

# **MANAGING SYSTEMS DEVELOPMENT**



**Jeffrey Keen**

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**Jeffrey S. Keen**

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## *Preface*

I have worked in the computer industry for over sixteen years in many varied capacities. Time and again, when acting as a consultant, or in a trouble-shooting role, or when in general contact with numerous computer installations, I came up against the same difficulties and mistakes in the way that organizations manage their DP. It seems unfortunate that so many managers must learn the hard way, struggling through similar learning processes. The aggregate money wasted by all these organizations is frightening!

How then can a data processing professional improve his own and his department's performance? Apart from on-the-job experience (which is often too late, or too slow) a popular method is to attend training courses (which may cover only a narrow spectrum), or to employ consultants (who also may have a limited brief). Currently available books rarely seem to be applicable in practice when an organization is experiencing difficulties. The market lacks a definitive text which covers both the theory and practice of system development and project management.

The combined topics of computing and management in current literature, often tend to be concerned with technical computing (for the specialist); with introductory computing for the business layman; or with ways computers can be used by management in its organization. There are not many books that relate the management aspects of the development of computerized business systems to the problems of business line management. Similarly, available literature fails to show how the technical requirements of the computer industry affect the practical way in which organizations are structured to use their computers commercially and effectively.

This book, therefore, attempts to illuminate some of the many problem areas in the managerial aspects of developing and installing computerized business systems. The text represents an accumulation, over a period of several years, of my ideas based on observations of both good and bad DP departments, coupled with copious notes made whilst working at numerous installations. These ideas have been augmented and refined as a result of general conversations with colleagues in the DP industry, notes taken whilst attending conferences or courses, and occasionally on reading thought-provoking articles. Also included are notes and feedback from presentations I have given to first-time user management (in organizations having their own computer) and to senior management of orga-

nizations acquiring their own first computer. The intention is to pass on practical advice (which to the author's knowledge is not readily available in other publications), and not to quote or paraphrase other authors.

As an aid for the practical manager, the text covers the planning and management of the entire development cycle of computer systems. This problem is examined not only from the viewpoint of the system development function within the computer department, but also from the organization's business requirements and the management of the development projects set up by the organization to develop computerized systems. Practical solutions are given to justifying and budgeting systems and projects, planning them with accurate estimates and minimum risks, motivating staff and measuring progress, and also to the interesting subject of politics within an organization and a DP project in particular.

The reader should be primarily a DP professional. As the text aims towards an advanced level, hopefully even the most experienced will learn something worthwhile from these pages. Teachers and students of DP may also find this book useful as supplementary reading for further education courses. This book is, therefore, addressed to all levels of management within a computer department and new or aspiring managers.

Although it is written from the viewpoint of organizations that manage their own DP, the issues raised should interest all computer manufacturing and servicing companies—in fact, anyone involved in making computers work.

With the advent of distributed data processing systems, and low cost computer hardware, more local management are forced to be responsible for their computerized business systems. It is intended that the text should appeal to this wider range of managers by facilitating their acquisition of expertise in DP management.

The reader should be able to extract and adopt those concepts that he feels are relevant to improve effectiveness in his own installation, and in his own job. After reading this book, managers should be in a position to appreciate the areas in which they could become involved personally, and what form their participation should take. Because of the connections between chapters, it is recommended that first the book be read in its entirety. The writing of this book will have been justified if it is not read just once for general interest, but if it finds its place as a daily reference to assist management in its work.

The text has been kept brief and concise for easy management assimilation. It has been assumed that the practical manager is too busy to check each section of the text against cross-references to other publications in order to 'substantiate the academic authenticity' of recommendations. As this book relates to management concepts, the detailed technical aspects of computing are not introduced. Similarly, the technical or management aspects of running live production work, or upgrading or replacing existing computers are not considered, as the purpose of the book is to cover the development side of computerized systems, as distinct from the hardware and its environment.

Certain project management aspects relating to the special case of commer-

cial tendering, the negotiation of contracts and the legal aspects associated with projects of this nature, have been excluded deliberately. This omission has been felt necessary, because these general subjects have been well aired in other publications, and they do not relate to the major methods of in-house DP development within most organizations.

The management philosophies discussed here should apply to the majority of projects, irrespective of their actual 'product' or of the computerized system being developed. Throughout this book, the text is equally applicable to developing new systems, as well as to enhancing existing ones. To avoid repetition, cumbersome phraseology, and to improve clarity of the concepts being discussed, the text refers simply to new systems. No lack of emphasis is intended for enhancement work; only where differences apply is the subject raised explicitly.

The book is structured so that chapters proceed sequentially from topic to topic in a flow, that starts at the highest levels of management and then works down to the lower levels. Similarly, the topics appear logically in a chronological sequence. Several appendices provide practical checklists, which could be useful to managers when setting assignments, or when reviewing work.

