Delivering Successful IS/IT Projects:

Eight Key Elements from Success Criteria to Review

via appropriate management, methodologies and teams

A Thesis submitted for the degree of Doctor of Philosophy

by

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ABSTRACT

In spite of decades of research, Information Systems/Information Technology (IS/IT) projects still often fail to deliver the objectives expected of them. Managers require information systems to achieve their business objectives and the failure of these projects inevitably hinders the progress and success of their organisations. This research examines the key criteria by which IS/IT projects are judged to be successful and what factors are important in influencing the success of IS/IT projects. The research shows that very often different participants in a project are aiming at different targets and they each have their own perception of project success. There must be greater convergence on the criteria for success. To achieve this, the criteria for success and associated factors that influence success need to be defined clearly, agreed by all parties at the start of the project and reviewed as the project progresses.

Agreeing the criteria is not sufficient to guarantee success. The project has to be carried out within a defined framework. The project life cycle is used to link the two disciplines of project management and systems development, and to highlight the fundamental issues that must be carried out on all projects. However, project managers need to focus more on the products of the system and not on the plans and schedules. Therefore, there should be the emphasis on configuration management as a means of linking the two disciplines. Furthermore, automated tools need to provide additional functionality to be of any practical use to project managers and system developers.

Project managers are crucial to the development process and they need a portfolio of skills to deliver successful projects in the future. The research outlines the development path for project managers to acquire these skills. They should not rely solely on experience but formal career development has to be part of the overall strategy of the organisation.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER ONE

IS/IT projects: success or failure

Contents

1.1 Introduction

The majority of computer-based system development projects are criticised for having failed the objectives expected of them (Management Consultancies Association (1993)). This is a problem that has blighted the computer industry for many years. Many papers and books have been written on the subject purporting to show the way to success. However, the problem still exists. The topic of this research is to examine all aspects of managing Information Systems/Information Technology (IS/IT) projects (that is, the development of the software and the hardware architecture on which it runs) and identify the key elements that contribute to making such projects successful.

Firstly, there needs to be a definition of the success criteria. What makes a successful IS/IT project? Is it meeting timescales, budgets, user requirements, achieving its purpose, meeting quality, happy users, sponsors or project team? Or is it a combination of these?

Secondly, what factors are important in the success or failure of IS/IT projects? What tools, techniques and methodologies can be used in the quest for successful IS/IT projects - automated tools, development methodologies, management methodologies, personal and personnel management skills, selection of managers and staff, education and training? All these affect the successful implementation of IS/IT projects.

Thirdly, what is the role of the project manager and what qualities and skills does he/she need to possess to aid the successful implementation of IS/IT projects.

1.2 Background

De Marco (1982) identified that:

> *'Fifteen percent of all software projects never deliver anything: that is they fail utterly to achieve their established goals.*

'Overruns of one hundred to two hundred percent are common in software projects'

Macro and Buxton (1987) suggest that cost and time scale overruns are sometimes even worse. The survey by Management Consultancies Association (1993) points out that twice as many IS/IT projects are considered 'less successful' than those which are considered successful. The survey highlighted amongst other aspects:-

'A remarkable number of projects which are not achieving what was expected of them'.

Many authors (Evan and Black (1967), Harvey (1970), Lucas (1975), Parkin (1980), Block (1983), Schlender (1989), Yeates (1991)) have proposed a variety of reasons for projects failing and there have been a number of spectacular failures over recent years. Rothfeder (1988), Winsburg and Richards (1991), Neumann (1993) and Martinez (1994) all give examples of software disasters, "software runaways":

1. an operations automation project which was originally estimated to cost $8 million with forecast completion in 1987. The targets were revised to $100 million and 1993;

2. a billing system cancelled after the company had paid out close to $1 million, claiming that the system was far from delivery;

3. City Government project: originally scheduled for two to three years with a budget in the tens of millions of dollars, this project is years past its original completion date and is facing overruns of more than double the original estimate;

4. Publishing Company project: after approximately two years and millions of dollars in expenditures, the project was halted;

There have been many notable failures closer to home:

- TAURUS for the London Stock Exchange;
- RISP at the Wessex Regional Health Authority (RHA);
- computer aided despatch (CAD) system for the London Ambulance Service;
- downsizing project for the Performing Rights Society;
- CHIEF system for Customs and Excise.

The CAD system had many problems with the management and development of the project and there were many reasons for the deficiencies in the system (London Ambulance Service inquiry (1993), Hougham (1996)). These were:

- project was over ambitious and was developed and implemented against an impossible timetable;
- quantitative not qualitative procurement;
- contractor experience and expertise;
- failure to follow Project Management Method;
- no full-time, professional and experienced project management;
- no staged implementation;
- each stage was not justified, qualitatively and quantitatively;
- incomplete ownership of the system;
- incomplete training;
- lack of testing;
- overloaded technical communications infrastructure;
- possible misuse of the system;
- no review of the project;
- poor communications between management and staff.

These problems point to a outright project disaster. For many people, this is undoubtedly the case. However, these problems are common among many projects. The CAD project was particularly poor and the situation led to an Inquiry. Not all projects have the benefit of this review process. Moreover, projects will continue not to deliver the benefits expected of them if they do not heed the lessons of previous project failures.

These examples are particularly large projects. The same applies to smaller IS/IT projects which can cause organisations major problems. A small- to medium-sized project here is defined as one which has a total project duration of up to 1.5 man years. It does necessarily apply to small- to medium-sized companies. Dworatschek (1989) further defines a small project as:

1. consisting of one hundred or less tasks or activities,
2. a budget of about $100,000 per year.

The distinction between 'small' and 'large' could be judged in a number of ways:

- time to develop
- projected cost
- perceived complexity
- function points
- volume of data
- need for new hardware
- need for new software
- consideration of new areas of business
- criticality
- experience
- office politics

It is the low level of these issues (that is, short time to develop, little complexity, little need for new hardware) which indicates that a project is small. There are many examples of small to medium-sized IS/IT projects (both software and hardware implementations) taken from the author's own experiences and from discussions with users and project managers failing:

> Example 1 - A department needed to link together a few terminals in a Local Area Network (LAN) environment to make full use of all the data available on stand-alone Personal Computers (PCs). The user department specified clearly and unambiguously the objectives and the requirements of the project. The IT

department specified the timescales and cost which was acceptable to the user and the development and negotiations with third party suppliers was carried out. The implementation was completed on time and within budget but there were problems encountered by the user department for several months after the implementation.

Example 2 - A system was being developed for a small insurance underwriting business. The computer used a small business machine installed in the consultant's offices for development work. The system requirements changed regularly and the computer time was at a premium. A shift work pattern had to be instituted to utilise the machine resources twenty four hours a day. Programmers had to travel to the computer suppliers' offices to continue work. The system when it was eventually was delivered was late and over budget.

It is often argued that small projects suffer from the fact that they do not have the same level of support from top management as large, and perhaps more 'visible', projects. Resources, both human and material, can be difficult to acquire. The project manager may only be allocated to the project on a part-time basis! Recognition as well as support from senior management is also found wanting. However, there is some empirical evidence (Saarinen (1990)) which shows that relatively small projects were successful. Large projects, with good planning and a phased implementation, can spread releases over time and also be perceived as being successful.

However, the track record of IS/IT projects, whether they be small, medium or large, has not been good. The importance of the research is, therefore, to determine how the success of IS/IT projects can be improved and this requires us to examine the criteria for success, the factors which influence that success and the tools, techniques and methodologies to deliver success. The project managers exert a considerable influence on the project and the qualities and skills required of a project manager need to be examined also and the methods available to acquire those skills and qualities. The results of the research need to be communicated to project managers in industry in order that IS/IT projects stand a better chance of success in the future.

There has also been much research on the subject of success factors. Much of the work has been on projects which are not directly related to IS/IT. Baker *et al.* (1983) carried out research on 650 completed projects in a variety of industries. Thamhain and Wilemon (1986) carried out further research by collecting data from 400 project leaders in technical undertakings, such as electronics, petrochemical, construction, and pharmaceutical projects. Pinto and Slevin (1988) carried out extensive research on projects by mailing a questionnaire to members of the Project Management Institute (PMI). The projects here were of many different types with the largest being construction. However, the second largest number was 'New or Improved Software Development', showing 14.6% of the total. With all this amount of research, IS/IT projects are still incurring major problems in development, implementation and operation. Is the research wrong? Is the research not relevant to IS/IT projects? Are project managers not heeding the lessons from the research?

Research has been carried out but much of the research that has been completed does not directly draw on IS/IT projects. We need to examine the research, evaluate the results and define the key elements for success. Duncan (1987) says in answer to the question 'Can IT projects learn from the experiences of construction projects?' 'a qualified 'Yes'. We need to see whether that is a well-founded analysis of the position. In the light of the problems that occur to many IS/IT projects, whether they be large, medium or small, research needs to investigate the reasons for this lack of success in implementing IS/IT projects.

1.3 Objectives: hypothesis and questions

(i) Hypothesis

The hypothesis to be proved by this research is that IS/IT projects can be made to be more successful if the criteria for success is decided before the outset of the project along with the appropriate critical success factors to deliver the success criteria. The use of appropriate development and management tools, techniques and methodologies will also aid the success of the project. Additionally, the

personal qualities of the manager and the leadership/management of the team are crucial to the success of the IS/IT project.

(ii) Research Questions

There are 4 major research questions to be answered in the thesis:

1. What can be defined as success criteria for IS/IT projects and what factors are appropriate to deliver the defined success criteria?

   The success criteria must be defined before the research is able to examine the solutions. Definition will enable the research to explain the problems in developing IS/IT projects and to provide solutions to the particular problems raised. The perception of success will vary depending on the type of system being developed and who is providing the system. Having agreed the success criteria, which factors can be used to deliver a successful IS/IT project.

2. What tools, techniques and methodologies are available for the development and the management of IS/IT projects and how can they be used to deliver the success criteria?

   System methodologies that provide some structure to the development process have been developed in recent years. There has also been the development of project management methodologies to provide an approach to the management of IS/IT projects. Many of these methodologies have been developed for large projects but suppliers/designers have provided a version of the methodology for small projects. However, the use of these methodologies, tools and techniques does not appear to have improved the situation.

   Additionally, there has been a large increase in the availability and use of automated tools to support the development and management of IS/IT projects. Tools for microcomputers have become the norm rather than the exception. There

is a need to assess the effectiveness of these tools to support the development and management of IS/IT projects

3. What is the role of the project manager and what qualities/skills should a manager of IS/IT projects possess?

   The research needs to examine models of management qualities and skills, define the role of the project manager and determine the personal qualities and characteristics that a manager needs to possess.

4. How can a manager become a better manager to help towards the success of IS/IT projects?

   We shall see that, although research has shown that a large percentage of the skills learnt by project managers is through experiential learning (Thamhain (1989)), there is scope for alternative methods of learning. Furthermore, would a structured programme, tailored to the needs of individuals, enhance the competence and skills of project managers? Having defined the role, qualities and skills of a project manager, a structure to the development of project managers must be defined.

1.4 Summary of methodology

In order to answer these questions initially an extensive literature survey was carried out to ascertain the research that has been completed and the conclusions/lessons from research and observations on the subject. Of particular interest was the extent of research on the matter both in this country and in America. The data gathering was undertaken in two phases. In the first phase interviews were held and, as a result of the findings in the interviews, a questionnaire was developed and the results analysed. In the second phase models were developed and post-implementation interviews were conducted.

The initial interviews were carried out with practitioners to establish whether the hypothesis was well founded. A number of interviews were held with practitioners prior

to the development of the questionnaire. The outcome of the interviews highlighted three major concerns:

- different participants were focusing on different objectives;
- the increased use of the latest tools, techniques and methodologies had not led to a commensurate success rate;
- project managers do not have the required skills to manage projects effectively.

These concerns and the results of reviewing literature (most research projects looked at the problem from a narrow viewpoint) led to the need to explore these issues further. The questionnaire was developed and distributed to IS/IT practitioners in industry (project managers and systems analysts), users, sponsors and other IS/IT support staff. Respondents were asked for their opinions on specific projects for the success criteria against which the IS/IT projects were measured and the reasons why the IS/IT projects failed (if it was appropriate). Additionally, IS/IT practitioners were asked for details of system development/project management methodologies and automated tools used. Project managers were also asked the most common causes of problems encountered in IS/IT projects and how they themselves could improve in the quest for a successful IS/IT project. The results of the survey were analysed, visually and statistically.

Models were produced, detailing:

- the criteria and associated factors;
- a project life cycle;
- the tools and techniques;
- the development programme for project managers;
- the key elements in the successful management and development of IS/IT projects.

A 'Health Check' was also produced in order to help project managers understand and deal with problems on the project.

More structured and in-depth interviews were carried out on specific projects, examining the views of a number of participants (for example, users, project managers, systems

analysts) on the particular project outcome in order to test out the models. More detailed knowledge could be acquired on the reasons for the success or failure of the project. Additionally, the 'Health Check' was tested on some final year undergraduate projects. Further details of the research methodology are given in Chapter 3.

1.5 Summary of conclusions and recommendations

The previous research had not gone far enough in defining project success (the success criteria) and the implications of certain factors to deliver that success. The shortcomings of previous research are highlighted as follows:

- there is no consensus on the criteria for success, except for three standard criteria - meeting time, meeting budget, and meeting user requirements. Furthermore, there has been little research on how success is judged;

- there is some, but by no means universal, agreement on the factors that contribute to a successful project;

- the previous research results have been derived mainly from the views of project managers, not users and sponsors, in a variety of industries and sectors and not specifically from examining IS/IT projects;

- there has been little attempt to match the factors for success to the success criteria;

- there has been no assessment of the effectiveness, functionality and applicability of tools, techniques and methodologies in the success of projects;

- there has been no evaluation of the relationship between the size of the project and the perceived success;

- there is little agreement on the competences, skills and qualities that a project manager needs to deliver a successful project implementation;

- there has been little attempt to examine project management skills and to define a programme for learning these skills.

The research, therefore, focused on these shortcomings in answering the hypothesis and the research questions identified. Importantly, there was little previous research specifically examining the outcome of IS/IT projects. Were these project disasters representative of IS/IT projects? It was necessary to get the views of all participants in a project. Consequently, project managers, systems analysts, users, sponsors and other IS/IT support staff were canvassed by completing a questionnaire.

There are 3 major outcomes of this research:

- Conclusions about achieving successful projects;
- Development of a project Health Check to help the team identify problems and provide solutions;
- Indicators to further work.

1.5.1 Conclusions

The contribution of this research is to identify that:

- people involved in IS/IT projects need to agree the criteria and apply factors that will deliver the success criteria. There are some key elements which need to be considered when undertaking any IS/IT project;
- the project Health Check will help the project manager choose the appropriate factors and methodologies to deliver successful projects;
- project management and system development are the two main disciplines within an IS/IT project but Configuration Management and the project life cycle provide the links between them;
- support tools must focus on certain facilities in order to provide proper functionality for project managers;

- there must be the development of a complete and comprehensive training programme within organisations, with continual development, for project managers, to meet future challenges.

To this end the conclusions highlight eight key elements which can be summed up as follows:

(i) Define and agree success criteria.

The criteria against which a project can be judged was proposed. Although many of the criteria are subjective, they are definable and measurable. Therefore, initially all participants, at the outset of the project, must define their success criteria, secondly agree the ways in which a project is to be judged and thirdly continue to monitor the criteria. This is fundamental to the success of the project. A list of success criteria is given in Chapter 7.

It was noted that different participants will have different views on how they will judge the outcome of a project. However, only by agreeing the success criteria and appreciating differing aspirations can a project move in a direction which is complementary to all.

(ii) Apply appropriate factors for the criteria

There has been little attempt to define success criteria. Additionally, there is very little agreement on the factors that contribute to successful projects. The success criteria is inevitably going to vary from one person to another and, therefore, certain factors will be appropriate under certain circumstances. Researchers have not matched the factors to the criteria. A mapping of the factors to the criteria is proposed. A matrix showing this mapping is given in Chapter 4.

(iii) Keep projects small and develop programmes of projects

Many IS/IT projects which have failed in recent years have been large and complex. Some have only delivered a system after excessive time and cost, others have been abandoned and delivered nothing. This research advocates the implementation of small (or a programme of) projects. The benefits of this approach would be:

- alterations to criteria and factors would be minimal;
- products can be delivered incrementally;
- changes in specifications would be reduced.

(iv) Apply appropriate tools, techniques and methodologies

Success depends the appropriate use of methodologies, tools and techniques for project management, system development and configuration management. Very often in the past they have been used inappropriately and/or applied badly. IS/IT projects are no more successful now than they were a decade or so ago despite the increased usage of methodologies in recent years.

A project life cycle is proposed (see Chapter 5), giving the basic activities which need to be carried out on all projects. It is believed that it is important to follow a life cycle approach but the particular life cycle will depend on the project itself. However, project managers will need to understand the objectives, agree the success criteria and apply the appropriate factors for the project. There is a need to plan strategically. However, a project strategy is more than merely planning and scheduling. It entails, in addition, defining and agreeing criteria, assessing risks, estimating and selecting and allocating resources. All these have to be considered on any project. Configuration management is the tool which links project management and system development. Greater emphasis needs to be placed on configuration management in a system development environment.

There is strong evidence to show that automated tools can help the project process. Such tools support project managers and system designers in their efforts. However, very often the automated Project Management Information System (PMIS) does not provide the features that project managers require. Some additional features are proposed in chapter 5:

- configuration management;
- additional functionality;
- a recognition of the iterative nature of software development and a move towards ability to plan that certain activities will be repeated;
- the ability to plan, schedule and allocate resources for a programme of projects;
- risk analysis;
- comprehensive reporting and analysis capabilities.

(v) Apply appropriate education, training and development

This and other research have shown that project managers have generally learned their project management skills from experience. The conclusion is that experience of bad management is being replicated consistently on many IS/IT projects. A further implication is that there is not adequate enough training and development for project managers. The lessons of decades of research into why projects fail are not being heeded.

Consequently, there must be commitment on the part of universities and colleges to develop programmes in project management. The careers of project managers must be developed through a structured programme of development. Chapter 6 proposes a plan for progression from undergraduate level to experienced project manager. These skills will not be acquired instantaneously but will be developed over time.

(vi) Promote ownership, commitment and communication

A number of interviewees remarked that the project team had to identify with the project and consequently show commitment towards the project. To foster this commitment and ownership, project managers must recognise the need for communication in the project process. The analysis of the factors which user respondents of the questionnaire identified as problems concluded that the lack of user involvement and general problems in communication were high on the list. This supports previous research results. Project

managers are not heeding the lessons of the research and, consequently, greater emphasis needs to be placed on the acquisition and use of these inter-personal skills.

(vii) Staff the project carefully

In the comparison of different research views on factors influencing project success, there was one area of agreement - the importance of a qualified team (see Table 2-6). Different projects will have different staff needs. However, a clear definition of the project and the tasks involved will indicate to the project manager the people and skills required and enable the project manager to select the project team to achieve success. Although some tasks will inevitably be sub-contracted, the project team has to be made up of the right people, with the right skills at the right time. The conclusion is that project personnel need to be identified early in the project. If personnel are not required at the outset of the project, then the right people need to be recruited to and employed on the project at the right time.

(viii) Review projects

Project managers must learn from their successes as well as their mistakes. Consequently, it will be necessary to have constant monitoring to review the criteria as the project progresses and to review the factors to deliver that criteria. At the end of the project there must be a formal evaluation and post-implementation reviews to measure the success of the project against the stated criteria, to understand the project experiences and to improve the development and management processes. These need also to measure the benefits to really understand the gains (effectiveness, efficiency, competitive advantage) made by the organisation. These evaluation and post-implementation reviews are often neglected as part of the project life cycle.

It is imperative, therefore, that organisations learn from their mistakes and carry out that learning process in a structured way. A review process needs to be part of the project life cycle. This review process should not only occur after the project implementation; it needs to occur during the project in order to identify potential problems and rectify those

problems at an early stage. There needs to be a diagnostic method to achieve this. The Project Health Check (see Appendix G) will enable this process.

1.5.2 Project Health Check

Project reviews are an essential part of the project life cycle. There have been many attempts at providing a diagnostic tool for project managers to assess projects. However, many of these diagnostic tools are retrospective providing technical support for the project manager or addressing the human, behavioural and managerial aspects of successful project management. They only help future projects. There is a great need for providing a model that:

- provides feedback during the project on its current state;
- allows the project team to identify their important (and not so important) success criteria;
- provides feedback to the project manager on project issues and direction;
- gives an assessment of the team's views on the progress of the project;
- identifies the areas where improvements could be made before the project proceeds too far.

The recommendation is that organisations should adopt a model:

- to monitor their projects in the early stages;
- to understand in outline what skills are needed on the project;
- to focus on the problem areas in the project;
- to rectify these problems that may have already occurred on the project;
- to anticipate future problems.

The project 'Health Check' (see Appendix G) enables project managers to do exactly this. It will enable the project manager and the team to identify the successful aspects of the project and also to identify the factors upon which they need to improve. It allows the project manager to evaluate and appraise the project and then identify and

understand the strengths and weaknesses of the project. It addresses the fundamental aspects of the project:

- the success criteria;
- the factors employed;
- the methodologies, tools and techniques used;
- the skills required;
- the project execution.

The project 'Health Check' needs to be completed by all members of the team anonymously at the start of the project. It would be appropriate for the 'Health Check' to be answered again at about one quarter to one third of the way through the project. The important aspect of the 'Health Check' is not the high or low score given but the variations by different members of the project team in the scores given to each question. Projects managers need to investigate these variations and discuss the results with the project team in order to understand the problem areas (if any) and focus on the issues which need attention.

Part 1 is used to identify the important project success criteria and the understanding of the general goals and objectives of the project - the Project Mission. Part 2 examines the factors that are being used by the project to deliver the success criteria. Part 3 assesses whether appropriate tools, techniques and methodologies are available, are being used by the project team and are being applied well. This part also examines the use of computer-based tools on the project and whether they are being used effectively. Part 4 can identify the requirement for additional skills (for organising, planning, controlling the project and developing the system) which need to be acquired by the project manager and other members of the team. Part 5 examines the execution of the project and whether appropriate methods (the project life cycle, project initiation, project risks, project deliverables) are being used.

Project managers need to identify where there are differences of opinion on the project and then try to bring those opinions closer together to ensure that everybody is moving in the same direction.

1.5.3 Further Work

The conclusions and recommendations proposed in this research have been discussed with people in industry who are involved in IS/IT projects. They have expressed the belief that the conclusions and recommendations would help IS/IT projects succeed more often in the future.

Project managers have an important and pivotal role in the success of IS/IT projects. Therefore, project managers need to be informed of the results of the research in order that IS/IT projects can improve their success rate. Greater emphasis must be placed on project managers attending conferences and seminars and learning the results of the research.

The recommendations (see section 7.3) proposed a project 'Health Check' (see Appendix G). At the moment the analysis of the results of the 'Health Check' can only be carried out manually. Project managers need a tool, preferably computer-based, to support the activity. A software tool can be developed to support the input and analysis of these results. The 'Health Check' can be completed by team members anonymously via a computer system and sent electronically to ensure that valuable lessons and indicators are not missed. Further research can focus on the success criteria and the implementation of the factors identified to deliver that success (see Table 4-8) and the outline life cycle (see Figure 5-4). Projects can be selected to test out the conclusions and recommendations. The 'Health Check' will be crucial to this research.

Initiatives providing undergraduate and post-graduate courses in project management need to be encouraged and developed using the model developed in Chapter 6. Further links need to be established between the Association of Project Managers (APM) and British colleges and universities to provide the foundation for future project managers. In addition, a research project to develop a project management development programme should be undertaken. This will focus on the training model proposed in Table 6-4.

Suppliers of computer-based software packages for project management need to address the issues of proper functionality for IS/IT projects. The additional functionality, outlined in Chapter 5, must be implemented.

CHAPTER TWO

Prior Research

Contents

2.1 Introduction

Four questions have been outlined in the previous chapter:

1. What can be defined as success criteria and what are the factors that impact upon the success or failure of IS/IT projects?
2. What tools, techniques and methodologies are available for the development and the management of IS/IT projects and how can they be used to deliver the success criteria?
3. What is the role of the project manager and what qualities/skills should this person possess?
4. How can a manager become a better manager to help the success of IS/IT projects?

Each of these questions will be assessed in turn to examine the prior research and observations that has been completed and to draw conclusions from the literature and previous research. The early work on project management examined the tools and techniques (Gareis (1994)). There were developments in the methodologies and research on the critical success factors. Only recently has there been any real attempt to examine the success criteria. This research will look at defining the success criteria and then the factors which can be employed to deliver that success criteria. It will then examine the tools, techniques available for the development and management of IS/IT projects. Additionally, it will look at the qualities and skills required by a project manager and how they can be developed.

Much of the research and literature addresses project management principles in general. IS/IT projects have many characteristics that are similar to projects in other industries but there are differences:

- projects not in the IS/IT domain are very much driven by task dependencies (using Program Evaluation and Review Technique (PERT) or Critical Path Analysis (CPA)) whereas, although many IS/IT projects follow a life cycle approach, they are more concerned with the allocation and use of resources.

