

Research sponsored by the Information and Decision Support Center (IDSC) of the Cabinet of Ministers within the past couple of years pinpoints a number of problems related to the implementation of office automation in Egypt:

- Users' resistance to technological change
- Users' lack of orientation with respect to the potential of the new technology and its possible implementation in their own organization
- Conflicts of interest and power struggles between office workers that result from technological change
- The lack of a medium and method to get users positively involved with the new technology
- The lack of a conceptual framework through which to perceive the office environment and office work

Even though office managers may want to automate their offices, they are often unable to tell systems analysts and designers what kind of systems they need or want. Similarly, office workers are often afraid of new technology and reticent to use it.

Although courses, workshops and tutorials about office automation have been tried before in Egypt at several public and private sector companies, they have generally failed to provide users with a real opportunity for participating in office automation planning and implementation.

To overcome these problems, a researcher preparing a

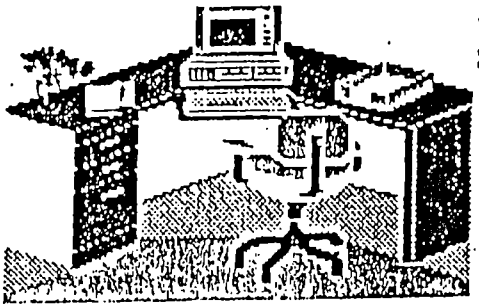
By Mona Kaddah

Office Automation

OF&IT

THE OFFICE & INFORMATION TECHNOLOGY

A General Orientation



Press any key . . .

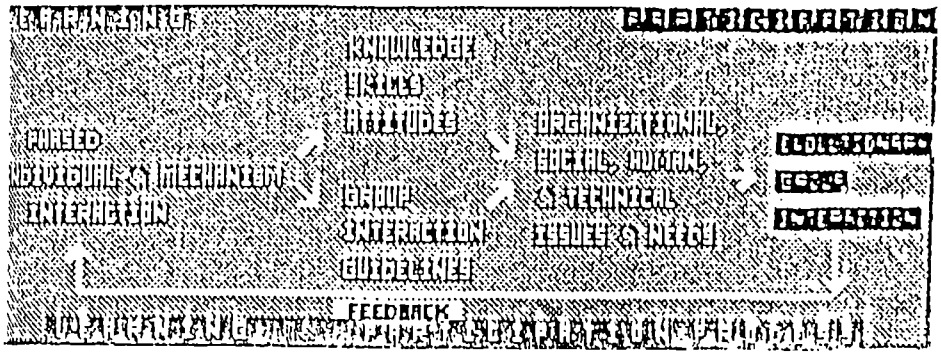
XI

OF&IT

THE OFFICE & INFORMATION TECHNOLOGY

The Structure of OF&IT

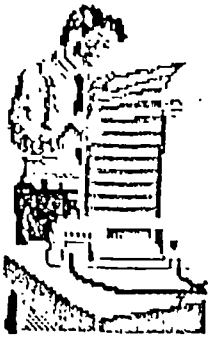
This is a diagram showing the learning & participation process.



OF&IT

THE OFFICE & INFORMATION TECHNOLOGY

Information Technology (IT) was introduced into the office to address processing needs of organizations for better information management, improved communication & more effective office administration.



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Ph.D. in computer studies at the University of Leeds in the U.K. decided about a year ago to develop a user-driven software package called "The Office and Information Technology--A General Orientation." The package, which was finished early this year, is designed to

- Mobilize user's interest and imagination
- Establish a common base of understanding and common vocabulary
- Influence users' attitudes
- Build skills
- Provide a forum for open expression of concerns and needs
- Minimize conflicts of power and interest
- Involve users in the generation of a needs assessment document

The package is already in use at AUC, the Information and Decision Support Center (IDSC) of the Cabinet of Ministers, and several government ministries in Egypt.

Four-Phase Strategy

The new orientation package introduces users to office automation in four specially designed phases that can be run on any DOS-based personal computer. Users interact individually with the program and progress at their own speed through each phase. It takes about three hours to view one phase, although it's recommended that no more than one phase be viewed per sitting, with time allocated for a brainstorming session. Users also receive "group interaction guidelines," which provide a basis for group discussion after each phase and enable them to relate the knowledge they have acquired to their own working environment.