When practical, each chapter covers the types of problems faced by small, medium, or large computer installations. The projects that these installations are called upon to deal with, will have varied problems or priorities. Where appropriate, the text discusses not only the management approaches that are required for different sized organizations, computer departments or projects, but also the change of emphasis that may arise during each phase of a project. Practical examples are liberally dispersed to illustrate points raised.

For the reader's convenience, many key words and descriptive phrases appear in bold type, and the reader is advised of the connotation placed on certain terms used. The words 'organization', 'company', and 'corporation' may be interchanged, as can the words 'directors', 'senior management', and 'presidents/vice-presidents'. The terms 'a computer department', 'DP department', or just simply 'an installation' embraces the corporate DP function, whilst a 'management services division' exists in organizations whose computer department has a wider brief than just computing. The part of the computer department responsible for running jobs on the actual hardware is termed an 'operations department' or 'DP operations'. In common usage, the word 'system' is vague and can apply to many things. Where appropriate, the text refers to the different types of systems.

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# Chapter 1

## Introduction

### SOURCES OF TROUBLE IN MANAGING DATA PROCESSING

Most managers of DP have experienced some, if not most, of the types of troubles that are illustrated in Figure 1.1. Before attempting to recommend solutions it is sensible to start with some analysis and so a selection of these

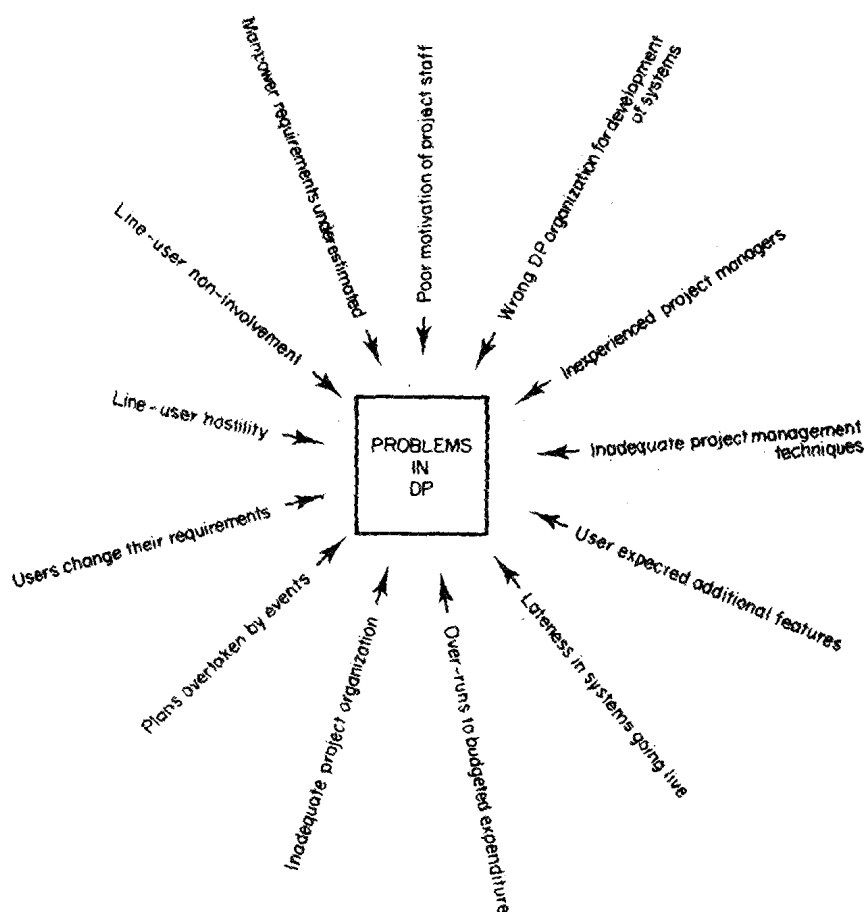


Figure 1.1 Sources of trouble in managing DP

troubles will be explored in order to achieve an understanding of how and why many of them arise. Effort and money are only expended on computerized systems so that the line user departments and not the computer department may benefit. Accordingly, it is good policy for the line departments to be given a degree of control over the *business* aspects of their computer projects, preferably at senior management level. Some senior line managers have preferred to remain only minimally involved in the development and implementation of computerized systems, making the DP professional's job more difficult. In other instances, well-meaning senior management involvement has swung the other way, with too much attention being paid to the wrong details. Frustrated DP management, lower DP productivity, or the development of unsuitable systems are often a result.

A frequently-heard complaint is that some computer line users may be unhelpful, being reluctant to assume their responsibilities. They may be critical of the management of computer departments which are supposed to benefit them. Frequently this is because their previous experience has been unfortunate. Promised objectives have been achieved *only partially*, or the original planning and estimating was over optimistic. Accordingly, the line users are now mistrustful.