- with the iterative nature of and the use of a prototyping approach in software development, there is often the need to return to previous phases of the life cycle for reasons such as changing requirements. The use of PERT and CPA does not accommodate this approach;

- with inherently changing requirements, even where project objectives are clearly defined, particularly in new product development, accurate estimates of completion dates and costs cannot be made until the project has almost completed the system design stage. Other types of projects do not generally suffer from these changing requirements and estimation difficulties;

- there is a high degree of importance in IS/IT projects on the very subjective features (such as user friendliness, reliability, responsiveness, maintainability);

- there is a more significant difference between the customer's or user's 'wants' and 'needs' on IS/IT projects. The project manager has to strike a compromise between wants and needs.

These differences will be explored in subsequent chapters in order to arrive at a model for implementing successful IS/IT projects.

Looking at the research previously carried out, the first question, examining previous research carried out on success criteria and success factors, will be addressed.

2.2 Success criteria and factors for success

In this section the previous literature on success criteria and success factors is reviewed. The question:

> *'What can be defined as success criteria and what are the factors that enhance the chances of success?'*

will be considered.

2.2.1 Success Criteria

Many authors have suggested time, cost and user specification as success criteria (Rook (1986), Selin (1989), Blaney (1989), Weitz (1989), Redmill (1990), Wallace (1990)). However, there have been other definitions. A successful project, as defined by Powers and Dickson (1973) in their research of MIS projects, met time, cost, user satisfaction (meeting information needs) and the impact on computer operations. Other authors (Might and Fischer (1985), Larson and Gobeli (1989)) have defined success as meeting time, cost and technical performance. Other success criteria discussed are: meeting quality levels, within the scope of corporate culture and values and meeting post-audit analysis (Cleland (1986), Stuckenbruck (1986)).

However, Baker *et al.* (1983) point out that the perceived success is of paramount importance to the eventual success of IS/IT projects. The implication is that if projects do not meet time, budget and user requirements they will be seen as failures but projects can still be successful even if they have not met timescales and budget. Morris and Hough (1987) cite the Thames Barrier project which took twice as long to build and cost four times the original budget, but provided a profit for most contractors. It was considered a success. Furthermore, projects can also be measured in varying degrees of success. Very often success and failure is seen as 'black and white'. However, projects may not always be seen as completely successful or complete failures and different participants may see the outcome of the same project in a different way (DeCotiis and Dyer (1979), Morris and Hough (1987)).

Therefore, are these criteria of time, budget and user requirements the sole criteria? Are people not identifying the correct success criteria from the outset, or concentrating on the wrong critical success factors? There is the need to identify how IS/IT projects are judged to be successful and what factors are important in influencing that success.

A computerised stock control system can be delivered on time, within budget and to user requirements. It can be user friendly and meet all requirements at the outset of the

project (and any changes throughout the project - how ever many there may have been!). However, if it does not reduce the amount of stock held in the warehouse, has it achieved its purpose? The answer must be no and users and/or sponsors will judge the project as a failure. Consequently, what are the criteria for judging the successful implementation of an IS/IT project, and what are the key factors which will influence that success?

There seems to be no conclusion on the success criteria. Cost is a concern, particularly in recessionary times. There are, of course, projects where timescales are important (for example, the implementation of a payroll system at the start of the financial year). Turner (1993a) identifies *on time, within budget and to specification* as the standard mnemonic for judging success. However, as Turner suggests, this measure is primarily a view of the contractor. The criteria needs to take account of all parties in the development process.

Baker *et al.* (1983) gave this definition of success:

> *'If the project meets the technical performance specification and/or mission to be performed, and if there is a high level of satisfaction concerning the project outcome among: key people in the parent organization, key people in the client organization, key people on the project team, and key users or clientele of the project effort, the project is considered an overall success.'*

What is important in this definition is the recognition that all people in the development process need to satisfied at the end of the project, what is termed 'perceived success of a project'. However, meeting the objectives is vital to the success of a project and Baker *et al.* (1983) relegate this to a subsidiary issue alongside the idea of a project meeting its technical performance specification (that is, its functionality). Meeting objectives, functionality and having satisfied participants are important but different projects will have different, and perhaps more extensive, criteria. Although they discuss the issue of time and cost not being included in the definition, the commercial success of a project may be depend on its meeting time and cost constraints. To ignore time and cost is to simplify the definition. Consequently, a more detailed definition is needed.

Morris and Hough (1987), in their study of the performance of a number of major projects, identified four criteria for success:

- the project delivers its functionality;
- the project implemented to budget, on schedule and to technical specification;
- the project is commercially profitable for the contractor;
- in the event of a cancelled project, was the cancellation made on a reasonable basis and terminated efficiently.

They point out that the evaluation of success criteria varies over time and that some judgement on a successful project can only be made at the end of a project (sometimes many years after the project has been implemented if a cost/benefit analysis has been carried out and the project does not show a profit for a number of years after implementation). Other criteria can be assessed throughout the duration of the project.

Turner (1993a) supports this view but identifies a more extensive list for judging success from the standard criteria. His list is:

- it achieves its stated business purpose;
- it provides satisfactory benefit to the owner;
- it satisfies the needs of the owner, user, and stakeholders;
- it meets its prestated objectives to produce the facility;
- the facility is produced to specification, within budget and on time;
- the project satisfies the needs of the project team and supporters.

He notes that many of these criteria are subjective, with only time and cost being objective. Furthermore, they are not mutually exclusive and can be satisfied simultaneously. However, some IS/IT projects are developed by organisations for the open marketplace. These projects should be profitable for all parties concerned. Therefore, a success criteria of 'the project is a profitable or a commercial success' can be added. A project to develop a particular package (for example, an accounting system, a payroll system) may be delivered on time, to specification, to budget, it satisfies the

need of all interested parties but it may not be a commercial success or it may not be profitable and consequently it will be judged as unsuccessful.

Kerzner (1989) accepts that the definition of success (time, cost, performance) is a standard measure of success and that it has pertained since the 1960s. However, he expands this definition of success criteria by acknowledging that the project must be acceptable to the customer/user but adds that the project must be completed:

- with the minimum or mutually agreed upon scope change;
- without disturbing the main flow of work of the organization;
- without changing the corporate culture.

Agreement is an important facet of the success criteria (Keen (1981)) which will be addressed later. Block (1983) went some way to defining success criteria by stating what he believed to be a successful system:

> *'one that is developed on time and within budget; is reliable (bug-free and available when needed), and maintainable (easy and inexpensive to modify); meets its goals and specified requirements; and satisfies the users.'*

The two important areas that Block addressed was, firstly, the necessity to satisfy the needs the users of the project. However, users are not the only interested parties in a project. There are sponsors, the technical participants and other stakeholders (Tuman (1993)). Secondly, he addressed the aspect of the 'quality' of the system - does the project meets quality thresholds and constraints?

Much has been written on the subject of quality which is seen as a very subjective issue (Crosby (1979), Deming (1982), Crosby (1984), Delgado (1992)). The current industry definition of quality is 'Fitness for purpose'. However, it is impossible to give a standard definition of quality. Different people will define quality in different ways. Block identified two definitions of quality - reliability and maintainability. There are many more. A project manager may define quality as 'maintainability', 'capacity for expansion' or 'efficiency'; different users may have different definitions of quality, for example

'usability', 'responsiveness to requests'. Whatever the definitions of quality, all parties must agree on the quality constraints, however hard that may be, and understand each other's views on the definition of quality in order to work towards the production of a quality product. In short, there must be an objective agreement on a topic that is very subjective. As Whitten (1990) states:

> *'Quality is definable, measurable and attainable'.*

Yeates (1991) supports this by suggesting that quality will never improve if some attempt is not made to quantify it. Although his examples are basic, there are quantitative techniques (for example, the number of faults per lines of executable code, the cost of fault correction against the size of the system) which can be used to measure quality. However, Yeates (1991) goes on to say that the process needs to be supported by a consistent and standardised approach. Otherwise, comparisons and measurements will be difficult to make.

Briner *et al.* (1990) classified the criteria has either 'hard' (tangible and quantitative) or 'soft' (intangible and qualitative). Although their list of 'hard' and 'soft' criteria was not exhaustive, they recognised the importance of defining the success criteria for the project. They identified that it is part of a project leader's job:

> *'to tease out such soft criteria in discussion with the client and end-users at the start of the project'.*

What this clearly shows is that very few people (except Turner (1993a), Morris and Hough (1987), Kerzner (1989), Keen (1981), Briner *et al.* (1990) and, to a lesser extent, Block (1983)) in the past have thought seriously about the success criteria. The established criteria have been used to identify whether a project has been a success. If it does not meet time, budget and user specification, it will be judged as a failure. However, there are instances where these three criteria have not been met and projects have still been perceived as successful. Furthermore, there has not been the recognition that the success criteria needs to be defined at the outset of the project.

Having reviewed the limited amount written on success criteria, a list could, therefore, be extended as follows:

- it is profitable for the sponsor/owner and contractors;
- it achieves its business purpose in three ways (strategically, tactically and operationally);
- it meets its defined objectives;
- it meets quality thresholds;
- it is produced to specification, within budget and on time;
- all parties (users, sponsors, the project team) are happy during the project and with the outcome of the project.

Very few authors in the past have considered success criteria and what they might be. Authors have concentrated too much on the critical success factors to achieve time, cost and user specification. Very often different project participants have different perceptions of whether a project was a success or not. In one way this could be beneficial, when reviewing the project, to identify where the project went wrong. However, it is better to have agreement on the final product - was it successful or not? To achieve this, the success criteria must be agreed by all parties.

Therefore, the success criteria must be defined at the outset of the project, although this may be very difficult. The criteria identified undoubtedly will be conflicting between different project participants. There will in many cases inevitably be trade-offs (Meredith and Mantel (1989)) and these trade-offs must be agreed by all parties before the project is started.

IS/IT projects in the past have suffered from a singular inability to specify and agree the success criteria. Furthermore, it is believed that, on IS/IT projects, the methods are well defined, but the goals are not (Turner and Cochrane (1993)). This may have been a problem in the past but it does not have to be a problem in the future. Success criteria are definable and, more importantly, measurable. Furthermore, the success of a project cannot be determined effectively unless the goals and methods to measure success are defined clearly at the outset of the project (Kothari (1986)).

Tuman (1993), in categorising the different parties who have an interest in the project outcome, noted some criteria for success for each of the parties and a technique for identifying and ranking stakeholder influence on the project. The results are plotted on a 'stakeholder success grid'. He advocates that the project team can focus its energy on particular parties who have a major impact on project success. This can be a useful technique in the early stages of a project to, firstly, identify the stakeholders and, secondly, to rank their power and influence on the project. However, there is a grave danger for project managers and project teams to concentrate their efforts on satisfying a 'few' major players and play down the importance of non-management personnel and the effects of the project on their jobs. However, if project managers can identify the stakeholders that have a major impact on success, then efforts and resources can be better focused. The importance of Tuman's ideas is that the success criteria must be established, defined, measured and evaluated.

Projects are unique and the factors that need to be employed will vary from one project to another, depending on the success criteria. Projects can be seen to succeed if they have achieved the success criteria defined. Having discussed the fact that there needs to be agreement on the success criteria, the ultimate test of the success of the project is the perception of users, clients and sponsors and the satisfaction of those key people. It is far better to have a happy user or sponsor, happy with the quality and requirements met, at project implementation but not meet timescales and budgets than to have met timescales and budgets, but left the user or sponsor unhappy about the project. After all, it is the users' system and they have to cope with the long-term effects.

In addition to keeping the users and sponsors happy, project managers need to weld the project team together to maintain its happiness, commitment and motivation. Adair (1984), in discussing leadership, talks about the team as a 'happy family'. He stresses that the team is an important factor in determining success and, therefore, the team should be happy. If sponsors and users are part of this team and they are happy, the project has taken a major step to success. The project manager, a key player in the project, must keep the project team happy during and after the project in striving for success. Projects

do not end when the system becomes operational. As Powers and Dickson (1973) suggest:

> *'Follow-through of the information systems staff is imperative to the successful implementation of the MIS project. The tendency to view the initial cut-over as the end-point of a MIS project, after which information systems personnel are committed to other activities, can render useless all of the efforts that have been exerted on the project. If the manager who receives the products cannot or will not use these products, the entire effort has been wasted.'*

This view is couched rather too strongly but it emphasises the point that a project cannot necessarily be judged a success on implementation. This is equally the case with non-IS/IT projects. When the Channel Tunnel became operational, many people considered it an outright failure (looking at criteria such as cost, time, customer happiness) despite that it was a tremendous engineering feat. By the early 21st century, views may have changed and it may be viewed as a success.

Therefore, each project will need to have a start-up activity to define the success criteria, to identify the project objectives and constraints, to organise the project team and to plan strategically the project (Turner *et al.* (1996)). The importance of, and procedures for, an effective project start-up were described by Fangel (1987). Only when the success criteria has been defined can project managers consider the appropriate factors to deliver that criteria.

Authors have tended to look at criteria and factors in isolation. However, Ashley *et al.* (1987) identified some success criteria and assessed which factors may influence that success. The criteria defined were very much in line with Turner's list but they did not define, as success criteria, that the project must meet its business purpose and prestated objectives. The research was examining construction projects which, as we have seen, are different in a number of ways from IS/IT projects. Furthermore, the data for the research project only comprised of 16 projects. The important point of this research, which is missing from many other research projects, is the attempt to link the factors used in a project to the success criteria. Because of the small subject audience, few

conclusions were drawn. Comparison between the author's own research and the research carried out by Ashley *et al.* (1987) will be drawn in Chapter 4.

The majority of researchers have examined what is perceived to be the critical success factors. The belief is that, if project managers and their teams carry out these factors well, the project will be a success. However, all projects are different and different factors will be appropriate in different circumstances. The research and observations on success factors, particularly on IS/IT projects, need to be analysed. However, other industries, such as construction and engineering, will be assessed in order to see whether IS/IT projects can learn from the experiences.

2.2.2 Critical Success Factors

Many authors have written a great deal, from research and observation, within the IS/IT domain and other industries, on the factors required for implementing successful projects. Four sets of authors in particular have carried out relevant work on these success factors, although not always specifically addressing IS/IT projects, and they are assessed here. I will then analyse the results of research and observations of people looking at projects in other industries and also specifically at IS/IT projects.

a) Pinto and Slevin

The Critical Success Factors put forward by Pinto and Slevin (1988) will be examined as a start point for discussing factors that impact on success. They talk of fourteen critical success factors (ten major and four supplementary), gained from research of over 400 projects (see Table 2-1). The first factor mentioned 'Project Mission' is looking specifically at establishing the objectives and goals of the project:

> *'The initial step of the implementation process is to clarify the goals of the project'.*

They suggest that any new project is an expensive use of organisational resources: time, money, and energy and so the project goals need to be defined and understood by all

parties from the start. Furthermore, the second factor 'Top Management Support' reinforces the setting of the criteria by getting senior management support for the criteria. However, the research is limited by the fact that it addresses the factors for success rather than identifying the criteria that need to be defined to deliver a successful project.

1.	**Project Mission.**	Initial clarity of goals and general direction.
2.	**Top Management Support.**	Willingness of top management to provide the necessary resources and authority or power for project success.
3.	**Project schedule/plans.**	Detailed specification of the individual action steps required for project implementation.
4.	**Client Consultation.**	Communication and consultation with, and active listening to, all affected parties.
5.	**Personnel.**	Recruitment, selection, and training of the necessary personnel for the project team.
6.	**Technical Tasks.**	Availability of the required technology and expertise to accomplish the specific technical action steps.
7.	**Client Acceptance.**	The act of 'selling' the final project to its intended users.
8.	**Monitoring and Feedback.**	Timely provision of comprehensive control information at each stage in the implementation process.
9.	**Communication.**	Provision of an appropriate network and necessary data to all key actors in the project implementation.
10.	**Trouble Shooting.**	Ability to handle unexpected crises and deviations from plan.
11.	**Characteristics of project leader.**	Competence of the project leader (administratively, interpersonally, and technically) and the amount of authority available to perform his/her duties.
12.	**Power and politics.**	The degree of political activity within the organisation and perception of the project as furthering an organisation member's self interests.
13.	**Environmental events.**	The likelihood of external organisational or environmental factors impacting on the operations of the project team, either positively or negatively.
14.	**Urgency.**	The perception of the importance of the project or the need to implement the project as soon as possible

Table 2-1 - Critical Success Factors (Pinto and Slevin)

If we look at the proposed extensions to the criteria identified earlier, we can see that some of the factors, identified by Pinto and Slevin, can be used to deliver specific success criteria. Their factors 4 and 9 - Consultation and Communication - and 5 - Personnel - can be employed to satisfy the last criteria, namely all parties should be happy during the project and at the outcome of the project. The careful recruitment and selection of the key members of the project team (ensuring that the project team will work together effectively) by the project management will set the tone for the project.

Project schedule/plans (Factor 3) and Monitoring and feedback (Factor 8) in their list can be employed to deliver the time and budget constraints on the project and, consequently, the profitability of the project for the sponsor - the longer and project takes to complete and the more resources that are employed on the project, the less profit the project will make in the short term and the realisation of the benefits will be delayed. Additionally, the Project Mission - identifying the objectives and direction of the project - can be used to deliver the project's 'stated business objective'. However, the other success factors, although seen as important, do not contribute in any substantial way to the delivery of the success criteria outlined.

Pinto and Slevin have developed these 'Critical Success Factors' without expressly defining the criteria which are required to be met. This is a weakness in the research. Different factors are appropriate on different projects. What they do identify (Pinto and Slevin (1988)) is that the critical stage of the project life cycle is the 'Conceptualisation' stage (Adams and Barndt (1983)).

However, they suggest that there are two factors which have the greatest impact on the project over the life cycle - Project Mission and Client Consultation. Although the application of success factors does vary as the project progresses, they do not address certain fundamental issue - identifying and agreeing the success criteria.

b) Baker, Murphy and Fisher

Baker *et al.* (1983) on the other hand concerned themselves with the perceived success of projects and particularly on the factors that affected that perceived success. Table 2-2 shows the factors that they discovered were related to these perceptions. They noted that the presence of these factors tended to improve perceived success, while their absence contributed to project failure.

As has been noted, Baker *et al.* (1983) qualify success of a project in terms of perceptions by participants in the project. What is important in their list is that the project must have clearly established goals and criteria. Those goals will vary from one

project to another, costs and time being of paramount importance on one project, but happy users being important on another. Furthermore, they analysed:

> *'the key factors which appear to be the most important for achieving high levels of perceived success'*

To this end they identified a number of general strategies for directing projects:

- appropriate organisational structure;
- definition of success criteria;
- definition of project goals;
- sufficient project manager authority;
- participative decision-making and problem solving;
- technical, human and administrative skills of the project manager;
- goal commitment.

1.	Goal commitment of project team
2.	Accurate initial cost estimates
3.	Adequate project team capability
4.	Adequate funding to completion
5.	Adequate planning and control techniques
6.	Minimal start-up difficulties
7.	Task (vs. social) orientation
8.	Absence of bureaucracy
9.	On-site project manager
10.	Clearly established success criteria

Table 2-2 - Success Factors (Baker *et al.*)

These strategies stress the crucial role which the manager plays in the project and that project success is within the control of the project manager. Their results suggest that the project manager needs three skill categories (technical, human and administrative) but, most importantly, the project manager needed to be a competent technician. Perhaps in the late 1970s technical skills were perceived to be important, particularly on major engineering projects. However, managers of IS/IT projects in the 1990s rather require the organisational, inter-personal and communication skills.

Their analysis identified that co-ordination and human relations (such as project team spirit, project manager's human skills, good rapport) were the strongest factors that

determined project success. This contradicts their other assertion that the technical competence of the project manager is of paramount importance. In fact, so often technical experts have been placed into managerial roles with disastrous consequences for the project and organisations. The overall conclusion indicates that these communication and co-ordination factors are most important when attempting to satisfy the needs of all parties. As Baker *et al.* (1983) conclude:

> *'In the long run, what really matters is whether the parties associated with, and affected by, a project are satisfied'*

c) Philips survey

An in-house survey carried out at Philips in the late 1970s, documented by Geddes (1990), shows that 'Clearly Defined Objectives' was the single most important key to success perceived by respondents. Conversely 'Poorly Defined Objectives' was identified as the most perceived cause of failure. Tables 2-3 and 2-4 show the results of the survey.

	Factor	Frequency of mention (%)
1.	Clearly Defined objectives	96
2.	High User Involvement	80
3.	Executive quality of project manager	73
4.	Well-defined project management structure	69
5.	High user commitment	69
6.	Quality of project team	57
7.	Choice of project	57
8.	Planning and control methods in project	57
9.	Limited objectives	30
10.	Well-defined responsibilities	26
11.	Good estimating methods	23
12.	Technical quality of project manager	7

Table 2-3 - Keys to success (Philips)

The in-house survey examined 150 IS/IT projects. Some of the results of this survey are in line with the results from Pinto and Slevin and Baker *et al.* As Geddes points out:

> *'Successful projects stem from a clear project definition and common understanding of success criteria'.*

The criteria need to be defined along with the overall objectives of the project. However, Geddes, despite his recognition that definition and understanding of the success criteria is paramount to project success, does not discuss the details of success criteria and propose his own analysis of what constitutes success criteria.

Factor	Frequency of mention (%)
1. Poorly defined objectives	50
2. User not involved	46
3. Poor planning and control methods	46
4. User not committed	42
5. Changes in requirements	42
6. Political problems in user organisations	42
7. Project Manager a poor executive	34
8. Ill-defined responsibilities	34
9. Bad estimating methods	34
10. Poor Project Management structure	34
11. Too ambitious	23
12. Project Manager a poor technician	19
13. Poor quality project team	15
14. Software failure	7

Table 2-4 - Causes of failure (Philips)

Other factors (such as user involvement, project planning, management structure, team quality) play, he says, a significant role in the achievement of the success criteria. The Philips survey is the only one that puts great emphasis on the involvement of the users in the development process. However, it is interesting to note that 'Top Management Support' is absent from the Philips survey. Yet Geddes (1990) suggests that:

'Projects must be actively sponsored at senior level'.

Perhaps in the late 1970s visible support for a project at a senior level was not seen as important, particularly if senior management did not understand IS/IT and the benefits that IS/IT could bring the organisation at all management levels. However, with the recognition of the importance of developing an IS/IT strategy in line with the business plan and the emergence of organisations appointing IT Directors at senior levels, it is not surprising that this is seen now as a major influence to success.

The Philips survey highlights the importance of user involvement in, and user commitment to, the project. This is again much in line with the evidence from other

research. What is further reinforced here and in the research by Pinto and Slevin (1988) is the relatively unimportant factor of the 'technical quality of the project manager'. Pinto and Slevin (1988) only highlight the technical competence of the project manager as one of the supplementary factors. The technical aspects of project management are increasingly being seen as a minor issue (see Table 2-10). This contradicts the assertion by Baker *et al.* (1983).

d) Morris and Hough

Morris and Hough (1987) reviewed about 350 different documents concerning the ability of management to influence project success. Initially a list of over 80 factors were defined. The list highlights the complexity in the management of projects and the issues which research believes to be important in influencing project success. They then developed:

> *'22 hypotheses concerning factors which might affect the chances of project success'*

The hypotheses are given in Table 2-5.

They then applied the hypotheses to 8 major projects, only one being a computer project - the computerization of PAYE (COP). They found that all of the areas had some influence on the eventual outcome of projects but the areas where the COP project were seen as particularly successful were:

- top management support;
- effective leadership;
- clearly defined and extensively researched feasibility;
- complete design before implementation;
- project planning and control systems;
- fall-back strategies;
- effective owner administration of contracts;
- strong management of contractors.

If we look at the factors for success, they identified that certain factors were of particular importance in the COP project and these factors led to its success. These factors are highlighted (by an asterisk (*)) in Table 2-5. One major conclusion which they made was that:

'the case studies provide clear evidence of the importance of objectives'.

Project Definition		**Schedule makers**	
1. Project viability evaluation	*	12. Schedule length and review points	*
2. Unclear objectives	*	13. Urgency	
3. Changes to specification	*		
		Managerial/organisational factors	
Technical factors		14. Inadequate planning	*
4. Technical uncertainty	*	15. Legal/contractual matters	*
5. Coordination of project interfaces	*	16. Organisation structure	*
6. Design management difficulties	*	17. Absence of effective controls	*
		18. Leadership	*
Finance /commercial		19. Human relations and teamwork	*
7. Amount of finance required		20. Labour relations	
8. Public/private sector funding mix		21. Communications	*
9. Financial risk		22. Error, incompetence, incapability	
Environmental, social, political			
10. Geophysical challenges			
11. External factors			

Table 2-5 - Factors affecting project success (Morris and Hough)

Their conclusions are wide-ranging, examining the importance of commitment, definition, planning, controlling, communication and leadership as preconditions for project success. They developed a model to illustrate these preconditions. This model focused on the following areas:

- a positive attitude and commitment to success;
- a full and workable definition of the project;
- management of external forces;
- an assessment of the schedule, finance and implementation (organisation, communication, controls and staffing) matters;
- effective human resource management.