The four phases of the program highlight various aspects of office technology and its application in the workplace:

Phase 1. Phase 1 of the package provides users with a global view of the office environment, introducing its human, organizational and technical constituents. With the assistance of guidelines, users are encouraged to investigate their own working environment and identify problems and needs.

Phase 2. Phase 2 of the package is an exciting one for users because it draws them closer to the technology. Having gained a broad perspective of the office and nature of office work in Phase 1, users become aware of the ways technology can be used to increase the productivity and effectiveness of an organization. Through hands-on training, users become familiar with popular office automation tools like word processing packages and spreadsheets.

Office Automation

Phase 3. Phase 3 of the package familiarizes users with the process of planning, developing, and implementing office systems. This enables them to participate positively in the introduction of new technology in their workplace.

Phase 4. Phase 4 of the package enables users to store, modify and retrieve the initial plans for office automation that they have developed in the previous three phases of the program and in subsequent group discussions. They thus finish the orientation package with a valuable analysis document on how office automation might best be applied in their own organizations.

For best results, it has been found that it is helpful to present the package first to office managers, followed later by a presentation to office workers. This allows managers an opportunity to set the standard for the design and use of new technology in the office. Similarly, presenters have found it useful to designate a group of young, enthusiastic "junior" office workers who have gone through the program to be available to upper-level managers who might need occasional assistance with it.

Colorful graphics, background help, and hot-keys make the new office automation program easy and fun to use. Although the current program is only in English, the package is currently being Arabized for widespread use.

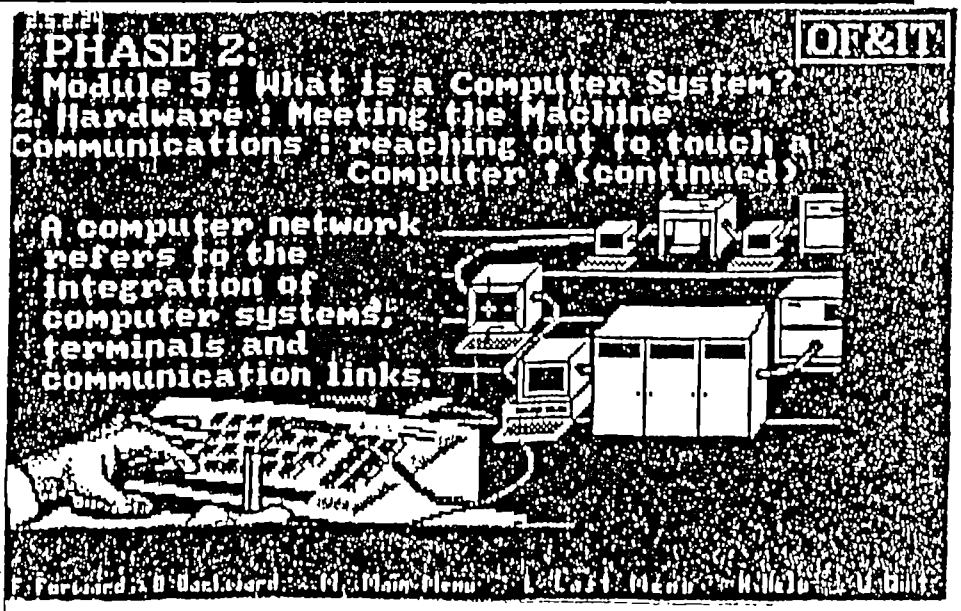
Good Reception

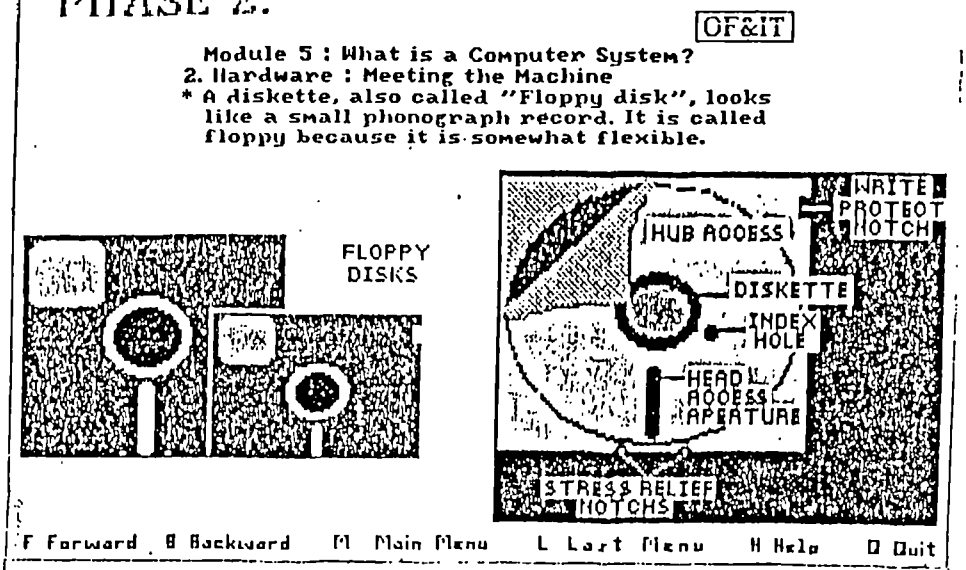
So far, the new orientation package has been well-received by users.