A common cause of these shortcomings is that, conventionally, a computer analyst is given responsibility for the development and implementation of a substantial business application system. In practice, he may not have the essential management tools for managing projects, or sufficient management status to guarantee success. Also he may not have had the correct business experience to enable him to exercise the right judgment when compromises have to be made. In addition, the analyst may have had insufficient experience in managing projects (a) to appreciate the numerous components of a project which require planning and control, or (b) to divide a project into precise, quantifiable units or checkpoints.

In the rapidly fluctuating climate of modern business, various people may try to force the computer department to accept impractical tasks and deadlines. The result may be that rushed, unjustified, and *ad hoc* jobs are run on the computer, contrary to good computing practice and effective strategic management. Adverse comments on the quality of output may then be received from the board downwards.

The recent dramatic growth in minicomputers, microcomputers, and in distributed data processing has made a significant impact on the management aspects of developing business systems which utilize these new technologies. Reductions in cost, coupled with the communications ability of these small computers allowing them to be sited in remote locations, affects management in several ways. First, managers who previously were only on the fringe of DP may now have to take a more direct responsibility with the development and running of systems on their own satellite computer. Secondly, the great reduction in the cost required to install and run one of these computer systems need to be matched by lower development costs. This in turn, means aiming

for reduced management overheads, using cheaper resources, and possibly employing a lower grade of staff than for, say, larger projects. This may then lead to an undesirable reduction in DP standards, and to the disregard (or unawareness) of management techniques which have been learned whilst working on mainframes, but may still be relevant to these limited budget development projects.

A further difficulty experienced in some organizations is that small cheaper computers invite individual divisions or departments to rush out and buy their own, sometimes without prior consultations with the established centralized computer department. The subsequent unco-ordinated mushrooming of computers throughout an organization may not only cause embarrassment to the DP management (who are often faced with a 'fait accompli', or are informed when it is too late to propose superior alternatives), but also it may be symptomatic of a lack of strategic DP plans for satisfying the organization's needs in a more effective and controlled manner.

### **Summary of the sources of problems**

In summarizing the above, we see that there is a broad spectrum of problems which will be discussed in this book. They range from the possibility of the line department users not assuming their responsibilities (for various reasons), to senior managers declining to become involved as they are not sure what they are supposed to control and how they are to control it; or the wrong manager with inappropriate qualities is delegated to take control. Included in this is the conflict of business pressures requiring quick results which may be contrary to good development standards.

Lower down the management hierarchy, the wrong level of person is often held responsible for developing a computerized system, who is possibly not acquainted with the appropriate planning and control techniques. Poor motivation of DP staff may sometimes ensue. Finally, distributed computing may mean that managers new to DP might be made responsible for installing their own mini or microcomputer system. Coupled with this, a strain may be placed on the traditional control exercised by the centralized computer department.

## **SYNOPSIS OF EACH CHAPTER**

### **Chapter 1: Introduction**

Some analysis of relevant problem areas in DP work

### **Chapter 2: Corporate Aspects of Developing Computer Systems**

The text first examines the reasons why an organization could need a new computerized system, but warns of the difficulties of adhering to these corporate ideals and objectives during the (lengthy) process that builds the new system. It then looks at the earliest stages of managing the development process.

Having defined what are the benefits of a project approach, and related it to the political framework of an organization, advice is given on setting up a corporate project, which develops the computerized system, and how this project is subsequently managed at the highest levels.

### **Chapter 3: Projects and the Computer Department**

Effective organization of the computer department is discussed, suggesting how it should interact with corporate projects, how best to facilitate the system development process, and how it incorporates ideas relating to joint line user and computer department projects. Ways of handling live production work and post live system maintenance and enhancements are also discussed.

### **Chapter 4: Costs, Benefits, and Budgets**

This chapter on budgets distinguishes between the corporate budget, the computer department's budget, the DP operations budget and the budget of an individual project. Also detailed is a comprehensive method of budgeting that could form a basis for justifying the project, and for its subsequent financial control.

### **Chapter 5: The Management of Developing Different Types of Systems**

The next level of management responsibility for the system development process is explained. Advice is given on defining in quantifiable terms, the relative sizes, complexities and risk factors of projects. This could be useful when justifying projects, and in the recommended project planning and control process. Consideration is also given to the project's end-product in conceptual terms, which relate to other application systems within the computer industry, and to the technologies planned to be employed. These discussions form the basis for strategic decisions that must be made by the system development management function.

### **Chapter: 6 The Particular End-Product**

The text moves from generalities to specifics, and defines the planning required for a particular end-product. This is important because the latter is difficult to define in black and white terms, and in large integrated systems, may become amoeba-like, being difficult to keep within continual grasp and under complete control.