Moreover, there are two aspects which are of particular importance in their work:

- they identified that the importance of these factors will vary from project to project;
- despite the fact that their list of success criteria (the measures of project success) is limited, they looked at the success factors in relation to the defined criteria.

This last aspect has rarely been addressed before or since (Ashley *et al.* (1987). It is an important notion which is further developed in Chapter 4.

The review of this research has identified a number of interesting points but what is noticeable is that there is little agreement on the factors that influence the success or failure of projects. Comparisons of the research will be drawn.

e) comparison of research

Exact comparison of these four sets of research is difficult. However, of the ten factors mentioned by all sets of research four by Pinto and Slevin and three by Baker *et al.* equate to three in the results of the Philips survey and three in the results from Morris and Hough (see Table 2-6). We can see from the results that there is only a small level of agreement, and quite a large area of disagreement, on the factors that influence project success. Agreement is as follows:

- Project Objectives;
- Planning and Control;
- Personnel and Team Building.

However, disagreement appear much wider in scope and can be summed thus:

- Communication and User Involvement;
- Senior Management Support;
- Estimating;
- Quality of Project Manager.

The agreement comes mainly in the more strategic aspects of projects - the activities completed before the execution of the development work. It clearly shows the importance of understanding the goals, objectives and direction of the project in order that it can provide a benefit for the organisation or the client. It also emphasises the importance of planning and control in the project development. However, there is no differentiation between strategic and detailed planning. The agreement also emphasises the need for good staffing of the project and team building.

Pinto and Slevin	**Baker *et al.***	**Philips**	**Morris and Hough**
Project mission	Goal commitment of project team	Clearly defined objectives	Clear objectives
Project schedule and plans Monitoring and Feedback	Adequate planning & control techniques	Planning & control methods	Planning & Control
Personnel	Adequate project team capability	Quality of the team	Team competence

Table 2-6 - Comparison of Critical Success Factors

(i) Project Objectives

The achievement of a particular objective (or set of objectives) and the delivery of business benefits are the main reasons for undertaking IS/IT projects. The organisation will want benefits (in the long-term as well as the short-term) accruing from the implementation of the project. Therefore, the mission must be clearly defined so that everybody knows where they are going. It is of utmost importance that the goals are communicated to the project team and the team agree to them in order that they can see how it will help the organisation and commit themselves to the project.

(ii) Planning and Control

Kerzner (1987) details comments made by practitioners about project management excellence and highlights three major problems:

- poor planning upfront;
- if planning is done, it is not being tracked;

- replanning is not done until it is too late.

He emphasises that the common identifiable element on the most successful projects was the quality and depth of early planning. Planning is important but too much can be as bad as too little. It is the right amount of planning at the right time that is important. Too often authors do not differentiate between high-level and detailed planning (Slevin and Pinto (1986), Jackman (1989), Luber (1991), Bentley (1992)). They advocate planning in detail from the outset of the project. Plans do need to be developed at the outset but completion times and costs cannot be fully defined until the end of system design (Brooks (1991)). Planning is an important factor in project success. People plan, sometimes subconsciously, most of their everyday activities (for example, shopping, driving, cooking a meal). By planning in advance and adapting plans as new information becomes available, the project is likely to be a success. The chances of forgetting to buy some grocery, getting caught in a major traffic holdup or omitting a vital ingredient to a meal are sharply increased without prior planning.

However, it is the strategic planning, the quality and depth of early planning, of projects that is a common identifiable element on successful projects (Kerzner (1987)). This appears to be a particular problem when managers of IS/IT projects produce detailed plans for the project using network diagrams and Gantt charts when what is needed is a strategic plan, showing major milestones and deliverables (Andersen (1996)). Coupled with this is the definition of the criteria for success at the very outset of the project. Authors do not generally draw the distinction between strategic and tactical planning and it is this strategic planning that is important to concentrate on and get right at the initial stages of the project.

(iii) Personnel and Team Building

This comparison highlights also that the personnel and team building activities (the selection and training of personnel) for the project is seen as important in delivering success. Slevin and Pinto (1986) talk about the importance of establishing the project team. The increasing use of project teams in industry tends to indicate that

there are significant benefits to be realised. There has been some work (Magal *et al.* (1988)) on critical success factors of using project teams for an Information Centre. Other work (Might and Fischer (1985) and Ein-Dor and Segev (1982)) have addressed organisational aspects. Further work (Kaiser and Bostrum (1981) and White and Leifer (1986)) has examined the characteristics of project teams and Lambert (1991) looked at the wider issue of the supporting infrastructure. The comparisons made in Table 2-6 point to the importance of the selection, capability and quality of the team in achieving project success.

However, there has been little empirical evidence that the use of project teams does in fact contribute to successful projects (Ford and McLaughlin (1992a)). In the same way that managers need to address the start-up issues of the project as the first step towards success, so too managers must focus on building the right project team. The team-building must take place early in the project and must be monitored throughout the project, new members being added to the team as and when required. There must be the right people on the project at the right time. When problems are encountered, the team, with *esprit de corps* and by working together, can provide solutions to these problems. It has been suggested that the use of project teams can slow down decisions (Ford and McLaughlin (1992b)) but it is the quality of the decision that is important, not the speed of coming to a decision.

There must be clear lines of authority (people know to whom they report) and clear definition of roles (people know who is responsible for which task) within the project. The team members must perceive themselves as a group, working to achieve the project objectives. To that end the team must be relatively small (Peters and Waterman (1982)). With large teams there is the great danger of the project manager losing control. He/she can only control so many people. There have attempts at specifying the ideal group size (Kliem and Ludin (1992)), Graham (1989)). Whatever the number of people within the team, the project manager needs to keep control and eliminate the barriers to good communication. This leads us to the conclusion that projects should be of a shorter duration with smaller project teams (Peltu (1994)).

It is important for the project team to work together in order to fulfil professional needs (Thamhain (1993)). Furthermore, it is the role of project managers or leaders to provide an atmosphere that is conducive to teamwork. This involves good leadership and communication, further reinforcing the views from IS/IT practitioners that communication and personnel issues are extremely important in striving for project success. The conclusions from the previous research regarding project teams are limited because, again, researchers have examined the use of project teams in isolation rather than address their use in relation to delivering the success criteria.

However, the comparison is notable for its inconsistencies rather than the areas of agreement. Some authors do not recognise the importance of communication and user involvement in the success of projects. Slevin and Pinto (1986) suggest that communication is a key factor. We have seen evidence in the Philips survey (see Tables 2-3 and 2-4) of the perceived importance of user involvement in project success. Yet Baker *et al.* (1983) have no mention of communication as a key factor. Others areas of disagreement are in senior management support, estimating and the skills of the project manager.

(iv) Communication and User Involvement

Other authors in the 1970s have examined and put forward proposals on the effectiveness of user involvement in projects to produce successful systems (Powers and Dickson (1973), Swanson (1974), Gibson (1977), Robey and Farrow (1979)). Lucas (1975) concluded that the reason for so many IS/IT project not delivering the expected benefits was the concentration on the technology and not on the users and their participation in system development. However, it has been noted that individual user differences play their part in systems success (Zmud (1979)). Other researchers and practitioners have identified that user involvement is the key to success (Vanlommel and DeBrabander (1975), Edstrom (1977)). Others still have suggested that successful projects in practice are managed directly

by users (Edwards *et al.* (1991)). Ives and Olsen (1984) summed up some claims of advocates for user involvement that:

> *'user involvement is a necessary condition for successful development of computer-based information systems'.*

They felt that this concept was not substantiated by sufficient data to make these claims and few conclusions could be made about the relationship between user involvement and system success. Tait and Vessey (1988) support this view by suggesting that increased user involvement in system development does not necessarily enhance the chances of system success. Although valid statements, they did not address the area of what constitutes a successful project - the success criteria - and the impact of user involvement on success.

Work by Spinas *et al.* (1988) has related the user involvement specifically to the stages in the development life cycle. The clear indication here, despite the limited evidence of only three companies, is that user involvement will, if started early enough in the project life cycle, lead to a system which users will certainly accept, with which they will be happy and will lead to job satisfaction (Locke and Schweiger (1979)). Users will be as happy with the development process as the eventual product (Winkler (1990)). Consequently, user involvement will be essential if users are to be happy with the project. Furthermore, there must be constant communication, consultation, involvement and participation throughout the development process and this is particularly important at the definition of the project objectives (Ginzberg (1981a)).

Conclusions that these authors expound are that user participation and involvement in the development process are vital. This would appear to be a sensible approach. It needs to be implemented at the very outset of the project with the definition of the success criteria. Very often the authors believe that it is established too late, if at all.

(v) Senior Management Support

Another notable omission from agreement is the issue of senior management support for the project. This is support in the positive sense (for example, senior management confidence in the project manager, acknowledgement of the necessity of the project) rather than the insistence of unrealistic delivery dates and budgets. As Slevin and Pinto (1986) state:

> *'Early in a new project's life, no single factor is as predictive of its success as the support of top management'*

Often in the past senior management have simply appointed the wrong person to manage the project. All too often, project managers are placed into the role because of their technical ability, with no account taken of the managerial and organisational complexity and the skills and competences required to successfully carry out the role. Companies promote technicians into managerial roles when they do not have the necessary managerial/leadership skills because it is seen as advancement within the company. The quality of the project manager is important. The Philips survey (Geddes (1990)) highlighted the quality of the project manager as the third most important key to success but Pinto and Slevin (1988) relegate this to one of the supplementary factors. Baker *et al.* (1983) only talk of an on-site manager. Project managers are crucial to the success of projects. They need to not only have the skills and competences to carry out the role, but also know when to use them. Therefore, the right training and development environment needs to be in place. This will be discussed later.

(vi) Estimating

Although planning and scheduling are perceived as crucial factors, another area where there is little agreement from the research is estimating. There is a great body of literature on estimating software projects but estimating itself is not the

focus of this research and will, therefore, not be discussed in any great detail. However, poor estimating is often the result of one or more of these reasons:

- the importance that senior and middle management place in many cases on the delivery of products quickly and cheaply;

- the emphasis on the part of project management to focus on time and budget constraints to the exclusion of other success criteria;

- the consequent focus on detailed planning to specify target dates at the very outset of the project.

It is this underestimating or, as Grottola (1989) points out, 'political estimating' - what the boss (client) wants to hear! - is seen as a factor that causes project failure. It is a significant area that causes projects not to meet costs and time constraints (Simpson (1992)). Such underestimating will not help the success rate of projects. Furthermore, there is a need to estimate and plan tasks at the appropriate time. There is no necessity to estimate the programming phase at the outset of the project when the user requirements are either not known or unclear. However, there is often the desire to produce a comprehensive plan for the project and pressure is applied to show costs and timescales for completion. Instead of being guidelines for users and senior management, these dates and budgets are seen as definitive. Consequently, this situation encourages the emphasis on the part of project managers and IS/IT staff on achieving these timescales and budgets at the expense of other, and perhaps more important, success criteria.

(vii) Quality of the Project Manager

Although the Philips survey (see Table 2-3) identifies the quality of the project manager as an important key to success, Slevin and Pinto (1986) relegate this to one of the supplementary factors and Baker *et al.* (1983) only mention the importance of having an on-site manager. The project manager plays an integral

part in any project and must display administrative in addition to leadership skills. The project management qualities and skills will be discussed later (see 2.4).

Pinto and Slevin (1988) recognise that all the factors, strategic and tactical, are essential for project implementation. However, they identify that the strategic issues are more important at the beginning of the project, during the Proposal and Initiation (or Conceptualisation) phases whereas the tactical issues are of importance during the Analysis and Design phases of the life cycle. The results of research by them show that 'Project Mission' is the most significant factor contributing to success. Table 2-6 supports their theory that the project itself has to be initiated well to enhance the chances of success and that strategic factors are most important. Yet, there is the assertion that project managers only 'may be involved' in the initiation and requirements analysis phases of the project life cycle (Edwards *et al.* (1991)). If this happens, it is clearly one major step towards failure. Project management starts at the outset (with the definition of the success criteria, the objectives and strategic planning). Project managers, with the integral role they play, must be involved from the very start when the project is initiated through to the implementation, handover and review.

What have the other research and surveys concluded on success factors? Are there other factors which other researchers agree are important? Pinto and Slevin (1987) examined and listed five different research attempts to define critical success factors. One of the research articles was by Baker *et al.*, the others being Sayles and Chandler (1971), Martin (1976), Cleland and King (1983) and Lock (1984). They compared the factors and highlighted nine factors which were raised by two or more of the research examples. Highlighting only two represents only agreement among 40% of the researchers. A more detailed examination on the factors has to be carried out in order to draw any conclusions. If we look at these five researchers and highlight the factors which were mentioned by at least four of the five (80%) we can show only four factors which are perceived as crucial to success:

- *planning and scheduling:* planning and scheduling the project at an early stage of the process;
- *control and feedback:* programs to monitor progress and review project status;

- *communication:* communication between project manager and the project team and clients/users/sponsors, ensuring that all participants are consulted and informed of project status.
- *top management support:* top management support for the project conveyed to all participants.

The factor conspicuously absent from this list is the 'Definition of Clear objectives' and the establishment of clear criteria for success.

Beale and Freeman (1991) completed a review of 29 papers giving authors' views of factors contributing to project success. Their results bear close resemblance to the factors compared in Table 2-6 but further emphasise the lack of agreement when examining factors for successful projects.

However, agreement indicates that there are some core factors which are common to all projects. As seen from the results of the previous research, every project needs a series of plans. The plans detail what is to be done, how it is to be done, when it is to be done and who is to do it. The plans should incorporate the goals, the approach or methodology, a statement of constraints, identification of activities, inputs and outputs and milestones, specification and allocation of resources, and the setting of schedules and procedures of controlling and monitoring. Above all the objectives and goals and the plans in general need to be realistic.

The indication is that project managers are focusing on the wrong factors and/or doing them badly in their quest for project success. Furthermore, project managers are not learning from their mistakes. What happens when the project starts to go wrong and either the system is never implemented or during operation major problems arise? What can be done to learn from these projects? Little can be done about the current project but much can be learned for the benefit of future projects. With a record of estimates and plans of previous developments, many problems can be addressed and overcome. Therefore, project reviews are a valuable source of information for the future. IS/IT projects are investments and, as such, they must provide some return on the investment. Some are critical to future operations, others improve management and performance.

What ever the nature of the IS/IT project, it will need to provide benefits and those benefits need to be measured to assess the success of a project. Therefore, in addition to the review, an analysis of the benefits that a project delivers must be carried out.

We have seen many instances of project failures in Chapter 1. How many of these have been reviewed and how many have learned from the experience? There have been a number of authors who have stressed the importance of learning from past projects (Kharbanda and Stallworthy (1983), Abdel-Hamid and Madnick (1990), Pitman (1991)). Abdel-Hamid and Madnick (1990) point out:

> *'In general, without an effective postmortem diagnostic exercise to identify problems and their causes, managers cannot adequately scrutinize project deficiencies, and may repeat errors on future projects. The payoff from an effective postmortem is a smarter organization that truly learns from its failures'.*

The author's experience indicates that many organisations do not review formally their projects and do not create a 'data bank' (Olsen (1992)) of project experiences - estimates, tasks, methodologies, tools, contingencies, resources - in order that future projects may learn from those experiences. To reinforce this view, Abdel-Hamid and Madnick (1990) continue:

> *'So why don't we learn from project failures? First, we rarely try. People tend to hide mistakes rather than report or evaluate them. Second - and this is often missed - the important lessons are almost never readily apparent; they need to be extracted from deep within the project experience.'*

Hubbard (1990) further emphasises the importance of carrying out project reviews as a part of the project by suggesting that mistakes will be replicated because past lessons are not being heeded. The project management and system development process will not substantially improve because the same methodologies, techniques and tools are still being used even though they were unsuccessful. Subsequent projects are undertaken in the same way even if the previous ones fail. The team must question the process and try to improve it.

Very often, it is only high-profile projects which have an in-depth review or inquiry. All projects need to have a review process that is part of an overall project life cycle. There have been a number of attempts at devising a set of questions in order to assess the success of projects and user satisfaction (Bailey and Pearson (1983), Ives, Olsen and Baroudi (1983), Slevin and Pinto (1986), O'Connell (1993)). These attempts, although fairly crude, highlight the importance of reviewing projects and learning from the project experiences.

On projects which have spanned a long time, there will be problems in team members remembering all the issues if there is only a post-implementation review. People's memories will be selective. What is important is not simply carrying out a project review after implementation but undertaking periodic reviews during the project in order to detect deviations from the plans and objectives (Cleland and King (1983), Turner *et al.* (1996), Remenyi and Sherwood-Smith (1996)). Slevin and Pinto (1986) devised the Project Implementation Profile (PIP) and point to case study examples to prove that the PIP is effective in assessing project performance during as well as after the project. By doing reviews during the project, managers will be able to be proactive in assessing and dealing with particular problems. Many failed projects could have been turned into successes if reviews had been held early in the project before matters became out of hand.

However, a review cannot really determine the success or failure of a project. Any project must provide a benefit (increased operational effectiveness, increased revenue, better management information, competitive advantage, assistance in managing operations, increased market share) for the owner or sponsor. Therefore, the benefits and the criteria must be measured to assess the success of a project.

All too often, IS/IT projects are implemented without any assessment of their effectiveness and the benefits which they produce. The assessment is not part of the overall system life cycle and there is little or no effort put into this activity. If an assessment is undertaken, it is carried out without any real conviction. Remenyi *et al.* (1993) state that some 90% of organisations perform no systematic evaluation. Can a

project really be perceived as a success if this activity is not undertaken with proper resources and the outcome of the project analysed? Much stems from the lack of any agreement on success criteria (how is the project to be measured?) at the outset of the project and a lack of understanding of the benefits required from the project. In many cases, the original benefits were not specified adequately. Therefore, any assessment cannot judge the project objectively.

Evaluation of the project benefits is not an easy exercise to complete. IS/IT projects very often have much importance placed on subjective features and therefore produce intangible benefits, on which it is difficult to place a monetary figure to demonstrate profitability. However, this evaluation must be completed, particularly after the implementation, to assess the success of the project. Furthermore, there are many ways in which benefits can be measured and the method used will be different from project to project. Edwards *et al.* (1991) suggest the techniques which are best suited to the different classification of project. Whatever technique is used, the evaluation must be carried out in order to assess the effectiveness of the project. A useful guide to the different methods is given by Remenyi *et al.*. (1993). Again, this evaluation can provide valuable data in order that organisations can learn from the experience. They can adapt their system development or managerial processes to get a better return next time or not make this type of investment again.

Furthermore, there must be the commitment for the evaluation from the all levels of the organisation, starting with the senior management. The project should be part of the overall strategy of the organisation and, as such, should impact on the organisation's business performance. The project will often involve a huge investment, in terms of time and money. Therefore, it should be in the interests of senior management to assess the benefits of the investment.

There was a wide cross-section of projects represented in Pinto and Slevin's research. Only some of the projects identified by Baker *et al.* in their research were IS/IT-related. Morris and Hough analysed the available literature but little of their research was also IS/IT-related. However, the research, carried out by Philips, addressed IS/IT projects specifically. Additionally, Pinto and Slevin surveyed only project managers in industry

not users of the finished product. Further examination of research and experience is necessary in order to give a comparison and to assess the perceived factors that could influence the success of projects.

Firstly, the dominant (most frequently mentioned) success factors that are the results of empirical research and observations for projects in all industry-types were examined. Secondly, the results of empirical research on IS/IT related projects and thirdly the results of observations by members of the IS/IT industry were examined.

If we look at the literature, research and observations describing success factors, the ten factors, for projects in different industry-types, most commonly mentioned (in descending frequency of mention) as contributing to successful projects are shown in Table 2-7.

1.	Project scheduling and planning
2.	Monitoring and feedback
3.	Communication and consultation
4.	Top management support
5.	Skills of the project leader
6.	Personnel in the project team
7.	Project goals and objectives
8.	Estimating
9.	Use of tools for planning and control
10.	Technical tasks

Table 2-7 - Success Factors (different industries)

Although planning is the most frequently mentioned factor, the authors do not differentiate between different types of planning (strategic and tactical). This is a weakness of the research. They do not identify that too much planning can be as bad as too little planning. Both are likely to lead to major problems. It is the right amount and type of planning, phased over the project life cycle, that can significantly contribute to the success of IS/IT projects. Of the three strategic factors that Pinto and Slevin put forward, it is interesting to note that project scheduling and planning appears as the most important success factor. The 'definition of project goals and objectives' does not come particularly high in the list. Furthermore, only six of Pinto and Slevin's ten critical success factors and only one of their supplementary four (Characteristics of the project leader) appear in this list. What we see from Table 2-7 is that some factors (namely, communication and consultation, top management support, and skills of the project

leader) are perceived as more important than having a competent project team and setting the project goals (see Table 2-6). This reinforces the view that there is little consensus on the success factors.

If we look at only empirical research specifically related to IS/IT projects (Lyytinen (1988), Thamhain and Wilemon (1986)), Table 2-8 shows the eight most often mentioned success factors. The most noticeable difference is that these researchers identify that the most important factor is setting the project goals and objectives - the Project Mission. They also identify that the personnel in the project team is of particular importance in achieving success. Researchers into IS/IT projects (in agreement with Pinto and Slevin (1988)) recognise the importance of the strategic aspects of the project and that the early planning needs to concentrate on the project mission, the goals and the success criteria. Ginzberg (1981b) supports this view but emphasises the importance of commitment - both from management and also to change. Having agreed the project mission and produced strategic plans, then the manager can produce more detailed plans for the project as information becomes available. In short, projects and project managers need to know where they are going before they can define and plan the factors that will enable them to get there.

1.	Project goals and objectives
2.	Personnel in the project team
3.	Project scheduling and planning
4.	Monitoring and feedback
5.	Communication and consultation
6.	Skills of the project leader
7.	Use of a methodology
8.	Estimating

Table 2-8 - Success Factors (Empirical research - IS/IT projects)

Researchers, on the other hand, do not perceive that Top Management Support is particularly important in the success of IS/IT projects. This supports the evidence highlighted earlier in relation to the Philips survey, which looked specifically at IS/IT projects, but contradicts evidence from Morris and Hough (1987) regarding the COP project. Again, this further emphasises the lack of any consensus on the critical success factors. Perhaps one reason why IS/IT projects have continually failed to deliver the objectives expected of them is that there is a lack of awareness and understanding on the

part of senior management in organisations of IS/IT. Greater support for IS/IT projects could perhaps increase the chances of success.

If we examine these results with the comparisons of the research shown in Table 2-6 we can seen that the first four factors match exactly. Comparisons of the four authors indicated that there was agreement on the importance of quality of the team and personnel on the project. This fact is emphasised here where the Personnel aspects are seen as particularly important to project success and particularly the lack of resources increases the likelihood of project failure (Ein-Dor and Segev (1978), Tait and Vessey (1988)).

Research has examined the reasons for overruns and delays in software development (van Genuchten (1991)). His conclusion was that over-optimistic planning was a probable cause of their delays. He identified that, during the study, many project activities started too late because of an overrun in a previous activity. He cited three other studies (Jenkins *et al.* (1984), Phan *et al.* (1988) and Thamhain and Wilemon (1986)). Jenkins *et al.* (1984) carried out a survey of 72 information system development projects, studying the way in which systems are developed. Phan *et al.* (1988) conducted a survey of Management Information System (MIS) managers addressing a question of how successful were projects. Thamhain and Wilemon (1986) investigated the practices of project managers regarding project control. None of the research surveys mentioned examined the criteria for success. The object of their research was to examine the reasons for cost and time overruns in IS/IT projects. Identifying reasons for overruns and detailing the factors to be employed to achieve projects on time and within budget is to oversimplify the matter. There are other, and far more important, criteria for success and, therefore, examining and defining the criteria is the area of particular importance to project managers and project teams.

However, much of the research thus far has focused on the opinions of project managers. It has not taken the views of the interested parties (sponsors and users) in IS/IT projects. The research and observations are limited by the narrow subject audience in the same way as the research completed by Pinto and Slevin and others. In later chapters we will see that there are significant differences between the factors that users,

project managers, systems analysts and sponsors believe are important to project success.

Although the results point to understanding and defining the project mission and objectives, thereby defining the success criteria, there is no discussion of the success criteria. This is a major limitation in the previous research. There is a need to define the criteria and then to choose the appropriate factors to deliver that success criteria.

Authors who have observed IS/IT projects at first hand have taken this one step further and have discussed and proposed factors for success. Some authors have claimed communication issues are of paramount importance (Laird (1992), Kay (1992)); others have proposed the human aspects (Kerr (1989), and Alexander (1990)); others have advocated a socio-technical approach (Bostrom and Heinen (1977)); others still have proposed a number of steps that project managers and teams need to take to deliver successful systems (Koenig (1989), Dulude (1987), Tsui *et al.* (1992)). The observations, however, take a slightly different emphasis. Table 2-9 shows the eight most often mentioned success factors.