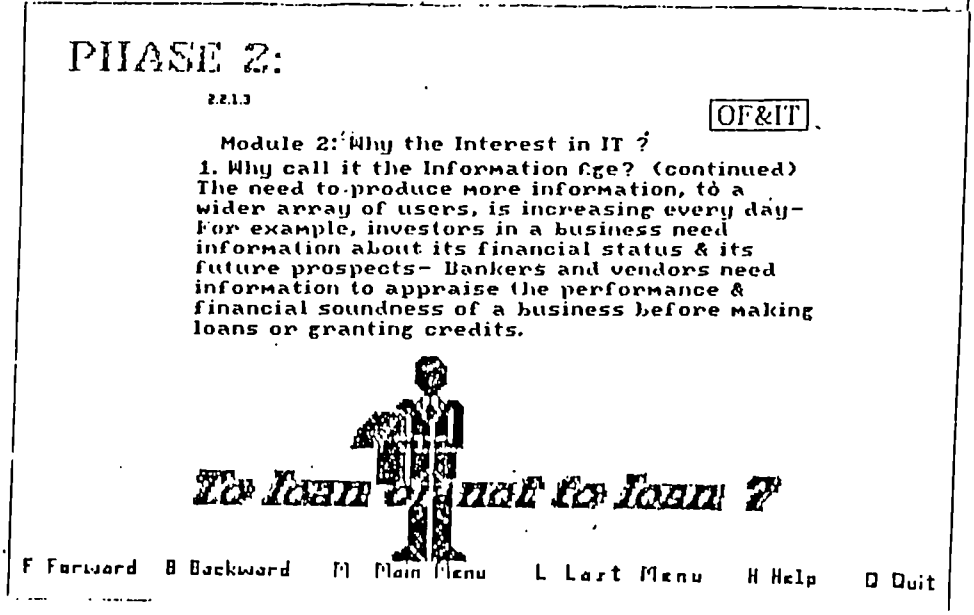
Developers hope that the positive response received to date will convince other organizations that the program is a useful addition to offices that plan to automate in the near future. ■

--Mona Kaddah

"The Office and Information Technology" package was designed by Mona Kaddah, assistant director of the Computer Center at the American University in Cairo (AUC) and an instructor in the AUC Computer Science Department. Ms. Kaddah has a B.A. in economics and political science and an M.A. in management information systems fro m AUC and is currently finishing a Ph.D. in computer studies at the University of Leeds, England. She was assisted in the development of the package by Professor Tom Gough of the School of Computer Studies, University of Leeds; Dr. Hisham El Sherif, Information Systems Unit Head, AUC Management Department; and by a team of four programmers.







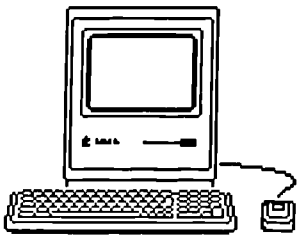
ARE YOU READY FOR OFFICE AUTOMATION ?!

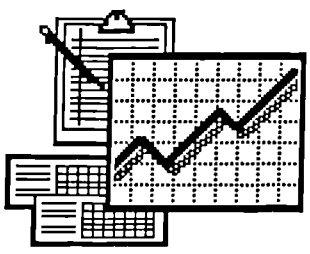
* Do you want to introduce new technology into your office ?
* Can you specify your needs and requirements ?
* Are you aware of the capability and impact of new office technology ?
* Do you have a clear perception of your working environment ?
* Do you know what planning, developing and implementing office automation systems involve ?