### **Chapter 7: How the End-Product will be Constructed and Controlled**

A feature of the book is the extensive treatment of the predictability of the components of a project, which require planning, monitoring, and controlling

(i.e. management in its widest sense). This chapter elaborates on *how* the end-product (as defined above) will be constructed and controlled, how changes in specification are kept in check, how the development process will be administered and supported, and how the data requirement and the files are designed.

## **Chapter 8: Standards and Techniques**

The topic of 'standards' causes many DP professionals to 'switch off'. This chapter continues the theme of how the end-product will be built, by taking a *practical* view of the minimum DP standards required, and couples them with useful techniques that facilitate systems development. Discussions regarding the thorny problem of documentation conclude this chapter.

## **Chapter 9: Testing**

An explanation is given as to why testing may take up half of a project's resources, and advice is offered in formulating a testing strategy, quantifying the number of errors anticipated, planning what steps should be taken in testing, and who should complete them. Techniques to facilitate testing both new systems and maintenance are included, as well as suggestions relating to which testing utilities and aids may be usefully employed.

## **Chapter 10: Project Planning and Re-Planning**

An extensive chapter on project planning starts by defining the purpose and extent of planning, and how a manager should and should not use planning. Detail is given of a structured approach to planning, when it should occur, and how *practical* plans are both iterative and evolving. No plan is complete without detailed consideration of the possible risks, and the ways of minimizing them with contingency plans during the implementation of the project. Finally, an examination is made of the consequences of the (parochial) project's planning on the rest of the DP department, and the organization as a whole.

## **Chapter 11: Project Organization and Structure**

Up to now, manpower has been treated as a resource, not as individual people requiring skilled management. This chapter starts by identifying the staffing constituents of a project, the skills required and a general reporting structure. The discussions include information on how projects themselves are organized and structured, examples of how these change for different phases of development, and on the importance of practical considerations of management styles, personal relationships and the resulting political situations that arise when implementing a project. Examples are given of larger and smaller projects.

**Chapter 12: People Management**

This chapter commences with an analysis of the desirable personal qualities required in all levels of DP management. Traditional methods of motivating staff are augmented by some additional observations, and practical advice, relevant to DP, is given on such topics as corporate personnel policies, staff deployment, career development, training, recruitment, and appraisals.

**Chapter 13: Project Control**

An analysis is conducted of what is project control, why it is only a sub-set of project management, who is responsible for project control, and why each level of management sees project control in a different light. Various control techniques are covered, together with recommendations on their relevance to different types of management plans. The knotty, but universal problem of measuring progress is tackled, and this leads to specifying the requirements of quantitative project control systems, that give reliable end dates well in advance. Examples of these are given, together with advice on what to do when difficulties occur, and on the subject of written upwards reporting.

**Chapter 14: DP/User Relationships and the Conclusion**

The important topic of professionalism is covered, and coupled with the relationship between users and the computer department. Typical problem areas are highlighted (including communication and improving users' awareness of DP), together with possible solutions. The book concludes by bringing together the more important themes being advocated, and suggests that the responsibility for introducing these improvements to his own organization must primarily rest with the DP professional.



## Chapter 2

### *Corporate aspects of developing computer systems*

The reasons are examined why an organization, or part of it, could need a new computerized system, but warnings are given of the difficulties in adhering to these corporate ideals and objectives during the (lengthy) process that builds the new system. The earliest stages of managing the development process are discussed. A definition is given as to what constitutes a project and relates it to the political framework of an organization. Advice is given on setting up a corporate project which develops the computerized system, and how this project is subsequently managed at the highest levels. Although an emphasis may appear to be made on new systems, there is no reason why a project cannot involve enhancements to existing systems.

#### **THE CORPORATE OBJECTIVE(S)**

As this book relates to the management of developing systems, a reasonable starting point is to examine some of the reasons why an organization might wish to develop a computerized system, and to illustrate some of the derived benefits for the business functions involved. The corporate heart of the business requirements relating to computing is examined, and those management decisions which can be taken locally by the relevant line managers are indicated. The discussions mainly relate to the beginning of the system development cycle, and they elaborate on the overall corporate planning process.

#### **Why introduce a computer application system?**

There are several categories of benefits to be derived from commercial computer application systems, ranging from improved profitability to handling large volumes of data. At this stage we are not too concerned with the type of computerized system that produces these benefits, as the latter are similar whether say a batch, a distributed data processing, a real-time, or a micro-computer system, is contemplated. As anyone battle-worn in system development knows, developing even an apparently simple system is fraught with difficulties. An organization will only be motivated to embark on the traumatic system development path if the anticipated benefits at the end of the road are worth it. Are these reasons for developing an application system absolute