Members of industry, in examining IS/IT project successes and failures, agree that monitoring, planning and communication are of the paramount importance. There are three important points to note here:

1. 'Monitoring and feedback' is mentioned most times, ahead of planning and scheduling;
2. 'Project goals and objectives' are not seen as particularly important in IS/IT projects;
3. 'Top Management Support' is seen as an influence on project success.

1. Monitoring and feedback
2. Project scheduling and planning
3. Communication and consultation
4. Personnel in the project team
5. Top Management support
6. Estimating
7. Skills of the project leader
8. Use of a methodology

Table 2-9 - Success Factors (Observations by industry - IS/IT projects)

It appears as no real surprise that IS/IT projects continue to fail when the people responsible for implementing the projects do not recognise the need to define the goals and objectives at the outset of the project, consider the success criteria and plan the project strategically. Gilb (1988) recognised the need for clearly defined goals:

> *'Projects without clear goals will not achieve their goals clearly. (You can't hit the bullseye if you don't know where the target is!)'*

On the contrary, they are concerned with planning, scheduling and controlling in order to achieve time and budget constraints. The importance of planning has been discussed; communication - talking and listening - appears from the data of equal importance. This is particularly true if the project manager does not have authority (Might and Fischer (1985)), because of a matrix organisation structure, over the members of the team when attempting to resolve conflict and solve problems. The way to motivate team members is through communication. Furthermore, there needs to be good communication between system developers and users (De Brabander and Edstrom (1977)) and such communication and client consultation is a particularly important factor throughout the project life cycle.

2.2.3 Summary

There has not much been written on success criteria and authors are not agreed on the factors that influence success. The most frequently mentioned success criteria by most authors are meeting timescales, meeting budget and achieving user requirements. The author does not believe that this goes far enough. Extension to this list by Morris and Hough (1987) and Turner (1993a) go some way to identifying a complete list. However, there are further extensions that can be made. A fundamental point made is the perception of success and the recognition that a computer system may be delivered late and over budget but still be considered a success, if it meets the requirements and objectives such that the user is satisfied on implementation. The users have to live with the system over a long time; the systems analysts and programmers move on to a new

project and a new challenge at project implementation. This view is further confirmed in the surveys and interviews reported in subsequent chapters.

The problems from the results of the surveys, research and comments can be defined thus:

- there is not the emphasis on the objectives of the project and the definition of the success criteria;
- there is the lack of distinction between strategic (at the outset of the project) and tactical (detailed throughout the project) planning;
- user involvement is often neglected on many projects;
- projects are often very large and complex;
- projects do not undergo periodic reviews during their lives, an evaluation and review after implementation and an assessment of the realised benefits;
- projects often suffer from bad communication and team-building .

The common threads throughout the research and experience show that planning and scheduling are seen to be the most important factor in the success of IS/IT projects. Perhaps the fixation by project managers and system developers on meeting time and budget constraints by planning and scheduling is causing projects to not meet expectations. These plans and schedules are detailed tactical plans and not strategic plans which identify objectives, goals and criteria. Project managers must concentrate on other factors (for example, communication, involvement of users) in the quest for successful IS/IT projects. As we have seen, the communication and inter-personal aspects (between users, sponsors, IS/IT professionals and managers) throughout the life cycle of the project are seen as important aspects to enhance the chances of project success. User involvement in the development process and the effectiveness of the support of senior management are also of particular importance. Pinto and Slevin's research

demonstrates that many factors are important. However, the target audience for much research has been managers of projects and IS/IT practitioners. It has been their perception of project success and the factors that influence that success. Research has not looked at the perceptions of users and sponsors. Their perceptions and feelings will, in many cases, be different from project managers. Pinto and Slevin and other research do not go far enough in analysing the views of all those involved in the development of a product (be it software or hardware). The conclusions of the research, although valid, are limited by this.

The research outlined in subsequent chapters takes this one step further by evaluating the perceptions of the different role players in IS/IT projects. There is the need, therefore, to look at the users and sponsors of IS/IT projects and their perception of success or failure. The research here will address this important point. There is a need to assess the users' views on the success factors and reasons for the failure of IS/IT projects and then to choose appropriate factors to deliver the success criteria. The views of other members of the project team need to be assessed. A project review is an important step in this process.

With the view from researchers and members of the IT industry that planning and scheduling is the most important factor influencing the success of IS/IT projects, the tools and techniques for planning and scheduling need to be examined in closer detail in order to assess their value and contribution to the system development process. The methodologies available for project management and software development need also to be examined. With this evaluation we will be able to assess the impact of the methodologies, tools and techniques on project success and how they can be used in the future to deliver successful IS/IT projects.

2.3 Tools, techniques and methodologies

IS/IT projects have very often in the past been developed in a piecemeal fashion in response to departmental needs and objectives. As has been noted before, there have been many authors who have written on the subject of success factors and advocating processes to achieve project success (Slevin and Pinto (1986), Baker *et al.* (1983),

Sayles and Chandler (1971)). Incorporated in some of these factors is the implication that the use of tools, techniques and methodologies can achieve successful projects. The system development process, the various life cycle approaches, the management of projects and the support tools will be assessed in order to see their impact on the success of IS/IT projects.

Despite the recent emphasis on methodologies in the development and management of projects, there has been little attempt to define what is a meant by the term 'methodology'. It is defined as 'a coherent set of methods used in carrying some complex activity' (Oxford Science Publications (1986)). This identifies that a methodology has some structure but methodologies can be appropriate when addressing non-complex activities. Alternatively it is a 'system of methods and principles used in a particular discipline' (Collins (1994)). However, the definition does not distinguish between different disciplines and it does not address the fundamental issue of 'providing a solution'. The author believes that the meaning differs when discussing project management and systems analysis. A project management methodology is 'a structured and coordinated approach to managing a project and delivering a product'. It is really indicating 'what needs to be done' - planning, controlling, organising. On the other hand, a systems analysis methodology is 'a structured set of tools and techniques for the development of a system or product'. It is indicating 'how it needs to be done' - Data Flow Modelling, Normalisation, Entity/Event Modelling. Implicit in both of these definitions is the idea that the methodologies are employed to deliver solutions to meet organisational needs.

The area of tools, techniques and methodologies falls into three broad categories for IS/IT projects:

- system development and the life cycle;
- project and configuration management;
- PMIS and system support tools.

Each will be addressed in turn.

2.3.1 System Development and the Life Cycle

Techniques and tools for managing and developing IS/IT projects have been available for many years. Many companies have as a matter of course adopted a life cycle approach or model and every project will follow this same life cycle. Very often it is a very simplistic life cycle where the development follows a number of distinct phases:

- Requirements Analysis;
- Specification;
- Design;
- Implementation;
- Operation;
- Retirement.

One limitation of this stagewise model is that each stage has to be completed before the next one starts. Network diagrams follow similar principles where there is task dependency. Very often, in the IS/IT project environment, tasks and stages may overlap. Another limitation is that this model does not allow for any feedback. System development is often an iterative process and there is no mechanism for returning to early stages of the model and correcting errors which are detected in subsequent stages of the life cycle.

Some of the limitations of the stage-wise model were overcome by the Waterfall Model. By identifying that feedback is necessary (the Waterfall Model allows for this), there is a recognition of the fact of the iterative nature of IS/IT projects. However, these early models appear to rather too rigid for many IS/IT projects since such projects rarely follow a distinct step by step approach.

Further developments on the life cycle approach have been made. Boehm (1988) developed the Spiral Model which overcomes many of the earlier problems. The cycle will follow a repeated number of steps:

- determine objectives, alternatives and constraints;
- evaluate alternatives, identify and resolve risks;
- develop and verify next-level product;
- plan the next stage.

It allows for a return to a previous stage if necessary as other, more appropriate, alternatives are assessed. It also incorporates prototyping as a feature of the model in order to allow customers or users to see the product, albeit in a prototype form, well before implementation, where further requirements could be identified. Prototyping is addressed in more detail below. More recently, there has been the development of the V-model of the systems life cycle (Edwards *et al.* (1991)). It is useful, like many life cycle models, for understanding the system development process and for carrying out initial planning. From each main phase, a deliverable is produced. This is then used as input to the next phase. However, what distinguishes this model from others is the horizontal links between the analysis and specification phases and the subsequent testing and implementation activities. For example, the output from the initiation of the project will be the benefits and performance review criteria. These will then be used in the implementation and operation phase. The Requirements Analysis phase will produce acceptance test plans which will be used in the User Acceptance Testing phase.

However, there is little agreement on the most appropriate life cycle model. In fact, there is a view that there is no need for a life cycle approach. Gladden (1982) stated:

> *'I am of the opinion that the concept of a 'software life-cycle' is no longer helpful, indeed may be harmful to our software development profession'.*

He details a model where initially high-level system objectives are set in order that systems do not evolve into one:

> *'that the user does not want or need'.*

He then encourages prototyping as a next step before a completed system is delivered. This appears to be another life cycle approach where he places the emphasis in two areas:

- define the system objectives;
- employ prototyping by creating 'mock-ups'.

Alongside the models of the project life cycle, there has been in the past decade or so the evolution and growth of system analysis and design methodologies which purport to aid the development of IS/IT projects. Methodologies for the management of IS/IT projects have also been developed. In addition to this there has been a flood of automated tools to support the development and management process. Despite this increase in methodologies and automated tools, there does appear to be any substantial improvement in the success of IS/IT projects. As Walsh and Kanter (1988) point out:

> *'Despite new project management techniques and application methodologies, we still seem to be "blowing them (projects)".*

Although organisations are developing corporate strategic plans, many projects are still developed to solve particular departmental problems and meet individual requirements. What is needed is a definition of the organisational requirements (in terms of data and information) as identified by a strategic plan. In this case, the project is undertaken to meet specific strategic objectives. Expected benefits will be specified at the outset of the project and can be reviewed at the implementation by those people who defined the plan and the objectives. Information Engineering (IE) has been developed to address these issues (Finkelstein (1990)). Furthermore, IE is supported by comprehensive Computer-Aided Software Engineering (CASE) tools (such as Information Engineering Facility (IEF)). IE requires the establishment of a project team, comprised of business rather than technical people, thereby encouraging the business users and managers to develop solutions to meet the business objectives. However, there needs to be considerable investment on the part of organisations in the methodology, workshops, and the CASE tools to make effective use of IE and, therefore, it will only be of interest to large organisations.

Whatever approach to IS/IT development is taken, the software life cycle should not be abandoned and companies return to a simple build and fix approach where systems are coded and tested without any formal definition or specification of requirements. This will inevitably lead to a system which does not meet user requirements and is of poor quality. Neither should there be a move towards a standard systems life cycle (Gordon *et al.* (1987)) for all projects. The important issue for project managers is to assess the different life cycle approaches and employ the appropriate approach for the project. The decision will depend on the the size, the complexity and the technical nature of the project. Furthermore, organisations must be wary of the time and cost required to commit to one particular methodology and the associated support tools. The life cycle should be one element of the overall environment in system development (Corbin (1991)).

Furthermore, not only should organisations employ a life cycle approach as a basis for systems development, but they should also continually seek to improve the system development process, and with that the products of their IS/IT projects. Only by examining, evaluating, reviewing and changing the process can organisations improve the quality and effectiveness of the information systems and the process to deliver those systems. By improving the process organisations will be able to deliver effective and high quality systems in a shorter time and at less cost. A useful model to guide organisations through the improvement process is the Model of Software Maturity (Humphrey (1990)). This specifies five levels of maturity from the Initial level (where organisations have little or no formalised procedures and few integrated tools which leads to severe problems of implementation and maintenance) to the Optimizing level (where organizations have the foundation for continuing improvement). Although this means setting up a number of task groups to manage and improve the quality of the product and the process and introducing methods and technologies, organisations must go through these maturity levels as it offers a real path to improvement. The track record of IS/IT projects is poor and as Humphrey (1990) suggests:

'There is an urgent need for better and more effective software organizations. To meet this need, software managers and professionals must establish the goal of moving to the Optimizing Process'.

Part of the improvement process is the introduction of tools, techniques and methodologies. The question:

'What tools, techniques and methodologies are available for the development of IS/IT systems and can the application of these tools, techniques and methodologies help towards a successful project?'

needs to be addressed to see what the literature says about these issues.

Tools, techniques and methodologies are increasingly being used by organisations in their pursuit of IS/IT project success but there has not been a clear improvement in the number of project successes. We have seen evidence of major disasters in the public and private sector already in recent years. Perhaps it is the disasters that are highlighted whereas the successful projects are implemented largely unnoticed. The current views on the tools, techniques and methodologies will be assessed and then this research will examine their effectiveness in delivering successful IS/IT systems.

However, what type of approach would be appropriate for IS/IT projects? For many authors the answer is a prototyping approach as opposed to a traditional life cycle or a 'mixed methodology' approach for small or medium-sized projects (Bally *et al.* (1977), Gladden (1982), Dos Santos (1988), Weinberg (1991)). Some authors (Harrison (1985), Stroka and Rader (1986), Willis *et al.* (1988)) have identified some significant advantages of a prototyping approach over traditional methods. Dos Santos (1988) identifies a framework for choosing a development methodology, examining various factors (for example, size of project, impact of application, user requirement definition) affecting the choice of methodology. For small- to medium-sized projects the preferred approach is either a traditional linear one (where requirements are well structured and defined) or prototyping (where requirements are initially vague). El Louadi *et al.* (1991) argues that a mixed methodology approach is appropriate in all but projects with low

complexity and low uncertainty. Furthermore, prototyping appears to have an increasingly important part to play in systems development. As Klinger (1988) says:

> *'most consumers (users) are very poor at describing exactly what it is they want or need but are very good at telling you whether they like or dislike the product you deliver to them.'*

However, to constrain the project team with a certain type of development approach depending on the size or complexity of the project is to take one step towards failure. As has been noted before, each project, in terms of size, complexity, technical nature and functionality, is different; the users of the system are different; the criteria of each project are likely to be different. Consequently, the type of development approach will be different. Burns and Dennis (1985) believe that there is a case for employing all types of development approach under the right circumstances. This is further supported by Humphrey (1990) when he suggests that the development life cycle must be attuned to the needs of the organization and will vary according to the nature of the project. The project manager and the project team must evaluate the project and apply the appropriate methodologies and techniques to achieve success. Furthermore, standard methodologies need to be adapted as the circumstances arise to serve the needs of the project (Downs *et al.* (1992)). A different methodology or approach needs to be adopted as the situation changes. As De Marco (1982) says:

> *'I find myself more and more exasperated with the great inflexible sets of rules that many companies pour into concrete and sanctify as methodologies . . . Use the prevailing methodology only as a starting point for tailoring'.*

That is not argue for there to be no standards within an organisation. It is important for organisations to have a standard approach and for projects to basically follow that standard approach for the long-term benefit of the project and the organisation. Many organisations have adopted a standard and benefited greatly from the implementation of a methodology. Texaco, the oil company, use a corporate-wide development and management methodology (Vowler (1992)) which is seen as appropriate for large-scale and smaller projects:

'that would have been swamped by a massive methodology'.

However, where the user requirements (but not the project objectives) are vague, where there is a need to ensure that the user clarifies the requirements and where there is an expectation of change, a prototype approach would be appropriate. As Burns and Dennis (1985) point out:

'Prototyping . . . helps to match performance of the evolving system to user expectations, thus increasing satisfaction'

Furthermore, user satisfaction is an important criteria for perceived success. If prototyping can be used to increase user satisfaction, it would be a positive benefit to the overall potential for success of the project (Er (1987)).

Having suggested that the system development approach needs to be decided for each individual project, undoubtedly a prototyping approach will be best suited to small- to medium-sized IS/IT projects with low complexity. However, a major critical success factor, identified by Pinto and Slevin and others, was 'Planning and Scheduling'. Can a prototyping approach with an unspecified number of iterations and prototypes be planned successfully?

Hilal and Soltan (1992) conducted an experiment involving two groups of students, one told not to prototype, the other forced to implement as many prototypes as possible. Their conclusions pointed to the fact that the non-prototyping approach was more amenable to better planning. However, they did not assert that planning was impossible for a prototyping approach. The advantage of a traditional linear life cycle is that there is a defined framework - analysis, design, construction, implementation - for any project. Prototyping is iterative and, as has been noted, can be difficult to plan (when the number of iterations is unknown). However, the importance of planning should not be underestimated. Furthermore, Owen (1989) suggests that:

'the prototyping approach has a number of advantages including 'Simpler project management'.

He argues that many tasks associated with managing a software project are eliminated completely, thereby contributing to a more manageable project. There appears to be little evidence to support this notion. However, he also argues that the prototyping approach will lead to improved user satisfaction and hence happy users. As Owen (1989) goes on to say:

'the result should be a system with functions that users need and want'

There does appear to be evidence to support this and functionality is very often a major criteria for success. With system development methodologies project managers and other IS/IT practitioners have found that the framework somewhat restricting. Users, it appears, are wanting to accelerate the move towards prototyping and bypass much of the early steps of the methodology. The latest version introduces prototyping as part of the methodology - an aspect which has been missing from earlier versions (Eva (1992), Ashworth and Slater (1993), CCTA (1993)). One wonders why it took so long to get to version 4 when this was suggested in 1984!

Advocates of prototyping believe that it leads to a shortened development cycle (thereby having an earlier implementation) and lower development costs increasing the chances of meeting success criteria like timescales and budget. Whether it does this or not is difficult to quantify. However, it should result, as Owen (1989) suggests, in increased user/developer communication - one of the major factors considered in project success.

In summary, research has indicated that a prototyping approach is best suited to smaller projects where the requirements are not defined well and where the system is not particularly complex. The traditional linear approach is particularly appropriate for small projects where the requirements are specified clearly and unambiguously. As has been seen, a prototyping approach, as part of a system development methodology, can lead to many of the success criteria being met. If done well, it should certainly ensure users are happy at the end of the project. However, different projects will employ different life

cycles and methodologies. Prototyping is only one of a number of factors which will influence the success of projects. Furthermore, with the increased availability of tools to support the management and development of IS/IT projects, there is a need to examine these tools for project and configuration management.

2.3.2 Project and Configuration Management

There have been many authors who have described the various techniques in planning and scheduling projects (Cleland and King (1983) and Kerzner (1989)). Jackman (1989) presents a summary of techniques used currently in project management. He defines the five basic techniques as Gantt charts, Work Breakdown Structure (WBS), Critical Path Method (CPM), PERT and PERT/COST. This is rather a limited list. Turner (1993a) gives a greater and more comprehensive list identifying others (such as Product Breakdown Structure (PBS), Configuration Management, Organisation Breakdown, Quality Management, Cost control cube, Risk Management) to manage the scope, organisation, time, cost, quality and risk.

We see from Jackman (1989) that he advocates in-depth (not strategic) planning after the initial identification of project scope and objectives. This is clearly a misguided approach. Many authors place the emphasis on detailed planning and not on the strategic planning of the project at the initial stages. There appears to be a lack of appreciation of the particular role planning has in projects. Furthermore, personal experience has shown that project managers concentrate on the detailed plans and tools in an attempt to identify and then meet time and budget constraints. Is it a wonder that projects fail? Previous research quite rightly has identified planning as a very important factor in project success but has not distinguished between high-level (strategic) planning and detailed (tactical/operational) planning and the importance of each on the project. It is the strategic plans that need to be defined first; detailed plans are only produced when more information becomes available. This is particularly important on IS/IT projects when the course of action is not known until the user signs off the interim deliverable.

As has been seen from research and observations on the critical success factors and reasons for failure, the lack of proper planning and scheduling is shown as the major

factor. However, are planning techniques appropriate for IS/IT projects? On any project the use of techniques such as those summarised by Jackman (1989) would be of use. Project managers need to define the tasks to achieve an effective solution and to coordinate the resources and the activities of the project team. The use of project management tools can help this process. However, it is important to state that project managers should not sacrifice the end product of achieving success with the need for producing exhaustive and complex plans.

Furthermore, these tools assume that projects can be broken down easily into a series of tasks, some to be performed in parallel, some to be performed in sequence. IS/IT projects do not always fit neatly into that notion. Network charts do not take account of the need for project teams to carry out iterative processes during systems development. Therefore, the conclusion is that the use of many traditional project management tools will not guarantee successful IS/IT projects. Far from it; in some cases the use of these tools may hinder the management process if too much emphasis is placed on the tools without focusing on the project objectives and the criteria for success.

The particular approach advocated by a number of authors (Schilling (1989), Lavold (1983), Tripp and Wahi (1980)) is the use of WBS which is a hierarchical representation of the project, broken down into successive levels of detail. It is developed by functional decomposition until a work task is identified. Cori (1989) advocates the preparation of a Work Plan incorporating a WBS when the project is broken down into tasks. Important facets, they say, of planning are to break down the project into tasks of manageable size and to identify milestones. However, to carry out no planning is a great risk in its own right. As Cori (1989) says:

> *'managing a project without a work plan is a risky venture indeed'.*

This is an important observation but it is the development of the appropriate work plan at the appropriate time that is important. There is no point in planning distant future activities. There could be many changes to requirements and objectives before these activities are reached. Furthermore, if requirements do change and these activities are not carried out, much of the planning would be wasted.

An important point for all project managers when developing a plan is the communication of the plan to the project team. There can be no doubt that planning is a fundamental activity that must be carried out before development of any system can be commenced. However, it may not be the major factor in delivering a successful project. This depends on the criteria set at the outset of the project and the criteria need to be defined at the outset of the project. Cori (1989) states:

> *'Each project is unique; therefore the approach to work planning should be tailored to the requirements of the project'.*

Methodologies for project management are increasingly being used as guidelines for organising, planning, scheduling and controlling projects, both large and small. As Bentley (1991) points out:

> *'PRINCE provides a flexible framework for the project; a set of structures and techniques'.*

Time, budget, functionality and quality are quoted as success criteria by Bentley. He advocates that PRINCE:

> *'provides checks at key moments to ensure the four targets are being achieved.'*

This is a bold assertion. With much practical experience of managing projects, there must be some evidence for the assertion. It should help but it won't 'ensure'. The use of a project management methodology provides guidelines on what to do and is merely one factor among many in delivering a successful project. Furthermore, it is a factor which is relatively low on the list of important factors in many peoples' minds. As we have seen, criteria (other than time, budget, functionality and quality) may be of greater importance on many projects. Although the use of a project management methodology, highlighted by researchers and practitioners earlier as a factor for success, would help the project, it would not ensure success because it defines what needs to be done rather than how to

do it. The project manager may choose the wrong tools or implement the right tools badly.

Project planning needs to be phased as the project progresses and as the requirements change. The users need to be involved in the planning process and the definition of the products that are to be delivered. The question that has not been asked by researchers is:

> *'How do you identify the products and manage the changes to the products as the project progresses?'*

Change management is a fundamental activity on any IS/IT project. There are different ways in which the change process can be managed. Project managers could freeze the requirements. If this happens, would everybody be happy? If the requirements are firm but flawed at the outset of the project, subsequent changes tend to be more expensive and time-consuming. Alternatively, project managers could allow the requirements to evolve throughout the project. However, should projects be aiming at a moving target? It is an inevitable situation on IS/IT projects that requirements and specifications change. Requirements tend to develop gradually over time. Control is needed in order that the right product - the one that is needed - is delivered. Requirements must be allowed to be refined as the project progresses but to be fixed, and base lines established, at appropriate points in the life cycle. Managers need to employ configuration management as a way of controlling any changes, coordinating the different project products and ensuring that problems do not arise (Babich (1986)). It is one area that researchers generally have not really addressed (NCC (1990)). As Cooper (1989) points out:

> *'Configuration management is a topic in software development . . . that at best is misunderstood, and at worst overlooked completely.'*

Planning projects has largely addressed the area of scheduling resources and fitting the tasks into the timescales allocated rather than examining the deliverables and the components that make up the products. Very often the result is that projects deliver the project manager's or systems analysts' views of what was required rather than the users' view. Concentration by project managers on the configuration, the constituent parts, of

the deliverable should at least deliver a product which meets user requirements. Changes are inevitable and those changes need to made and controlled in an effective and timely manner. Project managers and project teams need to focus much more on the configuration management aspects of IS/IT projects than they have done so in the past. It is a topic that requires commitment from all levels of the organisation. The importance and role of configuration management will be addressed in subsequent chapters.

In addition to the increased use of methodologies over the past decade or so, there has been increased availability of software products to support the development and management process. We will look at the effectiveness of software support tools in delivering successful projects.

2.3.3 PMIS and system support tools

The software itself has historically been designed to handle large/multiple projects - typically using critical path methods (Ward (1989) and Dworatschek (1989)). The software products have further evolved to address project management functions of planning, scheduling, organising, monitoring, controlling and communication. Wysong-Luke and Schmaltz (1989) believe that the mechanisation of project management tasks can significantly improve project management efficiency, accuracy and credibility. However, it does not appear that the use of automated support tools has reduced the overall time spent by project managers on the administration of projects. Project managers have simply transferred the time they spend on planning and scheduling to computer usage.

As Wall (1988) points out, when discussing microcomputer applications for project management, that

> *'micros can be very seductive, and in fact addictive, which can lead to more time than is necessary being spent with the machine rather than on the specific requirements of the project (for example meeting people, talking over problems)* .
>
> .