A new software package is designed to help ....

WHAT'S HAPPENING IN OFFICES ?

Information Technology (IT) was introduced into the office to address processing needs of organizations for better management, improved communication and more effective office adminstration. Computerized office tools have since been evolving very rapidly and becoming more pervasive.





We as individuals within organizations, need to be provided with the concepts and skills that enable us to exploit the new technology effectively and participate actively in the introduction process of INFORMATION TECHNOLOGY into our environment and into our lives.

THIS IS WHAT THIS PACKAGE PROVIDES !!

WE MUST FIRST ADDRESS

OFFICE AUTOMATION OBSTACLES

Major obstacles that may impede the implementation of office automation are :

* User's resistance to technological change.
* User's lack of orientation with respect to the potential of the new technology and its possible implementation in their own organization.
* Conflicts of interest and power struggles betwwen office workers.
* The lack of a medium and a methodology to get users positively involved with the new technology.
* The lack of a conceptual framework through which to percieve the office environment and office work.

PAVING THE WAY !

To overcome these obstacles, a package called 'The Office and Information Technology - A General Orientation' OF&IT for short, is designed to :

* Moblize user's interest and imagination.
* Establish a common base of understanding and common vocubulary.
* Influence user's attitudes.
* Build skills.
* Provide a forum for open expression of concerns and needs.
* Minimize conflicts of power and interest.
* Involve users in the generation of a needs assessment document.

FOUR-PHASE STRATEGY

The OF&IT package introduces users to office automation in four specially designed phases that can be run on any DOS-based personal computer. Users interact individually with OF&IT and progress at their own speed through each phase. It takes about three to view one phase, although it is recommended that no more than one phase be viewed per sitting. Users also receive 'group interaction guidelines', which provide a basis for group discussion after each phase and enable them to relate the knowledge they have acquired to their own working environment.

The four phases of OF&IT highlight various aspects of office technology and its application in the workplace .....

PHASE 1
PHASE 1 of OF&IT provides users with a global view of the ofiice environment, introducing its human, organizational and technical constituents. With the assistance of guidelines, users are encouraged to investigate their working environment and to identify problems and needs.

PHASE 2
Phase 2 of OF&IT is an exciting one for users because it draws them closer to the technology. Having gained a broad perspective of the office and nature of office work in phase 1, users become aware of the ways technology can be used to increase the productivity and effectivness of an organization. Through hands-on training users become familiar with popular office tools like word processing packages and spreadsheets.

PHASE 3
Phase 3 of OF&IT familiarizes users with the process of planning, developing and implementing office systems. This enables them to participate positively in the introduction of new technology in their workplace

PHASE 4
Phase 4 of OF&IT enables users to store, modify and retrieve the initial plans that they developed in the previous three phases and subsequent group discussions.

FOUR-PHASE OVERVIEW

OF&IT PHASE MENU

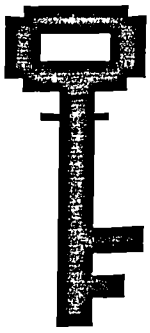
Phase 1 : The office environment
1. Objectives of this phase.
2. Introduction to the office.
3. The office environment model.
4. Self-evaluation.
5. Group interaction guidelines.

Phase 2 : Information Technology (IT) and the office.
1. Objectives of this phase.
2. Why the interest in IT ?
3. What is computer literacy ?
4. Computers in our lives !
5. What is a computer system ?
6. Technology in the office : Who needs it and Why ?
7. How about trying ?
8. Self-evaluation.
9. Group interaction guidelines.

Phase 3 : Office Automation : Planning and Implementation.
1. Objectives of this phase.
2. Change and the challenges of change.
3. Developing and implementing office systems.
4. Planning for automation.
5. Self-evaluation.
6. Group interaction guidelines.

Phase 4 : Getting ready for participation
1. Objectives of this phase.
2. Storage and retrieval of user documents.

YOUR KEY TO MODERN TECHNOLOGY IN THE OFFICE



FEEDBACK FROM USERS

* "It is certainly more effective than those classrooms courses or boring tutorials, because it forces you to relate the given material to your own environment." .....
* "What's good about it, is that I can switch it on whenever I have the time and proceed at my own pace" .....
* "It makes you see your work from a different angle and helps you discover your real needs for technology " .....
* "With the information and guidelines, we can now start from somewhere" .....