Using a computer does not replace the planning, scheduling or controlling functions of network planning techniques, nor does it replace the management decision-making process'

This emphasis on the administrative aspects of project management again confirms the observation that project managers spend too much time addressing the criteria of meeting time and budget constraints by planning, scheduling and using planning tools instead of communication and consultation. As a report from the Association of Project Managers (1984) states:

'Computer-based information systems cannot run projects'.

The use of the software tools must be used to complement the project management process, not to replace it. Software tools can only assist the decision-making process, they cannot make the decisions. The project plans, prepared at the appropriate level at the appropriate time, in addition need to be communicated to the project team in order that it can understand the project and where the project is going. Furthermore, the software tool must be compatible with the requirements of the project manager. All too often the tools appear to be inflexible and do not assist in managing the project - they were written by programmers, not project managers (Peltu (1994)).

Organisations will perhaps need to develop their own system (Sathi *et al.* (1986)) in order to provide the necessary functionality. This is particularly so if organisations use smaller and, perhaps, less crucial IS/IT projects as a training vehicle or new project managers. A PMIS will accelerate the education of new and inexperienced project managers As Hosley (1987) further suggests:

'Experience has always been a major factor in project management. . . Experience has not only been difficult to pass along to newcomers, but, attempts have been unreliable and expensive'

Experience has been passed on by project managers but these new managers inherit the bad habits, in addition to the good. Project managers need to make use of whatever tools

are available and can gain some level of experience initially in applying these tools on small to medium-sized projects. This is not to say that small projects are unimportant to an organisation. New project managers need to gain experience on projects that are less crucial to the overall effectiveness of the organisations.

Each project needs to be assessed on its merits and complexity. The tools and techniques used need to be adapted to the needs of the project. It is important to have standards of techniques (in project management and system development) in order that everybody is aware of what is happening. But these standards should not be 'set in stone'. Every project is different and different scenarios require different actions.

It is often believed that planning and development will be improved (that is, be more accurate and take less time) and that an end date can be defined at a very early stage and with more certainty by using of software tools. However, project managers need to be wary. As Wall (1988) points out:

> *'managers should be encouraged to focus their attention on the project and its aims rather than on the computer system'.*

This may seem stating the obvious but as Wall (1988) goes on to say:

> *'A planning package is a tool which when used properly can be a great aid and can help to some extent in achieving project success; but it can also be a temptation to rely too much on technology and not enough on management skills'*

The use of project management software is very prevalent in many organisations. Wall (1988) identifies that 93% of organisations said that they were using project management software. There seems, as Wall suggests, to be a strong temptation to concentrate on the software tool and use the techniques that the software provides even though they may not be appropriate within the IS/IT project domain. There has been little research in this area but discussions with project managers indicate that this reliance on software is a contributory factor to project failure in many organisations.

Assuming that planning and scheduling, in the opinion of many authors, are important factors in project success (evidence in Table 2-7 supports this notion), then support tools can aid the management (that is, the planning and scheduling process), even on small and non-complex projects. However, Cash and Fox (1992) contradict this view by pointing out that computer-based project management systems are popular for large projects but for small projects the use of one may not be cost effective. A manual reporting system, they suggest, can often be used just as effectively. This assertion may have some foundation but, whether a computer-based system or a manual system is used, the important point is that a control and reporting system must be in place in order to enhance the chances of a successful project outcome.

Furthermore, the planning process is an important aspect and must be carried out whatever tool or technique (or combination of tools and techniques) are used. A computer-based project management tool can provide valuable support to the planning process and there are many advocates of using computer tools to support the project management process. However, these tools are based around traditional networking techniques and, as we have seen, IS/IT projects are not always driven by task dependencies. Consequently, computer-based tools can only provide a limited amount of support unless the tools themselves provide extra functionality (see Chapter 5). The use of system development and project management software can help to speed up the development process (Dudman (1993)) but project managers and system developers need to be wary of relying too much on these tools.

With the increasing use of these tools, techniques and methodologies IS/IT projects still do not deliver the benefits expected of them. Tools, techniques and methodologies can help, and provide limited support to (within the confines of the functionality), projects, but they cannot guarantee success. Many authors have highlighted training as a prerequisite for the effective use of project management tools, techniques, methodologies and software (Vacca (1991), Weitz (1989), Radding (1990)). This lack of proper and organised training, not only in the software tools available but also in the techniques and methodologies, is seen as a major stumbling block to successful projects.

We have seen (see Tables 2-8 and 2-9) that some authors and observers identified that the 'Use of a Methodology' was a factor in influencing the success of projects (Weitz (1989)). Furthermore, one of the main claims made by advocates of a structured systems analysis and design methodology is that it will aid planning and the project management process. However, a system development methodology cannot be used in isolation. The methodology needs to complement the project management method and be used in conjunction with CASE tools and a computer-based PMIS in order that the quality, efficiency and effectiveness of the project team and the project tasks can be improved. System development and project management are interlinked and IS/IT projects will not succeed without effective use of both disciplines, supported by appropriate automated tools. A number of US companies have implemented an integrated system of project management and system development methodologies with an automated tool (Weitz (1989)). Certainly this is the way forward for organisations if they are to use a methodology as a means of delivering projects. However, it must be noted that these methodologies must be used as part of the overall package to deliver the success criteria. On many projects, particularly if they are small projects with little complexity, it will be appropriate to tailor the methodology to the needs of the project.

The conclusions, therefore, are:

- the use of automated tools need to complement the development and management process, not replace it; they are not being used to the best effect;
- project managers are tending to focus on the technical aspects and the technology to achieve timescales and budgets, and not on the project itself and the project aims;
- planning must be carried out but it is the right amount of planning at the right time which is important;
- the use of tools must be linked to the success factors and thereby to the success criteria.

An assessment of the tools, techniques and methodologies is important. However, research has demonstrated that the people aspects - human factors - are becoming increasingly important in the delivery of successful projects. Therefore, there is the need

to examine the role of the project manager in the IS/IT development process, look at the qualities that a project manager needs and how these qualities and skills can be applied to deliver the success criteria and successful IS/IT projects.

2.4 The role and qualities of a project manager

We saw in the discussion of success factors that leadership and communication are important for successful project management. The use of tools, techniques and methodologies is not enough; the project manager must be effective in leading the team with the appropriate style. This section addresses the question:

> *What skills and qualities must a project manager have and how will the possession of these skills and qualities affect the success of the project?*

to see what the literature says about the qualities and skills required by project managers and to relate them to the appropriate criteria and factors.

The classic management functions, as defined by Fayol (1949), are shown as:

- planning;
- controlling;
- organising;
- staffing;
- directing.

Alternatively, others have identified areas of project management expertise (Thamhain (1989)) thus:

- administrative skills;
- inter-personal skills;
- technical skills.

However, there has been no assessment of the relative importance of each of these areas. Are inter-personal skills more important than administrative skills? Will sufficient technical skills give the project manager credibility amongst the technical members of the team? What are the really important skills that a project manager needs to be successful?

If we can define the areas that a project manager needs to address in managing a project, then the skills can be developed to satisfy that need. Some authors have gone some way to identifying the relative importance of project management skills. Robertson and Secor (1986) identified that:

> *'An effective management process involves planning, organizing, monitoring and controlling the project. It includes estimating product and project size, and - most importantly - dealing with people'*

Graham (1989) reiterates this view but project management is more than planning, controlling, organising and people management. The project manager/leader is in effect the head of a 'temporary company' (Kharbanda and Stallworthy (1990)). He/she is involved in setting up the project, supervising it through to completion and responsible for all functions outlined by Fayol (1949) but more than that the project manager/leader needs to be people-orientated. Kharbanda & Stallworthy (1990) quote a manager in Bechtel, a construction company:

> *'You have to be a good listener and respect the thoughts and ideas of the project team members. Then you have to be able to evaluate this input and provide appropriate direction. You have to be able to recognise capability in individuals and give them every opportunity to use their initiative. . . . Technical training is essential, but I don't think you can be highly technical or theoretical and be a good project manager on that basis.'*

They go on to point out that words and phrases such as 'learning', 'initiative', 'experience', 'being a good listener', 'teamwork', 'cooperation' recur constantly. Consultation and cooperation play a major role in successful project management. The project manager/leader must be able to cultivate these areas. There are many other examples of

authors identifying project management skills and giving a detailed description of these skills and attributes (Kerzner (1989), Turner *et al.* (1996)).

Advertisements for project managers in the trade and national press (for example, The Times and Computer Weekly) specify some or all of the following requirements:

- Management skills of running projects;
- Technical expertise;
- Organisational skills;
- Team leadership skills;
- Business acumen;
- Strategist;
- Fluent and influential communicator.

As has been shown above project management is, for many authors, about people management and communication. It is the human factor, rather than the tools and techniques, which determine success (Kharbanda and Stallworthy (1990)). They are convinced that people, rather than materials or money, are by far the most valuable resource. The mere formation of a team is no guarantee of success but the effective manager must be able to lead the team and sound leadership, they feel, is the single most important factor in the success of any project. This is, in the view of the authors, effective people management. Kerzner (1989) quotes an executive about the recruitment of project managers:

> *'You give me an individual who has good communicative skills and interpersonal skills, and I'll give him a job.'*

Furthermore, Mintzberg (1973) has identified that the majority of project managers' time is spent communicating with the different interested parties. The characteristics and qualities demonstrated by Taylor (1989) are paramount to today's project manager/leader. He points out that project management is people management. He advocates certain characteristics in the make up of a project manager:

- appreciation;
- empathy;
- patience;
- understanding;
- persistence.

However, what are the benefits of people management? Managers need people to work for the success of the team and the project and ensure that they are around for future projects. Consequently, there must be set objectives for each individual and an assessment of the aspirations and plans of each individual in the project team. However, project managers must not simply concentrate on their subordinates. They must be aware of their responsibilities to all affected parties. Edwards *et al.* (1991) give four key roles:

- project manager;
- specialist (technical developer, programmer, database designer);
- business/systems analyst;
- user.

However, this gives a narrow view of the stakeholders involved in an IS/IT project. The project manager needs to be aware of all interested parties. A useful model for detailing project managers' role and responsibilities is the 'direction finder' (Briner *et al.* (1990)). The direction finder details all interested parties and identifies that project managers must:

- manage the stakeholders (by looking upwards (the sponsor) and outwards (the client end end-user));
- manage the life cycle (by looking backwards (monitoring progress) and forwards (realistic planning))
- manage performance (by looking downwards (the team) and inwards (yourself)).

Again the view here is that planning, controlling and people management are the essence of project management. They are important but project management involves more (APM (1992)).

Much research has been completed in recent years regarding the skills required by a project manager. Table 2-10 shows the types of skills advocated by a number of authors (Adair (1991), Fayol (1949), Posner (1987), Thamhain (1989), Einsiedel (1987), Godsave (1989)).

In the same way that there was a diversity of opinion on the critical success factors, there is very little agreement, as can be seen from Table 2-10, on the qualities and skills required by project managers. Leadership appears as the most important skill that researchers have identified that project managers need to possess.

Roman (1986) suggests that:

'leadership is an essential ingredient of good project management'.

Zawacki (1990), furthermore, advocates simply to get back to 'basic leadership'. Behavioural and leadership problems, he suggests, have led often in the past to the demise of many well-planned IS/IT projects.

Skills	Adair	Fayol	Posner	Thamhain	Einsiedel	Godsave
Leadership	*	*	*	*	*	*
Planning	*	*	*	*		*
Team building	*	*	*	*		
Controlling	*	*		*	*	
Organisation		*	*	*		*
Delegation		*	*	*		
Communication			*	*	*	
Decision making					*	*
Business				*		*
Staffing		*		*		
Directing	*	*				
Technical				*	*	
Technological			*			*
Stress management			*		*	
Problem solving				*	*	

Table 2-10 - Required skills

Administrative tasks, like planning and controlling, are also seen as crucial in what the author terms, the 'skills portfolio' of project managers. Kerzner (1989) suggests that planning is the major responsibility of the project manager. However, it would appear

from the analysis that there are more important responsibilities than mere planning. It has been thought that technical skills are particularly important for project managers to possess (Baker *et al.* (1983)) but the evidence here suggests that the technical and technological skills, although perceived as necessary, are less important skills in the modern project manager. The technical skills are of importance to the project manager, if only to enhance the credibility of the project manager in the eyes of the technical team members but very often managers cling to the position that their primary knowledge must be about programming and other technical aspects of their role. However, as can be seen from Table 2-10, the technical skills are perceived to be of considerably less importance than the inter-personal and communication skills. Technical skills may have been important in the 1970s but now the balance is shifting towards the communication and leadership aspects. This has been borne by the author's own experiences and the evidence of the research and observations previously mentioned, where communication was cited as one of the major factors in delivering successful projects (see Tables 2-7, 2-8 and 2-9). Other authors have also advocated the aspects of leadership as the major skill for today's project manager (Annett and Wetherbe (1986), Wright and Taylor (1984), Kothari (1986)). As leadership is becoming more critical for managers in organisations (Kanter (1989)), so too is it becoming more critical for project managers in their attempt to motivate teams towards project success.

Examining the research and observations, there was the belief that planning and scheduling (the administrative tasks) are the most important factors in project success. However, it is the right amount of planning and scheduling at the right time that is important. This is perhaps where project managers start on the path to failure by continually producing comprehensive plans at the very outset of the project. Moreover, with the apparent contradictions on the criteria, factors and skills, it is undoubtedly confusing for project managers to know when to employ the appropriate skills. This is the important issue and project managers need training to identify where the skills can be applied for the project good in order to deliver successful projects.

The research and observations expressed here are sufficient in their own right in identifying skills and qualities required by project managers. However, they do not examine the application of these qualities and skills to particular factors that will be

applied to deliver the chosen success criteria. Every IS/IT project sets its own problems and project managers need to be adaptable to the different circumstances. The assertion is that different factors will be employed to achieve the stated criteria for success. Consequently, the project manager will need to adapt his/her skills to the demands of the project, team and users. To be prescriptive about all the required skills for all project managers - "perfect" project managers - is to be too simplistic regarding the nature of projects and the nature of human beings. People are seen as the biggest contributors to the success of projects (Tampoe (1989)). The need to manage those people - technicians, sponsors, users - and to communicate with them is paramount. However, each project is different, people are different and skills and qualities required to be employed by project managers will be different on each project. Motivation skills will be of importance where the project is very long and perhaps the momentum is being lost. Technical skills will be important when planning and scheduling using a support tool. Teambuilding skills will be important when staffing a project.

The project manager/leader has to ensure that there is successful project completion against the success criteria laid down. The success criteria needs, therefore, to be decided at the very outset of the project as has been discussed earlier in this chapter. This successful completion is delivered mainly through people. The manager, as Morton (1983) points out, needs to predict and control human behaviour. Project managers must turn their staff into a team, a group who work well together, are enthusiastic and responsive (Roman (1986)).

In summary researchers and practitioners have shown that they believe that there are ideal qualities needed by a project manager/leader. Project managers need a technical, coupled with a sound business, knowledge and the ability to motivate, and keep themselves and the team motivated (a difficult proposition in very large and complex projects, less so where end dates are in the short term).

Leadership, as distinct from management, (as can be seen from Table 2-10) is perceived as the most important skill required by project managers. With this, planning, team building, motivation and communication/interpersonal skills are recognised as having an important role to play in the management of IS/IT projects. These areas are identified as

the important factors for project success. Employers are looking for people with strong inter-personal and communication skills to manage projects successfully. The ability to be a good administrator (particularly in planning, scheduling and monitoring) is also of importance. A competent project manager must, therefore, have administrative, technical, inter-personal, business and political skills. However, not all of the skills will be necessary on every project. Different projects will require different qualities and different skills. Therefore, the skills required for any given project will vary according to the success criteria and the factors applied to deliver that success.

Having examined and compared the qualities and skills of the ideal project manager, as defined by many authors, there needs to be a examination of how managers/leaders can acquire and develop these skills and qualities over a period of time.

2.5 The making of an effective project manager

The project manager exerts an immense influence over the whole project, more than any other individual, to turn a potential success into an abject failure and a potential failure into a resounding success. Despite their influence, an unsuccessful project does not always indicate an unsuccessful project manager. There are many external factors (Block (1983), Kothari (1986)). However, many project managers are still employing the same ideas, the ideas they learned from their superiors and mentors, to run projects now as they did a decade or more ago. This section addresses the question:

> *How can a manager become a better manager to ensure the success of IS/IT projects?*

to see what the literature to date says about the development of project managers and how they can acquire the necessary skills and qualities to deliver successful projects.

Undoubtedly the main method for managers to learn aspects of project management in the past is through experiential learning. Burgetz (1991) expounds the theory that excellent project managers learn from experience. He suggests that they augment their sound instincts with experience. Hosley (1987) sees experience as a major influence on

project managers. Kerzner (1989) identifies current thinking on project management training and suggests that 60% of skills can be learned through experience and 'on-the-job' training. Thamhain (1989) notes that some 85% of all skill developments are derived from experience but skills can be learned by reading, seminars/workshops, and schooling. Thamhain's views were based on a field study and fifteen years of observations. His final observation is:

> *'continue your education. Lifelong learning . . . is a prerequisite for managerial skill building and career development'.*

This is an important statement with which the author agrees. Skills for project management will take a long time to develop through experiential learning. It may be that project managers will merely continue the bad habits of their superiors and mentors in applying their experience to project situations. Thamhain (1989) notes that on average project leaders spend each year some 39% of their annual working time developing and upgrading their skills. Is there a better and more efficient way of providing these skills?

There are many training courses for managers/leaders using different methods to gain an appreciation of the skills required. Payne (1989) details a number of management training exercises. Adair (1984) describes the Action Centred Leadership course looking at functional and situational leadership. Schlick (1988) identifies the main functions of a project manager/leader and details a basic workshop for aiding delegates to gain those skills. All are important in the development of effective project managers but the organisation itself needs to show its commitment to training at all levels within the organisation.

Project management skills must be taught early at undergraduate level, if not before. Davidson (1993), in proposing a 40-point guide to becoming a successful manager, highlighted that the current education system is poor at producing IS/IT project managers. However, teaching inter-personal skills to undergraduates is very difficult, if impossible; they can be taught the technical and administrative skills involved in project management, but most undergraduates, even those on four-year sandwich degrees, will

be unable to grasp the human aspects of project management (managing people) until they have spent some time in industry.

Pulk (1990) identifies an ineffective university education as a barrier to producing effective project managers. This may be the situation in America but it is changing in Britain today. Information Systems Management and Business Information Technology degree courses are addressing this situation. For undergraduate students it is an ideal platform to move into the software industry with particular knowledge of the administrative and technical skills in addition to some appreciation of client consultation. There is obviously a need for more of these types of courses to be developed for undergraduate students.

For practitioners in industry the Association of Project Managers (1992) has developed a Body of Knowledge with project managers becoming accredited with a recognised management certificate. The Body of Knowledge addresses four major areas:

- Project management, covering aspects of project structuring, appraisal, quality and the environment;
- Organisation and people, concerning the assembling the project team and communicating and motivating the team;
- Processes and procedures, covering the aspects of planning and running the project;
- General management, concerning the business environment.

This Body of Knowledge provides the basis for the Project Manager Certification. Furthermore, the Body of Knowledge identifies a Personal Profile of the Certificated Project manager which the Association

> *'considers to be the knowledge and experience that people involved in the formal management of projects would have'.*

These characteristics include:

- Attitude, an open and positive attitude which encourages communication, motivation and fosters co-operation;
- Common sense, an ability to implement sensible and effective solutions;
- Open Mindedness, always open to new ideas, practices and methods;
- Adaptability, avoiding rigidity in thinking and behaviour and adapting to the needs of all parties for a successful outcome;
- Inventiveness, to discover and implement innovative strategies and solutions;
- Prudent risk-taker, being able to identify and analyse risks and not to take risky approaches;
- Fairness, employing a fair and open attitude which respects all human values;
- Commitment, a strong commitment to project success, user satisfaction and team working.

The Body of Knowledge goes on to stress:

> *'Much emphasis is placed on tools and techniques in managing projects and with the growth of the personal computer there has been a great amount of development work on sophisticated scheduling and control systems. These have a major part to play in modern project management but one must not forget that projects involve people. It is the project manager's ability to bring together the project participants and contributors and meld them into an effective project management team that will achieve the project's objectives.'*

This supports other research which identifies the technical and technological aspects of project management as of lesser importance to the modern project manager than the inter-personal and administrative skills. The Body of Knowledge and the Project Manager Certification is aimed at project managers in any industry. What is available for the project manager in the Information Systems field? The Information Systems Examination Board (ISEB) administers examinations within this field. Successful candidates will receive a Certificate in Project Management for Information Systems. The Certificate (ISEB (1994)) covers areas as:

- the project management process;

- managing plans;
- managing people and other resources;
- managing project products;
- managing documentation;
- managing quality;
- managing change.

The Certificate examines many of the important issues in managing information systems (for example, quality, risk, human resource management, configuration management) but there appears to be as much, if not more, emphasis on the technical aspects of project management as opposed to the leadership (which is only mentioned once, in relation to leadership styles) and team building aspects which were seen as particularly important (see Table 2-10). Planning and control are important but PERT, CPA and other planning techniques do not accommodate the iterative nature of IS/IT projects. Therefore, the concentration on these tools and techniques will promulgate the problems of IS/IT projects. In addition, the concept of the project direction finder (Briner *et al.* (1990)) is inadequately addressed as is the definition and agreement of the success criteria. This certification is an important input to the management of IS/IT projects but there are concepts which are omitted and certain aspects (particularly technical) which have undue emphasis. The syllabus needs to take account of other aspects of project management and adapt accordingly.

Another important development has been the development of an Industry Standard Development Programme (ISDP) for project managers by the Computer Services Industry Training Council (COSIT). This allows staff within companies to develop a level of competence in technical and business areas. It is a step in the right direction for computer practitioners within industry to acquire the skills to make effective project managers and leaders. Davidson (1993) further emphasises the point:

> *'Find out where you [the managers] are weak and take steps to improve yourself'.*

In addition to these innovations there are many masters courses for project management. Most are aimed for the Engineering and Construction industries but Cranfield University

and Henley Management College who run masters programmes in project management (M.Sc. or MBA), and Henley Management College with an MBA for IT Hybrid Manager, are addressing this area of the IT industry (O'Connor and Smallman (1995)).

There will be the need, according to Godsave (1989), to recruit high calibre, business-orientated individuals. Personal development programmes (like ISDP) should be established for every prospective and current project manager. Bentley and McKoen (1993) advocate :

'formal training programmes linked to a project management career structure'.

Organisations need to commit themselves to training project managers and have a plan for all in order that they can develop the skills in order to enhance the chances of project success in the future. Experience will always play an important part of the learning curve but other methods are of equal, if not more, importance and value.

However, will project managers benefit from training and education? The author believes that people need four attributes to be successful:

- innate intellectual and physical ability;
- desire and opportunity;
- initial training and development;
- training and coaching to improve oneself.

Any absence or shortfall of the four attributes will lead to a person (for example, project manager or sportsman) to fail to be successful. Was Daley Thompson born to be an Decathlon Olympic and world Gold Medallist? With such a wide variety of disciplines in the Decathlon (110m hurdles, javelin, 1500 metres, shot putt and others) the answer surely must be 'No'. He had the innate intellectual and physical ability; he had the desire and opportunity. He then had the initial training and development and his coach developed his skills further in order to become World and Olympic champion. Would Geoff Capes have made an Olympic-standard decathlete? He could certainly learn the skills and techniques to be a decathlete and training and coaching could make him a

better decathlete. However, he doesn't have the innate physical attributes for a top decathlete or perhaps the desire and he would probably not achieve any significant performance in many of the disciplines. Can Angola produce a home-grown Olympic decathlon gold-medallist? In the future the answer would be "perhaps, yes" but, at this moment, the country does not have the facilities and the athletes do not have the opportunity. China, on the other hand, has begun to produce world-class athletes because the athletes now have the opportunity and the coaching, imported from the former East Germany, along with the innate ability and desire.

In the same way successful projects managers are not born. However, they must have the innate abilities, the desire and opportunity supplemented by initial and on-going training. Experience plays a part in that development process. Experience, coupled with training, will make them a better manager, give them the skills and qualities to succeed and help to make their projects succeed.

2.6 Conclusion

We have seen that there has been very little research on the criteria for success. Most authors highlight that there are three standard criteria - time, cost, quality - by which a project is judged to be successful. This is a major shortcoming of previous research. This leads us to ask the question:

'What are the success criteria for the project?'

There have been some attempts at defining the success criteria (Morris and Hough (1987), Turner (1993a). However, very few people have seriously considered of success criteria and its importance in determining success. We need to define the criteria for the project taking into account the view of all parties involved. Furthermore, success criteria must be defined at the outset of the project and reviewed as the project progresses.

Previous research has pointed to certain factors being critical for success but it has highlighted that there is by no means full agreement on these factors (see Table 2-6). Furthermore, there has been little attempt to match the factors to the success criteria.

Therefore, they need to be chosen to deliver the success criteria. Some factors will be more appropriate to deliver success than others under different circumstances. In addition to this, the views on the success factors have been those of project managers and not the users or sponsors of projects. Research has not addressed their perceptions of success and the factors that they see as important. Many surveys have also not looked specifically at IS/IT projects. The various factors which are seen as possible causes of failure must be examined, from the viewpoint of all participants in IS/IT projects, and relate the factors to the success criteria. More importantly it is necessary to match the factors applied in the project to the success criteria defined at the outset of the project and throughout the project, if the success criteria changes.

There has been no assessment of the effectiveness, functionality and applicability of tools, techniques and methodologies in the success of projects. Organisations are increasingly using life cycle models and development and management methodologies in their attempt to deliver successful projects. There does not appear to be a substantial increase in the success rate. There is also a vast number of information systems and support tools which purport to aid the development and management of IS/IT projects. However, project managers, it appears from the evidence of previous research, are relying too much on the technical aspects of project management. Different tools, techniques and methodologies can be used to deliver the success criteria; support tools can also help but project managers need to use the tools with appropriate functionality. This research must look at these issues and develop an answer to the question:

> *'What are the appropriate tools, techniques and methodologies to deliver successful IS/IT projects?'*

With the suggested move towards smaller projects and teams, would projects benefit from the current techniques, tools and methodologies available? There has been some debate over the use of SSADM (and other structured methodologies) for small development projects. In the same way would the use of a project management methodology and the various support tools be appropriate for small- to medium-sized projects? The team may not use all the tools and techniques of a structured systems analysis methodology and produce all the documentation but there will be requirements

to produce Business Options, create a database specifications, carry out logical design before physical design. A structured analysis and design methodology (like SSADM) provides the framework for the development of the system. In the same way, use of a project management methodology (like PRINCE) provides a framework for management (CCTA (1994b)) and guidelines on what to do. There may not be a stage manager at every stage of the project but there needs to be a certain organisation structure set up at project initiation.

Large projects should be a thing of the past. They need to be broken down into a 'programme' of projects or subprojects of manageable size (Schlender (1989), CCTA (1994a)). There are many benefits to be gained from this approach:

- the project team do not become demotivated through momentum and enthusiasm being lost;
- sponsors and users can see benefits accruing through phased implementations;
- users do not see excessive delays.

Obviously the interfaces between two or more subprojects will increase but it is, the author believes, a price worth paying. In addition to the subdivision of projects, organisations must improve their system development processes (Humphrey (1990)) otherwise there will inevitably be an increase in the risk of errors to applications which are more critical to organisations.

Previous research has highlighted a lack of agreement on the competences, skills and qualities required by project managers to deliver success (see Table 2-10). Many view that experience is the most important method of acquiring project management competences but project managers appear to be learning bad methods and not improving the success rate. With the project manager crucial to the success of project, the competences need to be considered and the project manager needs to apply particular competences in a particular situation. Project managers have to develop competences as they gain experience and experience alone will not provide those competences.

A shortcoming of the previous research has been the fact that there has been little attempt to define a programme for developing project management competences. There have been Bodies of Knowledge developed (APM (1992)) and project management certification through formal processes (ISEB (1994)) but these are not enough. This research will examine the real issues concerning project management competences and the development of these in order that project managers can influence the success of IS/IT projects.

The dilemma can be summed up thus:

- If project managers do not identify how projects can be judged as a success, the criteria for success, how can managers identify which factors to employ to achieve that success?

- If project managers cannot identify the factors to deliver success, how can they identify the skills needed for delivering a successful project?

- If project managers cannot identify the skills required, how can they realistically identify a training programme to acquire those skills?

All the shortcomings of previous research will be addressed and answers to the research questions will be developed in later chapters.

CHAPTER THREE

Research Methodology

Contents

3.1 Introduction

We have seen from the last chapter that most of the previous research into success factors has not been directly related to IS/IT projects but has focused more on general project management. Where research into IS/IT project success has been undertaken, much of the evidence is the views of IS practitioners, project managers and systems analysts, and not from the viewpoint of the users and sponsors of IS/IT projects. It was recognized that the results of this research would not enhance the knowledge of project failures if only project managers were asked their views. Therefore, it was important to acquire the views and experiences of all parties interested in the development and implementation of IS/IT projects.

The objectives of this research is to understand the success criteria for IS/IT projects from different viewpoints and then to identify the key factors that influence the achievement of that success and the methods, tools and techniques that can be used on projects. There was also a need to identify the role and qualities of the project manager and how a project manager can best acquire the various qualities and skills to enhance the chances of successful IS/IT projects.

Therefore, it was necessary to carry out research by asking questions of members of industry who have been and/or are involved in the IS/IT projects as project managers, systems analysts, users, sponsors or other support staff. The emphasis of the research is on collecting qualitative, rather than quantitative, data. Interviews are a prime method of collecting such data (Moore (1983)). Questionnaires were also used to collect data and these results are compared for levels of significance (see 3.3) in order to analyse the different opinions on criteria and factors.

The practical research was carried out in a number of stages. Initially, a literature survey was carried out to understand the current focus of research and the current thinking on the problems of, and solutions to, IS/IT project implementation. The literature survey and an evaluation of the literature (research and observations) are described in Chapter 2.

There has been little mention in literature of the criteria used to measure project success. Furthermore, there is only broad agreement on the critical success factors (see Table 2-6). Consequently there is the need to examine the criteria and the factors, in particular relating to IS/IT projects (in a similar way to Thamhain and Wilemon (1986), Lyytinen (1988)). Initially, interviews were carried out to discover the extent of the problem of IS/IT project failure. Secondly, a questionnaire was prepared and completed by members of industry (their roles in IS development are highlighted above). Thirdly, models for IS/IT project success were developed. Fourthly, structured interviews were carried out as a further discussion of the problems associated with IS/IT project implementation and to test out the models.

3.2 Research Hypothesis

The examination of the empirical evidence and literature regarding the criteria and factors for success leads us to develop the following hypothesis and ask the following research questions:

(i) Hypothesis

The hypothesis to be proved by this research is that:

> *IS/IT projects can be successful if the criteria for success is decided before the outset of the project along with the appropriate critical success factors to deliver the success criteria. The use of appropriate development and management tools and techniques will also aid the success of the project. Additionally, the personal qualities of the manager and the leadership/management of the team are crucial to the success of the IS/IT project.*

This hypothesis contains a number of key elements which can be summarised as follows:

- Can the success criteria for IS/IT projects be defined?

- For each success criteria can a number of factors be defined ?

- Can a number of tools, techniques and methodologies be selected to deliver the appropriate success factors?

- Can the project manager influence that success with personal qualities and skills?

- Can the project manager acquire this portfolio of skills and know when to use the appropriate factors and skills?

- How can the project manager acquire this portfolio of skills?

(ii) Research questions

In order to answer the hypothesis we need to consider the following research questions:

1. What can be defined as success criteria for IS/IT projects and what factors are appropriate to deliver the defined success criteria?

   The success criteria must be defined before the research is able to examine the solutions. Definition will enable the research to explain the problems in developing IS projects and to provide solutions to the particular problems raised. The perception of success will vary depending on the type of system being developed and who is providing the system. Having agreed the success criteria, which factors can be used to deliver a successful IS/IT project.

2. What tools, techniques and methodologies are available for the development of software products and the management of such products and how can they be used to deliver the success criteria?

   Systems analysis and design methodologies that provide a structured approach to the development process have been developed in recent years. There has also been the development of project management methodologies, compatible with the

systems analysis and design methodologies, to provide guidance in managing projects.

Many of these methodologies have been developed for large projects but suppliers/designers have provided a version of the methodology for small projects. However, the use of these methodologies, tools and techniques do not appear to have improved the situation. Additionally, there has been a large increase in the availability and use of automated tools to support the development and management of IS/IT projects. Tools for microcomputers in particular have become the norm rather than the exception. There is a need to assess the effectiveness of the tools to support the development and management of IS/IT projects

3. What is the role of the project manager and what qualities/skills should a manager of IS/IT projects possess?

   The research needs to examine models of management qualities and skills, define the role of the project manager and determine the personal qualities and characteristics that a manager needs to possess.

4. How can a manager become a better manager to help towards the success of IS/IT projects?

   Although research has shown that a large percentage of the skills learnt by project managers is through experiential learning, there is scope for alternative methods of learning.

In order to answer these questions and develop appropriate models, the research had to gather data about IS/IT projects. The detailed data gathering and research design is given below.

3.3 Research Methodology - Description and Rationale

Many authors have given instances of project disasters (see Chapter 1), described critical success factors (see Tables 2-1 to 2-9) and have suggested ways whereby projects can be successful. If the different participants could understand and appreciate different perceptions of success, agree them and adjust them as the project progressed, that would be a major step towards delivering successful projects.

Project managers are concentrating, it appears, on the tools, techniques and methodologies to achieve their perception of success. They do not appear to have learned from the research carried out thus far, even though it is limited in the way it focuses on success factors rather than the criteria - how projects are judged to be a success. We shall see that they are very often focusing on different, and often conflicting, targets from users and sponsors. Project managers may perceive the project to be a success but the users and sponsors may not. In addition, the belief is that different factors will be appropriate to deliver the different success criteria. The assessment of these differences in perceptions and the application of different factors to deliver success criteria will result in more successful projects. Project managers, and their teams, must understand these differences and take action to implement the conclusions and recommendations of this research. Only then will the various participants (project managers, users, sponsors and systems analysts) have some common ground to evaluate a project as a success or failure.

In order to answer the research questions data was gathered through interviews and questionnaire (see Figure 3-1). This data gathering (Moore (1983)) was carried out in two phases. Phase 1 involved a number of interviews in order to understand the current problems in implementing IS/IT projects and define the criteria for success. This would allow an understanding of the perceived success criteria and the factors for success, thereby helping to design the questionnaire. The questionnaire focused on these issues and the results interpreted (see 3.3.1). Phase 2 involved the development of models and a second set of interviews. These interviews were more structured and examined the same project from different viewpoints (see 3.3.2).

The aim of the interviews and questionnaires was to elicit qualitative information regarding the success of IS/IT projects from a number of viewpoints and personnel - from project managers, systems analysts, users, sponsors and other support staff. All these categories of professionals would have distinct views on IS/IT projects. The perception of success will vary depending on the type of system being developed, who is providing the system (i.e. in-house development by a Data Processing department for a user in the organisation, software house providing a bespoke system for a customer/client) and who is the recipient of the system. As has been shown in Chapter 2 empirical research has not completely addressed these issues - that of analysing the success criteria and examining projects from different viewpoints. The success criteria for IS/IT projects must be defined before the research is able to examine the solutions.

3.3.1 Methodology phase 1

(i) Initial Interviews

The initial stage of the research was to carry out a number informal interviews with project managers, systems analysts, users and sponsors of IS/IT projects in order to establish the nature of the problem and to clarify the objectives of the research. The interviews were held in 1991 with 12 people who had varying roles on IS/IT projects. The interviewees were selected because of their in-depth involvement in many IS/IT projects of different size and complexity. They were involved in all aspects of system development, management, implementation and operation. Interviews with prepared and rigid questions was felt to be too constraining on the interviewee. Therefore, a discussion format was chosen where interviewer and interviewee discussed a series of prepared topics relating the major questions raised in Chapter 1 and 2 - the success criteria, success factors, problems encountered, tools, techniques and methodologies used, project concerns, capability and experience of the project team. The rationale behind this approach was that the interviewee and the interviews themselves would be more relaxed. The interviewee was then able to elaborate and develop discussions and

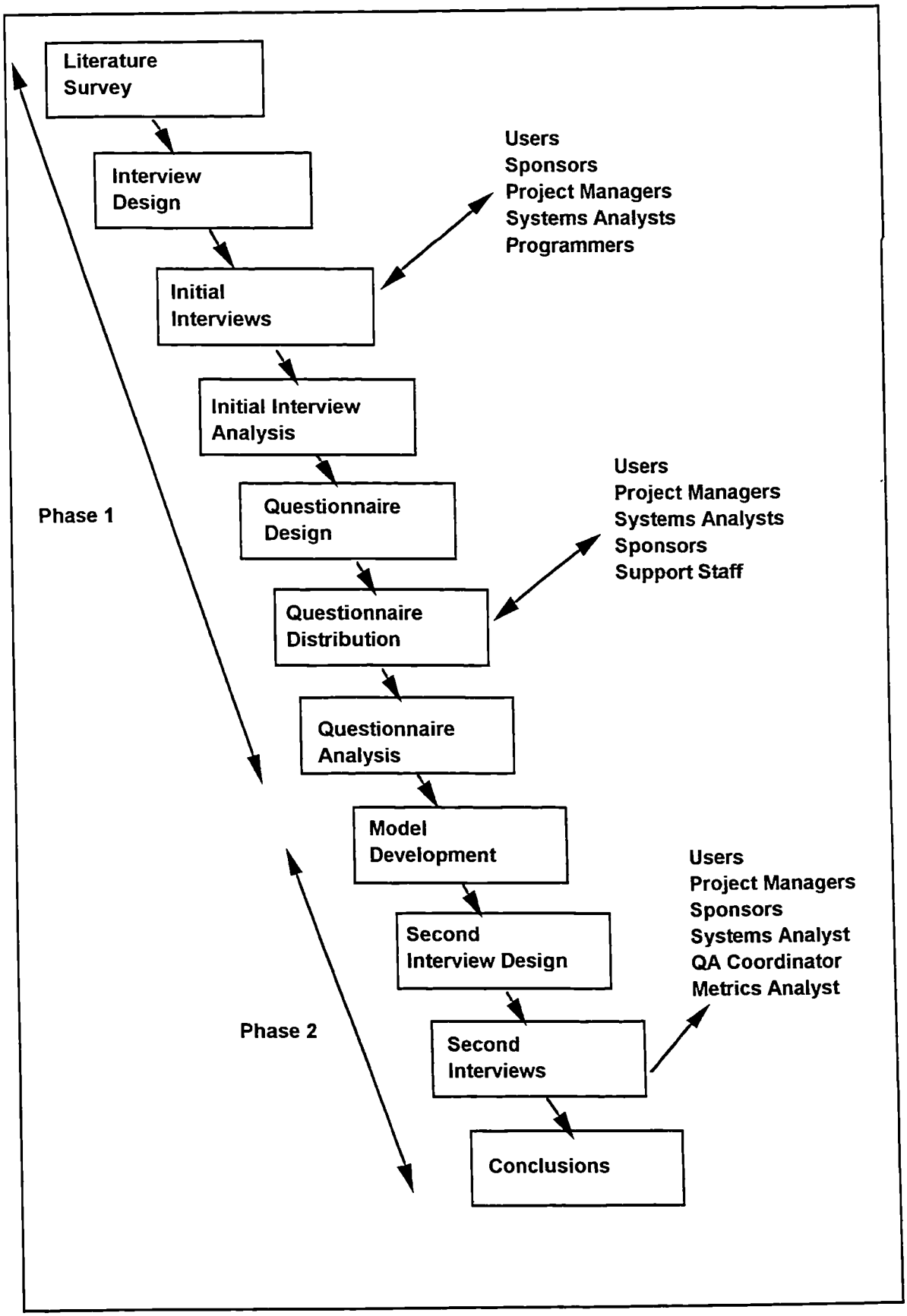


Figure 3-1 Research Methodology

demonstrate areas of importance through experiences of IS/IT project implementations. Interviewees were encouraged to give examples of particular project experiences.

Notes were taken of each interview and a transcript was written up within two days. A synopsis of the major points raised in the interviews are given in Appendix B.

The main outcome of the interviews was that the different participants were focusing on different success criteria. Another important point from these initial interviews was that, despite the increased use of tools, techniques and methodologies to develop and manage IS/IT projects, there was still a major problem of delivering success. The final point was the view that the project manager, more than any other person, was crucial to success. Project managers, it appears, are focusing on different targets and criteria from users and sponsors. They do not always have the necessary skills and competences to manage the aspirations of all the participants. In addition, they do not know which skills to use under which circumstances.

The discussions highlighted a set of success criteria and factors which were then used as a basis for the questionnaire. The interviews highlighted that the questionnaire needed to focus on two other areas:

- the tools, techniques and methodologies for the development and management of IS/IT projects;
- the problems faced by project managers and the competences required.

A knowledge of the problems that project managers face and competences that they perceive are important for delivering success will indicate a way forward. Therefore, the initial interviews helped design the questionnaire by defining the main issues which are seen to affect IS/IT projects:

- success criteria and factors;
- the tools, techniques and methodologies;
- project manager competences.

(ii) Questionnaire

The initial series of interviews pointed quite clearly to the fact that different people involved in an IS/IT project have different objectives and are, therefore, trying to deliver different, and incompatible, criteria. In addition, previous research has not discussed the success criteria in any detail and has clearly highlighted the lack of agreement on success factors. As a result of the interviews and the previous research, a questionnaire (see Appendix A) was developed during the summer of 1992 in order to attempt to answer the research questions posed in the hypothesis and to acquire more knowledge of the points arising from the initial interviews. A questionnaire was seen as an ideal approach to get qualitative data from a large number of respondents. As the process is impersonal, there was a greater chance of avoiding a defensive attitude among respondents. The questionnaire was relatively short and easy to complete (with a mixture of closed and open questions) and dealt with the points raised in initial interviews. It was structured into four major parts and each part focused on particular questions :

- success criteria, factors and possible causes of failure - what were the major success criteria and what factors were employed to deliver that criteria? What were the main issues of possible failure? How well defined were the criteria and factors at the outset of the project? (Section 1 of the questionnaire);
- project management tools, techniques and methodologies - what is the nature and size of projects? How much time is spent on project management? What approach is taken to manage IS/IT projects? What project management software is used? Does it provide the features required of it? How does it help to manage projects better? (Section 2 of the questionnaire);
- system development tools, techniques and methodologies - what is the nature and size of projects? What system development methodology is used? Does the methodology help to complete projects more successfully? (Section 3 of the questionnaire);
- project management problems, competences and the acquisition of competences - what problems are most often encounter? What competences are most important for a project manager to possess? How are these competences acquired? (Section 4 of the questionnaire).

There was a need to relate all responses to specific projects, not to projects in general. The results could be distorted if the view given by respondents were influenced by their experience of projects in general and not particular projects. With projects being different, different success criteria could be applied and different factors to achieve the success of the project could also be applied. Respondents were, therefore, had to specify particular projects (a maximum of two) with which they had been involved.

It focused on respondents' perceptions of the criteria and factors for success. The respondents were required to define the criteria for each project chosen and the factors used to deliver the criteria. Respondents needed to define for a particular project the appropriate success criteria and, if the project was perceived to have failed, the factors which contributed to that perceived failure.

The criteria and factors given in the questionnaire (section 1 in Appendix A) were chosen from the results of the various research (Slevin and Pinto (1986) and Geddes (1990)) and from the most commonly quoted criteria and factors in the initial interviews. Each project was plotted on a 2 x 2 matrix showing whether the ends and means were well defined at the outset of the project. The results are analysed in Chapter 4. The matrix was included to discover the relative importance of criteria and factors on the success of projects.

The requirement was to elicit the opinion of respondents and so detailed definition of criteria was not important. It was paramount that the respondents gave their interpretation of the success criteria for the project. Therefore, the criteria of 'meeting quality' was included, rather than specifying the many individual definitions of quality, because it was only important to understand whether quality was important, not particular definitions. If detailed definitions were given, respondents might not have highlighted the criteria as important because they disagreed with the definition. Respondents were allowed to put supplementary comments on individual criteria and factors to add depth to their answer. Certain criteria, with which it was felt respondents could identify, and factors were specified but respondents could have identified other criteria and factors, if the important criteria and factors for the project had not been

specified. Very few respondents gave their own definition of success criteria, indicating that they identified with the criteria presented in the questionnaire.

The initial interviews highlighted the importance of the tools, techniques and methodologies in delivering successful IS/IT projects. Therefore, respondents who defined their job description as systems analyst and/or project manager were then asked to specify their use of systems analysis and/or project management tools, techniques and methodologies. Firstly, in order to get a greater insight into the type of practitioner and the type of project that was being assessed, the respondents were asked to specify their experience and type of project that they had typically been working on, both in terms of size and in terms of nature (internal use, bespoke for client). The respondents were then asked to give their impression of the tools used and whether they matched their requirements for the project (see Chapter 5 for analysis of results).

In the attempt to assess the qualities and skills required, project managers were asked to detail the competences that they feel are important in managing successful project management and the most difficult problems in managing projects. They were asked to specify their own thoughts by way of open questions (see Chapter 6). In order to assess how project managers could improve, they were asked initially how they had acquired their project management skills. The respondents were then asked to list the areas in which they felt that they could improve managerially. With these questions addressed specifically at project managers, trends could be assessed for the way forward for the development of skills for project managers.

67 responses were received, with a total number of 132 projects. Initially, the audience for the questionnaire were students on the Master of Business Administration in Project Management at Henley Management College. Subsequently a letter was circulated to all members of the APM. Only 13 returns were made by members of APM. Other responses were received from the author's personal contacts within companies throughout Great Britain. All questionnaires were completely confidential and were completed in the presence of the author or posted directly to Bournemouth University.

Advice was taken from statisticians at Bournemouth University on how to analyse the results of the questionnaire. They were analysed visually and then statistically, testing for significance, assuming that they follow a normal distribution (Freund *et al.* (1988), Kvanli *et al.* (1992)). The research is primarily qualitative but the statistical analysis was completed to show that there are differences of opinion and beliefs between one group of people and another. Projects which were perceived as failures or successes displayed some differences in visual comparison. Therefore, successful and unsuccessful projects were compared statistically, for both the criteria and the factors, in order to see if there was any significant difference (see Chapter 4).

A large variety of responses was received to the questions posed in Section 4 of the questionnaire - the project management problems and competences. Each response was given in the project manager's own words and this made it difficult to interpret. Therefore, all responses were placed into well-defined categories and presented in these categories for analysis (see Chapter 6).

The questionnaire results confirmed the results of the initial interviews but had highlighted other issues. As a result of the initial interviews and questionnaire, there were certain issues which needed to be explored further. A number of models were developed to address these issues and further interviews were held in order to examine individual projects from different viewpoints.

3.2.2 Methodology phase 2

(i) Model Development

Turner (1993b) suggests:

> *'How can you say what the correct success factors are until you have identified the criteria?'*

As a result of the data gathered, a pattern emerged that the achievement of certain success criteria could be attained using certain factors. Therefore, a model (see Chapter

4) was developed to show the success criteria and, against each criteria, the factors that were of primary and secondary importance to be employed to deliver that success. If the different participants in the project could agree the criteria at the outset of the project, certain factors could be employed to deliver that success criteria. As the project continued, and perhaps the emphasis of the criteria for success altered, the project manager and project team could adapt to the new ideas and criteria. Consequently, different factors could be employed. The important point to note is that projects should not be so large that there are great variations in the criteria for success throughout the life cycle of the project with the inherent danger that project teams could be concentrating on the wrong factors.

Phase 1 of the methodology highlighted some factors that appeared to be fundamental in delivering successful projects. A project life cycle was designed to show these factors. This model shows the necessary activities which need to be carried out on each project (see Chapter 5). Furthermore, it was identified that configuration management and the project life cycle are the links between project management and system development. A model to show these links is given in Chapter 5.

The belief is that the project manager is crucial to the success of the project. A plan for developing project management skills and competences (from an undergraduate level to an experienced project management practitioner) is proposed in Chapter 6. However, it is not only the skills that are important but also the ability to use these skills in appropriate circumstances. The model developed in Chapter 4 will enhance an appreciation of what skills to use under which circumstances.

A 'Health Check', a set of questions for project participants to answer about the project, was also developed as a tool for project managers to review projects during the development and focus on potential problems on the project in order to achieve the success criteria. The respondents scores each question out of 6 in order to identify their understanding of the project goals and to comment on the effectiveness of the tools and techniques to achieve a successful project. This can be used most importantly during the project but also retrospectively at the end of the project. The 'Health Check' (see Appendices G and H) is discussed in Chapter 7.

After developing the models, it was necessary to test them out by conducting a series of in-depth interviews. These more structured interviews were held to review specific projects from different participants' viewpoints.

(ii) Second interviews

These second in-depth interviews were project evaluation and post-implementation interviews which took place over a six month period in 1994 as a method of confirming the results of the questionnaire survey and testing the models developed by this research (see Appendix C, D and E). A total of 12 projects were assessed in this phase. It was necessary to get the different opinions on the outcome of particular projects and the perceived reasons for the success or failure of these individual projects. Could two or more people think differently about the same project, that is, could one person believe a project to be success where another person believe that the same project to be a failure? Consequently, a number of people who were very involved in the project were interviewed. They were mainly project managers, users, sponsors and systems analysts but people with other project roles (Quality Assurance Co-ordinator, Metrics Analyst) were questioned about the project. The aim was to interview at least 2 people involved in all projects in order to get different views of the same project. In all cases 2 people were interviewed, but it was possible to go further and in 11 out of 12 projects 3 or 4 people were interviewed.

Specific projects were reviewed, examining the criteria for success and the factors that were employed to deliver the success criteria. To overcome the problem of people's inability to recall issues on the project, all the projects had been implemented within the previous six months. There were a number of prepared questions (see Appendix C), examining the criteria defined and the factors applied although other issues (such as staffing, testing, training) were explored. The models developed earlier were used as a reference for assessing how the projects fared and how relevant the models were. Detailed notes of all the interviews were taken and transcripts were written again within two days. The results of the second interviews are in Appendix D and E.

Additionally, the 'Health Check' was tested out on 5 final year projects on an undergraduate degree programme. This was completed both during the project and after its completion. The client was asked by 1 project group to complete the 'Health Check'. The results were examined and the students were interviewed to ascertain the impact of the 'Health Check' on the project. The students reported that the 'Health Check' made them consider certain important issues (what criteria were they aiming for? The link between criteria and factors) which would have been overlooked without the exercise. The same sentiments were given by the client who completed the 'Health Check'.

With the results of the interviews and questionnaire available, 8 key elements for project success were then developed (see section 7.2). These elements encompassed the whole project life cycle from success criteria to review, incorporating the management of the project, the methodologies required and the impact of the project team on success.

3.4 Summary

The research was essentially practical with the conclusions and recommendations particularly important to industry and all those involved in IS/IT projects. Previous research projects had examined the situation from a very narrow viewpoint - that of mainly one party, namely the project manager. Consequently, it was necessary to get the opinions of people carrying out different roles on IS/IT projects. The methodology used was designed to acquire more in-depth knowledge of the problems involved in IS/IT projects, starting with a general understanding for the particular problems via the initial interviews. The questionnaire was designed to focus on particular areas of concern:

- the success criteria;
- the critical success factors;
- the tools, techniques and methodologies;
- the project management competences.

The results of the questionnaire showed that there are differences in beliefs but the projects specified by respondents to the questionnaire were all different. A number of models (identifying the criteria, factors, the project life cycle, the links between the

development and management disciplines and the skills acquisition development) were developed attempting to provide answers to the issues highlighted. A project 'Health Check' was also developed. The post-questionnaire interviews examined the same project from different viewpoints. More detailed knowledge could be acquired on the reasons for the success or failure of the project. These three complementary approaches developed ideas further in order that valid conclusions and recommendations could be drawn. A model, incorporating the key elements in the successful management and development of IS/IT projects, was produced. This model addressed the fundamental aspects from defining the success criteria to reviewing the project in order to IS/IT projects can be more successful in the future.

CHAPTER FOUR

Analysis of results: 'Success Criteria and Factors'

Contents

4.1 Introduction

As has been mentioned in the previous chapter the questionnaire (see Appendix A) required the respondents to consider the two most significant IS/IT projects in which they had been involved. It has been noted that previous research has tended either to concentrate on non-IS/IT projects or to get the opinions of project managers, not the users and sponsors of IS/IT projects. Consequently, 132 projects were examined from project managers, systems analysts, users, sponsors and other support staff.

This chapter will analyse the views on success criteria and the perceived factors that lead to successful projects noted by the different participants in IS/IT development. The results will then be compared with past research on the subject matter.

The first of the questions posed by the research is:

> *'what can be defined as success criteria and what are the factors that impact on the success or failure of IS/IT projects?*

Many commercial organisations have experienced the situation of IS/IT projects not meeting timescales, costing more than was originally budgeted and not meeting user requirements. These are standard criteria for project success mentioned by many authors. This research needs to analyse the success criteria and assess the factors which should be employed to deliver that success.

4.2 Research results

4.2.1 Questionnaire results

i) Criteria

Initially the respondents had to identify the role that they had taken in IS/IT projects. The majority of respondents came into the category of project managers. However, there were many users/sponsors. Some respondents specified multiple roles within the project

environment. A breakdown of all responses (whether they be one or multiple roles) is given in Figure 4-1. All projects specified were IS/IT-related projects.

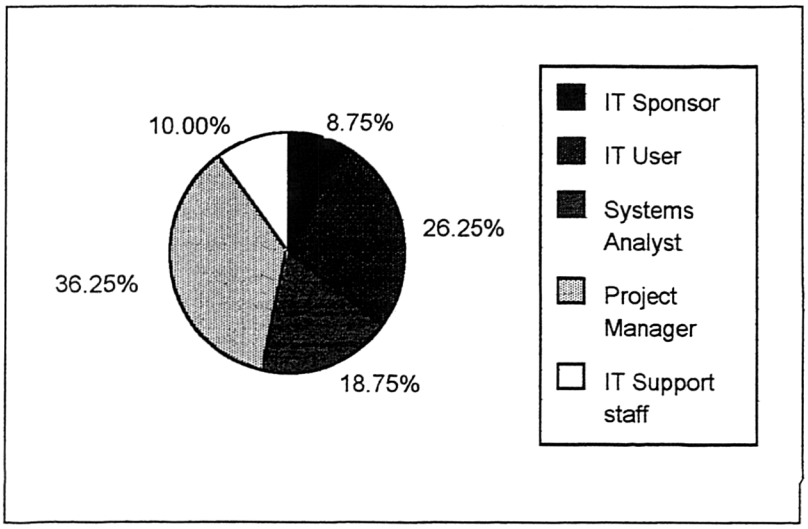


Figure 4-1 - Respondents' Role in Projects

The first question asked was:

> *'What are the five most important criteria of how you judge success for the two most significant projects with which you have been involved?* '

As can be seen from Figure 4-2 the six most important criteria across all respondents and all projects were:

- meets user requirements;
- achieves purpose;
- meets timescale;
- meets budget;
- happy users;
- meets quality.

The results from all respondents on all projects would appear to be predictable, accepting the fact that the highest number of respondents were project managers. There would probably be a higher frequency of mention of 'Happy users' or 'Happy sponsors' if there was a higher percentage among respondents of those two classes. Budget,

timescale and user requirements appear to be still extremely important in judging the success of IS/IT projects. In the economic climate of the late 1980s and early 1990s any development of an IS/IT project needed to show tangible and quantifiable benefits early in its operational life. If the project is delayed or costs more than budgeted the benefits defined in the cost/benefit analysis exercise are unlikely to be realised in the period required by senior management in the organisation. Budget and time are determinants also of commercial success and any delay or overspend would impact on the commercial success of the project. As Walsh and Kanter (1988) suggest:

> *'missing deadlines has more business impact than ever . . . When an application deadline is missed, an opportunity may be lost to reach a new market'.*

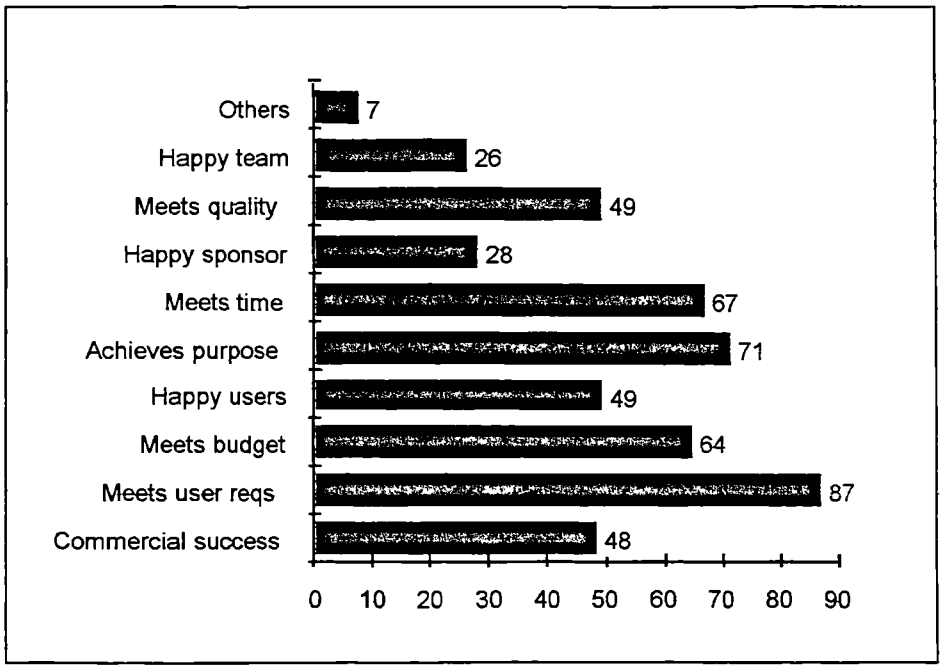


Figure 4-2 - Criteria for success

(all respondents/all projects, % frequency of mention)

However, the overriding emphasis of majority of questionnaire respondents of judging the success of IS/IT projects is the meeting of user requirements, meeting agreed timescales and budgets and achieving the purpose identified at the outset of the project.

If the results on success criteria are analysed from the viewpoint of users and project managers, there is a different emphasis (see Figure 4-3 and 4-4). Users feel that the

system delivered should meet their requirements and that they should be happy with the system. Although achieving timescales and budgets were important, other criteria were more important. Users will not particularly perceive a project as having failed if it is implemented a few weeks late and cost a few thousand pounds more than budgeted. However, if the system does not work and the users are not happy, the project will be remembered as a failure and users will be reluctant to readily involve themselves in another IS/IT project.

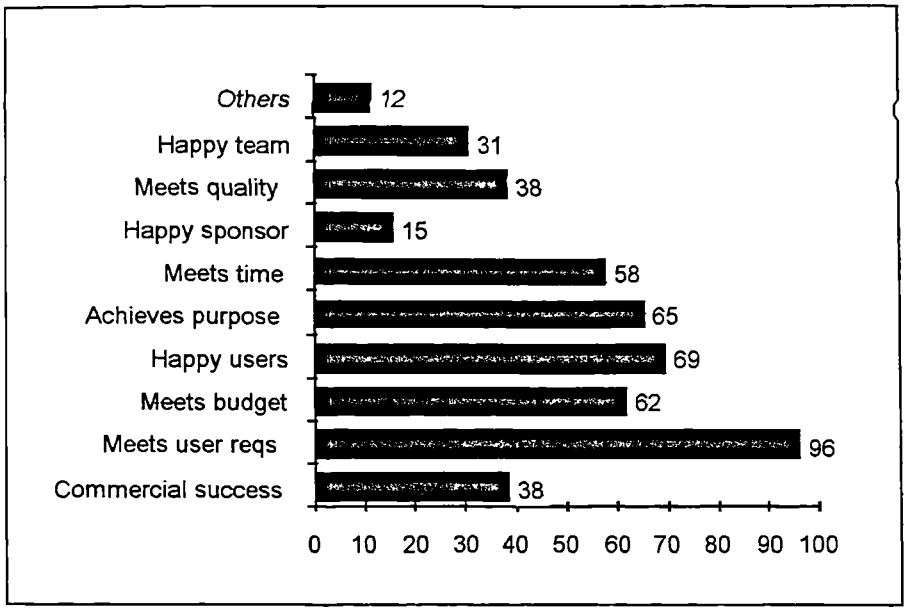


Figure 4-3 - Criteria for success
(users on all projects - % frequency of mention)

Furthermore, users will have performance objectives (such as response times and reliability) and those performance objectives will need to be met. Users will not be happy if they are not!

Project managers, on the other hand, view the commercial success of a project and meeting quality as more important criteria than do users. Cost, time user requirements are still extremely important criteria for success as perceived by project managers. It is not surprising that project managers, with their emphasis on meeting budget and timescales, indicate that commercial success also is an important criteria.

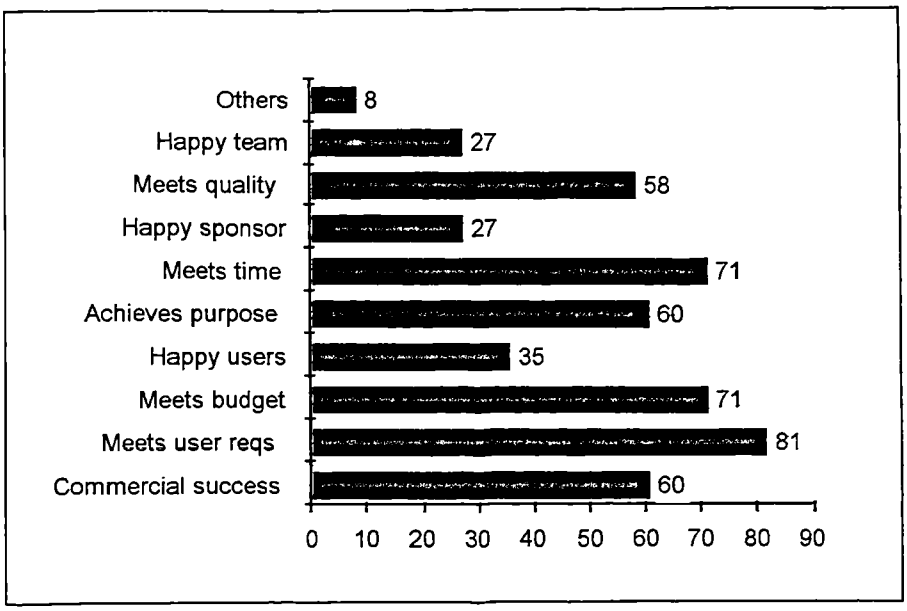


Figure 4-4 - Criteria for success

(project managers on all projects - % frequency of mention)

The conclusion from the results indicates that project managers are concentrating on meeting the time and budget constraints which are set by senior management as opposed to delivering a product with which the users are happy. The reason for project managers' emphasis on these criteria is often because they are appraised by their superiors on their ability to deliver projects within these time and budget constraints. Therefore, they plan and monitor the project exhaustively in their attempt to deliver projects which meet time, budget and user requirements. This is, in their eyes, the sign of a successful project.

With the desire to achieve time and cost constraints, project managers do not put great emphasis on the users being happy with the system. This is further emphasised by the results from systems analysts where again 'meeting user requirements' was extremely important but 'happy users' was not a major success criteria. 'Meeting user requirements' was paramount but users are generally not happy with IS/IT projects. This leads to the conclusion that project managers and systems analysts implement their interpretation of user requirements and not the users' interpretations. They produce a system whether the users like the system or not.

If we look at the results for failed and successful projects between users and project managers (see Table 4-1), we see there is a distinct emphasis by project managers for meeting timescales and budgets on failed projects. On the other hand, on successful

projects they are focusing on the commercial success (time, budget and functionality) and quality constraints. Users are more concerned that their requirements are met and that they are happy with the project. Systems analysts are very much in line with project managers' views that time and budget are paramount in delivering successful projects. This is again not surprising as many project managers come from a technical or computing background and were systems analysts before moving into project management. The emphasis on meeting time and budget constraints is instilled in technicians early in their working life and this appears to stay with them throughout.

In the opinion of users, the criteria for measuring success is straightforward: it must meet their requirements, it must achieve its purpose, they (the users) must be happy and, if possible, the project should be delivered on time and within budget. Successful projects meet these criteria, unsuccessful projects don't!

Others (including sponsors) perceive that achieving purpose and meeting budget are the major success criteria. They are more interested in ensuring that projects reap the benefits and meet the costs that were identified. Sponsors are investing money in the project and they naturally wish to see the project realise benefits within the budget. The failure to meet a budget (and time) is likely to affect the realisation of those benefits.

There appears to be a greater agreement on the criteria on successful projects than on those projects which were perceived as having failed. However, it is clear that different criteria will be important on different projects. It is necessary to agree the criteria at the outset and all participants need to work towards achieving the criteria for the project to be perceived as successful by all parties. If there can be greater convergence of the criteria by all parties in the project, there will be a greater chance of success. Agreeing the criteria at the outset of the project would be one way of achieving that convergence.

Users		**Project Managers**	
Criteria	**%**	**Criteria**	**%**
All projects			
Meets user requirements	96	Meets user requirements	81
Happy users	69	Meets budget	71
Achieves purpose	65	Meets time	71
Meets budget	62	Commercial success	60
Meets time	58	Achieves purpose	60
Successful projects			
Meets user requirements	96	Meets user requirements	86
Happy users	71	Commercial success	71
Meets budget	71	Meets quality	67
Meets time	67	Meets budget	62
Achieves purpose	57	Achieves purpose	62
Failed projects			
Meets user requirements	100	Meets budget	83
Achieves purpose	100	Meets time	78
Happy users	67	Meets user requirements	78
Happy team	67	Commercial success	61
Commercial success	67	Meets quality	56
Others		**Systems analysts**	
Criteria	**%**	**Criteria**	**%**
All projects			
Achieves purpose	100	Meets user requirements	90
Meets user requirements	71	Meets time	90
Meets budget	64	Meets budget	70
Happy users	64	Commercial success	70
Meets time	57	Achieves purpose	70
Successful projects			
Achieves purpose	100	Meets user requirements	89
Meets budget	86	Meets time	89
Happy sponsor	57	Commercial success	78
Meets time	57	Meets budget	78
Meets user requirements	57	Achieves purpose	67
Failed projects			
Meets user requirements	86	Meets budget	100
Achieves purpose	86	Meets time	100
Happy users	86	Meets user requirements	100
Meets budget	57	Achieves purpose	100
Meets time	57	Happy sponsor	100
Meets quality	57		

Table 4.4 - Five major criteria for success

The conclusion must inevitably drawn that the fixation, on the part of project managers particularly, to satisfying timescale and budget constraints, at the expense of other criteria, is leading to the failure of IS/IT projects. It may also be the case that project managers are applying the wrong factors, or simply applying the right factors badly (such as too much detailed planning, not enough high level planning) to achieve the success criteria instead examining and controlling the products and user functionality (by employing configuration management).

The questionnaire results were then tested for significance, and were found to be significant if the test result fell outside the range -1.96 to 1.96, assuming differences follow a normal distribution. This will give a 95% level of confidence in the results. It can be seen as highly significant (99% confidence level) if the result is more than 2.58 in either direction from the mean. The questionnaire results were examined for both the criteria and factors, from different participants' viewpoints and from the assessment of perceived failed projects compared with successful ones. The results of these analyses are shown in Tables 4-2, 4-3, 4-6 and 4-7.

Criteria	User vs PM	User vs SA	User vs others	PM vs SA	PM vs others	SA vs others
Commercial success	-2.58	-1.96	-0.15	-0.20	2.02	1.66
Meets user requirements	1.60	0.66	2.15	-0.61	0.84	1.10
Meets budget	-0.43	-0.19	0.15	0.11	0.53	0.29
Happy users	3.10	2.72	0.42	0.67	2.20	2.15
Achieves purpose	0.48	-0.42	-2.62	-0.78	-3.00	-2.92
Meets time	-0.55	-1.60	0.33	-1.33	0.82	1.75
Happy sponsor	-1.04	-1.46	-1.77	-0.72	-1.01	-0.14
Meets quality	-1.86	-0.14	-0.33	1.23	1.21	-0.14
Happy team	0.54	1.20	1.04	0.92	0.70	-0.31
Others	-0.25	0.94	0.13	1.06	0.34	-0.86

PM = Project managers
SA = Systems analysts
others includes sponsors

Table 4-2 - Significance test of criteria (comparison of participants)

We can see that there are highly significant differences between the users and project managers/systems analysts on the importance of users being happy with the project. There is also a significant difference, between users and project managers, in the perception of commercial success as a criteria. Inherent in this is the importance of achieving time and

cost targets. On the other hand, we can see that it is highly significant that sponsors feel that the project should achieve its purpose.

Having looked at all projects, there was a necessity to analyse the results to see if there was significant variations in the failed and successful projects (see Table 4-3). The conclusion from this is that there is not the emphasis, on the part particularly of IS/IT practitioners, on satisfying users. This confirms earlier findings that budgets are seen as more important. The more a project costs, and the longer it takes to implement, the less profitable will be the project. Sponsors feel that the project team needs to be happy and that is apparent on successful projects and perhaps neglected on failed projects.

Criteria	Users	PMs	SAs	Others
Commercial success	1.33	-0.83	-1.69	-0.73
Meets user requirements	0.39	-0.78	0.37	1.55
Meets budget	-1.33	1.81	-1.69	-1.55
Happy users	-0.17	1.25	2.21	2.19
Achieves purpose	1.46	-0.91	0.72	-1.36
Meets time	-1.13	1.30	0.37	0.00
Happy sponsor	0.84	-1.81	1.35	-1.42
Meets quality	-1.46	-0.87	-0.90	1.42
Happy team	1.55	0.79	-0.37	-2.00
Others	-0.57	-1.09	0.00	1.36

Table 4-3 - Significance test of criteria (failures vs successes)

There is general agreement from all parties that the project should meet the specified user requirements. However, there is a variation in emphasis in other areas. The conclusions from the research into success criteria (see Tables 4-2 and 4-3) are:-

- Users feel that the system delivered should meet their requirements and that they should be happy throughout the project and on its final implementation;

- Project managers view the commercial success of a project as extremely important. They concentrate on budgetary and time constraints to achieve that commercial success;

- Project managers and systems analysts implement their interpretation of user requirements and not the users' interpretations;

- The fixation, on the part of project managers particularly, to satisfying timescale and budget constraints, at the expense of other criteria, and focusing on inappropriate factors, is leading to the failure of IS/IT projects;

- Sponsors feel that the project must achieve its purpose and meet budget constraints, thereby realising and maximising the benefits of the project.

- Systems analysts feel that time is of overriding importance in judging the success of the project.

ii) Factors

Having identified the criteria for success, the respondents needed to identify their perceptions of the possible causes of failure (the key factors). Respondents were asked:

'what the five main causes of failure in IS/IT projects?

The results (see Figure 4-5) show that there are five predominant causes of failure in IS/IT projects. As can be seen, the 'top' five responses were very similar in importance but were some way ahead of the next factor - wrong emphasis on criteria. The results tend to contradict previous research (Slevin and Pinto (1986)) where it was identified that the most likely causes of failure are factors that occur early in the project - poorly defined objectives and poor planning. It would appear that the cause of IS/IT projects potentially failing, from these results, could occur at any time during the life cycle although Pinto and Slevin's research and Philips survey (see Tables 2-1, 2-3 and 2-4) indicate similar factors.

If we look at the relationship between project objectives and the life cycle, there is one conclusion which can be drawn - matters will get much worse, the further the project progresses. If the objectives have not been defined clearly at the outset and the project is not planned with defined objectives the level of success is unlikely to increase in the execution phase. From personal observation and discussions with practitioners in

industry the likelihood of success will never improve because there is no common goal at which the project manager, team, users and sponsors can aim.

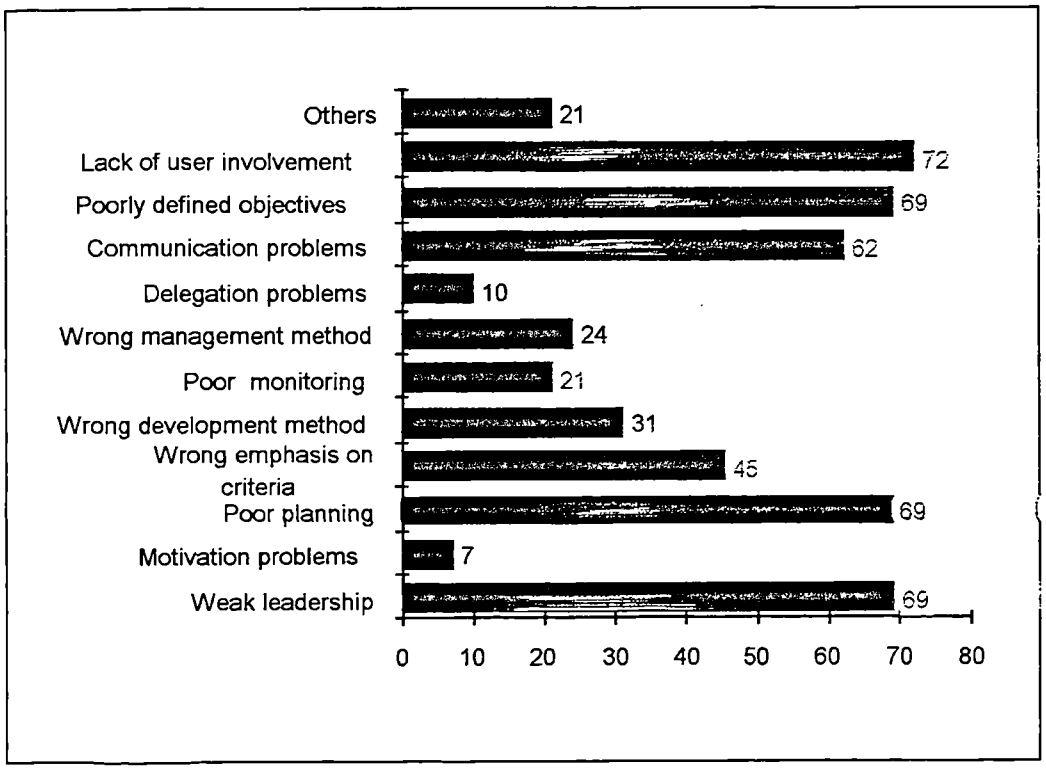


Figure 4-5 - Major causes of failure

However, previous research differed substantially from the observations of IS/IT project participants in industry by identifying 'Project Mission' or 'Clearly Defined Objectives' as the key to success. The results of the questionnaire show that the second most frequently mentioned cause of failure was the lack of any defined objectives - the establishment of a clear, precise and realistic terms of reference at the outset of the project. This is quite contrary to the views of IS/IT practitioners which were analysed (see Table 2-9). It is no surprise, therefore, that projects continue to fail when IS/IT professionals seemingly ignore the fundamental activity in any project of defining the project mission. These results point to the fact that clearly the objectives and purpose of the project is becoming extremely important and being seen as important by all parties but the differences emphasise the view that the factors will vary on different projects, depending on the criteria set for the project. If the criteria is defined and agreed by all parties, the appropriate factors to achieve that criteria can be selected.

There were, however, differences in the perceived causes of failure, when we examine the responses from users and project managers. Users felt that the most important factor leading to project failure was the lack of user involvement. Despite the prevalent use of structured analysis and design methodologies (with the claim that they encourage user involvement), many users still see this as a problem. This calls into question the effectiveness and the use of structured systems analysis and design methodologies. This is, from a user's view, is a potential cause of failure (see Table 4-4) and a problem on failed projects (see Table 4-5).

Users	**%**	**Project managers**	**%**
Lack of user involvement	77	Weak leadership	71
Poorly defined objectives	77	Poorly defined objectives	71
Poor planning	77	Poor planning	64
Communication problems	62	*Communication problems*	*57*
Poor monitoring	62	Lack of user involvement	57
Others	**%**	**Systems analysts**	**%**
Weak leadership	67	Poor planning	100
Communication problems	67	Communication problems	75
Lack of user involvement	44	Lack of user involvement	75
Poor planning	44	Poorly defined objectives	75
Poor monitoring	44	Development method	50

Table 4-4 - Possible causes of failure

On the other hand, project managers felt that weak leadership was the main cause of failure. Project managers believe that leadership for the project should come from senior management, rather than themselves. Consequently, we can substitute 'top management support' for 'weak leadership'. However, the results of this research bear little correlation with the analysis carried out in Chapter 2 (see Tables 2-7, 2-8 and 2-9).

We can see that the possible causes of project failure, from the viewpoint of project managers, occur in the early stages of the project life cycle. Project managers need to define the criteria and objectives at the outset of the project and plan appropriately. If the objectives are not specified and the criteria not agreed, the chances of success will be seriously compromised. However, that will not be enough. Project managers cannot sit back having established the success criteria, defined clearly the project objectives and carried out high-level planning. The objectives and criteria may vary as the project

progresses and the project manager needs to monitor that variation constantly with the users and act accordingly.

Users	**%**	**Project managers**	**%**
All projects		**All projects**	
Lack of user involvement	81	Weak leadership	74
Poorly defined objectives	75	Poorly defined objectives	74
Poor planning	69	Poor planning	71
Communication problems	69	Communication problems	55
Poor monitoring	63	Lack of user involvement	55
Failed projects		**Failed projects**	
Lack of user involvement	100	Weak leadership	76
Communication problems	100	Poorly defined objectives	76
Emphasis on criteria	67	Poor planning	76
Poorly defined objectives	67	Communication problems	53
Poor monitoring	67	Lack of user involvement	53
Others	**%**	**Systems analysts**	**%**
All projects		**All projects**	
Weak leadership	71	Poor planning	100
Lack of user involvement	71	Communication problems	80
Communication problems	65	Lack of user involvement	80
Poor planning	53	Poorly defined objectives	60
Emphasis on criteria	47	Development method	60
Failed projects		**Failed projects**	
Lack of user involvement	100	Poor planning	100
Weak leadership	75	Communication problems	100
Communication problems	63	Lack of user involvement	100
Poorly defined objectives	63	Poor monitoring	100
Emphasis on criteria	63	Development method	100

Table 4-5 - Causes of failure

The comparison between these different parties (see Table 4-6) highlight a number of significant differences. Project managers perceive that weak leadership (interpreted as 'Top management support') is a very significant possible and actual cause of failure in IS/IT projects. Sponsors also see weak leadership as a significant cause. In this case, they may feel that the project managers are not leading the users effectively. Sponsors further take the view that projects can often be perceived as having failed if there is a wrong emphasis on success criteria. Users surprisingly highlight the importance of monitoring the project as well as planning. What they probably mean here is poor configuration management, that is poor monitoring of their requirements and the system components and products, and not poor monitoring of the project against the plan.

We can see a significant difference between systems analysts and project managers on the development method. The systems analysts are using the development method on a daily basis and they feel that the method is in many cases inappropriate. Project managers on the other hand are primarily concerned with the management method. This points to the fact that project managers need to acquaint themselves with the development method and life cycle and choose an appropriate method for the project. There is also a significant difference between project managers and users on the management method used. Users are not concerned about the method used provided that they are involved throughout the project in order that the project is successful. There does not appear to be many significant variations in the comparison of factors between failures and successes (see Table 4-7). This indicates that the same factors are used on the majority of projects, whether they are successes or failures. However, it is the definition of criteria by which the success of projects is judged and not the application of the factors.

Factors	User vs PM	User vs SA	User vs others	PM vs SA	PM vs others	SA vs others
Weak leadership	-1.25	1.42	-0.83	2.39	0.27	-2.02
Motivation problems	-0.40	-0.91	-0.60	-0.68	-0.23	0.47
Poor planning	-0.16	-1.43	0.96	-1.39	1.25	1.92
Emphasis on criteria	1.08	1.62	-0.60	1.18	-1.75	-1.92
Development method	0.73	-1.45	-1.06	-2.19	-1.92	0.74
Poor monitoring	2.70	0.10	2.44	-1.73	-0.52	1.25
Management method	-2.18	-0.91	-1.04	0.68	1.30	0.12
Delegation problems	-0.70	-0.57	-1.04	0.85	-0.45	-1.01
Communication problems	0.92	-0.49	0.24	-1.06	-0.66	0.65
Poorly defined objectives	0.06	0.65	1.75	0.66	1.88	0.51
Lack of user involvement	1.79	0.06	0.62	-1.06	-1.07	0.42
Others	-2.36	0.57	0.06	1.70	2.45	-0.56

PM = Project managers
SA = Systems analysts
others include sponsors

Table 4-6 - Significance test of factors (comparison of participants)

Where there was a wrong emphasis on the success criteria as perceived by project managers on failed projects, the meeting of timescales, budgets and user requirements are seen as the major criteria. This indicates that if project managers concentrated on other criteria, such as happy users or achieving purpose, projects would be more successful, reinforcing the necessity for convergence on criteria.

Factors	Users	PMs	SAs	Others
Weak leadership	-0.89	-0.32	-0.56	0.38
Motivation problems	-0.50	0.43	-0.56	-1.42
Poor planning	-1.47	0.74	0.00	0.74
Emphasis on criteria	1.16	1.87	0.00	1.20
Development method	0.37	0.25	0.91	0.70
Poor monitoring	0.17	-1.59	0.91	-1.44
Management method	-0.50	0.73	-0.56	-1.80
Delegation problems	-0.50	-0.21	0.00	-0.52
Communication problems	1.30	-0.23	0.56	-0.18
Poorly defined objectives	-0.37	0.32	-1.37	1.20
Lack of user involvement	0.92	-0.23	0.56	2.51
Others	-0.50	-0.43	0.00	-0.97

Table 4-7 - Significance test of factors (failures vs successes)

Additionally, respondents were asked to plot on a 2 x 2 matrix how well defined were the criteria for success (the ends) and the possible causes of failure (the means) at the outset of the project. The results show that successful projects had the means and the ends generally well defined. Conversely, failed projects generally had means and ends badly defined. There were exceptions. If we look at the scatter diagrams (see Figure 4-6 and 4.7), projects can be successful despite not having criteria or factors or both well defined. However, there are obviously greater chances of success if the criteria and factors are well defined.

When projects, where the criteria were perceived as not being well defined, are examined, budgets and timescales are the major criteria specified (80% and 84% frequency of mention for successes and failures respectively). Of all projects where factors were well defined, irrespective of the criteria, 68% were identified as successful projects. However, of all projects where criteria were well defined, again irrespective of the factors being defined, nearly 81% were identified as successful projects. It would appear from the projects shown in Figure 4-6 that projects are more likely to be successful if the success criteria, as opposed to the critical success factors, are defined at the outset.

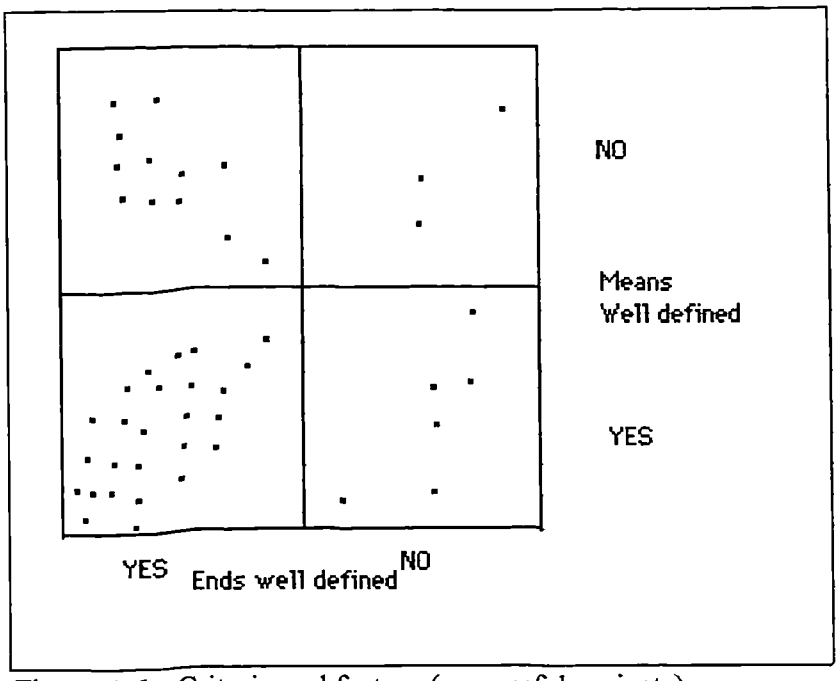


Figure 4-6 - Criteria and factors (successful projects)

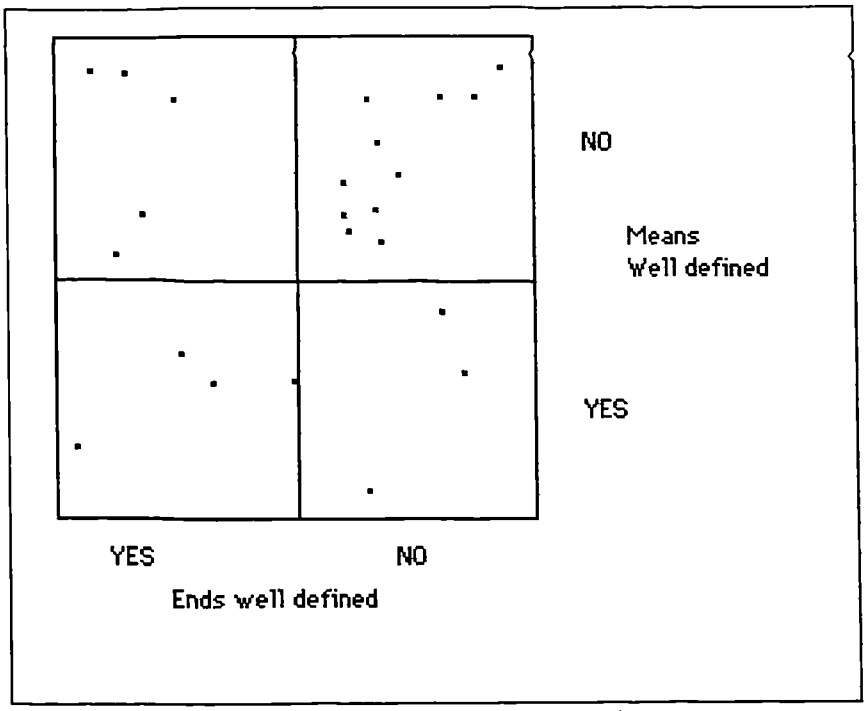


Figure 4-7 - Criteria and factors (failed projects)

43% of respondents (representing 55% of successes) viewed that the projects selected defined well the means and the ends of the project at the outset; 20% of respondents (representing 48% of failures) identified that the ends and the means were not well defined at all at the outset of the project and only 13% of projects were identified as having the means well defined and the ends not. This would appear contrary to the view

put forward by Turner and Cochrane (1993) where, they suggest, IS/IT projects tend to have the criteria ill-defined but the factors well defined.

In the majority of cases the success criteria and subsequently the success factors are not defined at the outset of the project. Although there are more than twice as many (67% as opposed to 33%) successful projects identified as failures (see Figure 4-6 and 4.7), projects are more successful if the criteria are defined. However, there is always the question of 'perception' of success. Managers may perceive the project to be successful but other participants may not. Furthermore, project managers may believe that their own perceived success criteria were defined for the project, whereas a user may not. If the project met budget and time constraints, it may be seen as successful by the project managers. However, a user or sponsor may not perceive those criteria as important. We have seen from the earlier responses and analysis that in fact users and sponsors do have different perceptions of a successful project. Consequently, interviews (see section 4.2.2) were subsequently carried out to examine individual projects from the viewpoints of the different project participants.

However, it is clear from the results that:

> *'the better the criteria and factors are defined at the outset of the project, the better the chances of success!'.*

There are inevitably exceptions to the rule. Projects may be seen as successful even though the criteria and factors are not well defined. Figure 4-6 shows that over 6% of projects succeeded despite this being the case. Conversely, projects can be seen as having failed despite the criteria and factors being well defined at the outset of the project. From Figure 4-7 we can see that over 17% fell into this category. Although projects can succeed 'against all the odds' or projects can fail despite everything seemingly being done, there is no doubt that the success criteria and the factors required to deliver that success need to be defined clearly at the outset of the project.

Therefore, the questionnaire results point to the following action:

- define the success criteria and the factors to deliver that success criteria at the outset of the project;
- the criteria must look more to user satisfaction and achieving its purpose, not simply at standard criteria of time, budget and user requirements. Too great an emphasis on budget and time, particularly on the part of project managers, is leading to failed projects. There needs to be greater convergence;
- factors need to be applied to deliver that success criteria.

However, the results point to some major critical success factors:

- clear definition of the objectives of the project;
- strong leader;
- user involvement;
- communication;
- project plan;
- control, monitoring and feedback on the requirements and the plan.

Although the results here do not show complete agreement on the success factors, we can identify certain success factors which are important on many projects. However, more importantly, all participants need to agree the direction of the project and how the project is to be judged as a success. Otherwise, there will inevitably be the situation where project managers may judge a project as successful whereas a user may not (and vice versa). Only by agreeing the criteria at the outset can the project take its first tentative steps towards success.

The results of the questionnaire examined specific projects but particular projects were not assessed from the viewpoints of different participants on the same project. The next stage of data gathering was to examine individual projects and assess the views of the different participants on the same project.

4.2.2 Interview results

If we look at the projects that were perceived as being overwhelmingly successful, it is noticeable that in these cases the success criteria were defined at the outset of the project. In fact, project managers and other team members felt that it was of the utmost importance to begin the project with a start up meeting that addressed this particular point to establish the success criteria. On the other hand, the projects that were perceived as failures (completely or otherwise - there could be varying degrees) did not invariably establish the success criteria. If success criteria on these 'failed' projects were established, the project manager addressed only the areas of meeting timescales, budgets and user requirements. As we have seen, the emphasis on budget and timescales have led to a number of project failures. Moreover, projects had timescales set, very often by senior management, which were seen as too tight, leading to a lack of motivation on the part of all parties - the project was doomed before it started! There was also the difference of opinion between the various participants on the criteria that would measure that success. This confirms the results of the questionnaire.

If we look at the success factors that were employed, the emphasis on the successful projects was on having:

- clearly defined objectives;
- the appropriate development method and the life cycle for the project;
- good communication;
- good planning, scheduling and monitoring of the project;
- the right people (technical and users) on the project at the right time and involving these people in the project throughout.

It was seen as of the utmost importance to get the eventual users (or appointed representatives) of the system involved in the development process - analysis, design and implementation - as part of the project team. There was complete involvement in project meetings as the project progressed, in testing and in training. This led to a happy project, which achieved the requirements of the user, and a happy project team (sponsors, users and technicians), who felt good about working on the project and

worked to make the project a success. The success criteria were defined early in the project and the team decided on the factors that were important to deliver that success (see Appendix D.1). However, this approach does not appear to be common on IS/IT projects today.

The major concern (see Appendix D.1) was that, where the project posed logistical problems (such as those on international projects), there were problems when only a representative of the eventual operators of the system was present for training, and not the operators themselves. This fact further emphasises the point of having the right people on the project at the right time.

We have noted that planning and scheduling is seen as an important factor contributing to the success of projects but that it is the right amount of planning that is important - too much is as bad as too little. The results of the project reviews confirm the view that planning needs to be appropriate for the situation. Plans were drawn up (*it was felt that* it would be foolish not to!) but strategic planning was carried out at the start of the project and then detailed planning was undertaken when appropriate. The plans were then monitored as the project progressed. However, the emphasis was not on the planning but on team building and user involvement. Additionally, some project managers felt that it was important to carry out an assessment of the risks, again at the outset of the project, and manage those risks as the project progressed. These again were projects which were seen as successes. In short, projects which were planned strategically and were assessed for risks were perceived to be successful. These projects also carried out a formal and in-depth review of both the process and the outcome in order to assess the performance of the project. The less successful projects did not invariably carry out this review process. The review process itself will not make a project successful but subsequent projects will stand a better chance of success if the participants learn from the experience. Furthermore, most of the projects (see Appendix D.8) did not measure the benefits to assess whether the project delivered any benefit to the sponsor or client. Only one project (see Appendix D.1) carried out any evaluation of the project after implementation.

Furthermore, it was interesting to note that the projects that were perceived to have succeeded were relatively small projects (in terms of timescales and complexity) whereas failed projects were much larger involving many people, over a long time, and having great complexity.

Consequently, the results of the interviews confirm the conclusions of the questionnaire. To increase the chances of a successful project:

- the criteria (not just timescales, budget and user requirements) need to be defined at the outset of project;
- projects need to be planned strategically at the outset;
- there needs to be an assessment of the risks involved; the risks need to be managed, again as the project progresses;
- projects need to be of a relatively small-scale;
- careful staffing of the project is necessary; the project must be initiated with the right people in the right positions (with positions reviewed as the project progresses);
- the users need to be involved in the project;
- each project must go through a review process as part of the project life cycle

The results of this research, both questionnaire and interviews, need to be examined with reference to previous research carried out and highlighted in chapter 2.

4.3 Comparison with previous research

Many of the case studies given in Chapter 1 show that the three standard criteria are still regarded as the measure of success. However, there are other criteria to add to the standard criteria (noted by Keen (1981), Block (1983), Morris and Hough (1987), Kerzner (1989) and Turner (1993a)) and these other criteria (achieving purpose, a commercial success, meeting needs of users and sponsors) have been raised as important in this research. Budgets and timescales may be important but it is the responsibility of all parties to discuss this matter and agree the criteria.

There is no obvious agreement on the success criteria for any individual project. That should not come as any surprise. Different projects have different objectives - timescales may be paramount to one project (for example, the implementation and operation of a payroll system at the start of the financial year) but not so important to another (for example, the feasibility study for the use of a structured systems analysis and design methodology). It is very clear from the previous and this research that many project managers do not agree the success criteria for the project. Each party defines its own criteria and very often is moving in a different direction.

Ashley *et al.* (1987) drew relationships between the criteria and factors. They concluded that there were direct cause-effect relationships between them. However, their sample size was small (only 16 projects) and all the projects were construction projects. Despite the limitations, it shows that there is a link between the criteria and factors. Morris and Hough (1987) confirmed this view. Furthermore, they identified that a number of factors were significant in implementing an outstanding project as opposed to an average one. In comparing the results given above (see 4.2.1), there are similarities but there are differences. This could be explained by the fact that the projects assessed were in different industries.

There is, however, agreement, both from previous research, limited though it is, and from the analysis of this research, on the fact that the project must meet user requirements and functionality otherwise the project will undoubtedly be considered a failure. However, people do not always see failure in a clearly defined manner, not as black and white; there are several shades of grey. A project (see Appendix D.10) was perceived as completely successful by the project team - it met user requirements and timescales. That was the project team's criteria for judging success. However, the user was not completely happy, citing the development process and user involvement as crucial areas where the project proved less than successful but the user did not perceive it as having failed completely. The outcome of this project was not seen in the same light by different parties, because each party was aiming at a different target.

Consequently, there needs to be a greater emphasis on defining the success criteria at the outset of the project and then applying the appropriate factors to achieve that success.

This research confirms that there is currently a greater emphasis in this area than in the past but it is not very widespread. However, those organisations and projects are still few and far between.

One shortcoming of the previous research has been that it simply examined the factors. Furthermore, the majority of the research has been carried out from the viewpoint of the project managers. In contrast to this, Lyytinen (1988) carried out research by looking at project failures from the viewpoint of 34 systems analysts. This was a relatively small number and Lyytinen recognised the limitations of his research. Furthermore, the results of this research are far from conclusive because of the low number of respondents who identified themselves as systems analysts. However, Lyytinen's results compare closely to the results of this research - systems analysts tend to implement their interpretation of user requirements and not the interpretation of the users themselves. Lyytinen (1988) suggests that:

> *'Systems analysts' view of failed systems. . . . differs from the users or management view'*

The evidence of the research supports this view and it is no surprise. It further enhances the notion that the criteria needs to be agreed at a start-up meeting and factors need to be applied to deliver that success criteria.

Block (1983) further identifies that if corporate and project goals are not understood and teams target their own personal goals:

> *'The project team will proceed in a different direction than is desired. This usually results in the project team's trying to build the wrong system.'*

We have seen from the questionnaire results that there is the tendency for project managers and systems analysts to build the system to their interpretation of the requirements, emphasising their own personal goals rather than those of the organisation or the users. The way to overcome this problem is to define the objectives and direction at the very outset of the project.

The most frequently mentioned cause of failure in the questionnaire was the lack of user involvement. This equates to Pinto and Slevin's 'Client consultation' which they identified as a critical across the phases of the system life cycle. The results, by identifying user involvement as the most important cause of failure, here clearly support this view and the results of the Philips survey (see Tables 2-3 and 2-4).

Another major cause of failure, identified by this research, was poor planning. This is a task - a high level plan of user functionality, not detailed planning - that needs to carried out at the early stages of the development cycle, assuming that the team have clear terms of reference defined prior to the planning process. This view is very much in line with the one put forward in the research and observations reported and analysed in Chapter 2.

Previous evidence from research and observations (see Tables 2-7, 2-8 and 2-9) on projects shows that predominantly planning and scheduling are seen as the most important factors in project success. The results from this research point out that planning is still of extreme importance in determining the success of IS/IT projects. However, user involvement, the definition of the project mission and the objectives of the project are also extremely important.

It has been noted that much of the research so far undertaken has examined management views, not the views of users. The results of the author's research, in addressing this issue, has shown that users feel that the lack of user involvement is the most contributory factor to failed projects. Research by Saarinen and Saaksjarvi (1990) showed that:

> *'the quality, not the quantity, of participation is of key importance. A good balance between both user and systems analyst participation and competence is needed for all phases of the development life-cycle to succeed.'*

This is a very important statement. It is not enough just have the involvement of users on a project. As was identified in the project reviews, it is important to have the right people and the right time - high quality involvement with the users understanding the

development process and the tools and techniques used in the process. The evidence of their research points to the necessity for the definition of corporate and project goals - the Project Mission - and greater and more effective communication in IS/IT project development. However, the challenge is to get all participants to agree on the success criteria and then apply appropriate factors to deliver that success - two activities that are very often absent from current IS/IT development. The conclusions will address this specific area of criteria and associated factors.

4.4 Conclusion

Researchers and observers have identified a number of critical success factors without looking in detail at the criteria defined for successful IS/IT projects. Apart from the standard success criteria, meeting timescales, budgets and user requirements, only Morris and Hough (1987) and Turner (1993a) appear to have defined in more detail the criteria for success. A more extensive list of key criteria has been proposed:

- it is profitable for the sponsor/owner and contractors
- it achieves its business purpose
- it meets its defined objectives
- it meets quality thresholds
- it is produced to specification, within budget and on time
- all parties (users, sponsors, the project team) are happy during the project and with the outcome of the project on implementation

As has been seen from this research, all participants need to define and agree the criteria for success by which the project is to be measured before the project is started. This is something that is rarely completed on projects and, as a consequence, there are still a large number of unsuccessful projects. Where the criteria are defined, very often there is a conflict between project managers (who perceive time and cost as important) and users (who perceive that they need to be happy at project implementation). Therefore, although the criteria defined will vary on different projects, the criteria for success needs to be agreed by all parties at the outset and reviewed as the project progresses. Moreover, the criteria needs to take account of the users' and sponsors' feelings. It must

be a joint exercise. Otherwise, the different groups will set off on a journey down different routes and not arrive at the same destination. Defining the criteria on its own will not achieve a successful project (the project manager and project team may choose inappropriate factors) but at least everybody knows where the project is heading.

This is not, however, the only reason for project failures but, by defining and agreeing the criteria, projects will take a big step towards success. To illustrate this view one project review (see Appendix D.1) identified and agreed the success criteria before the project was started. The project was perceived to be a great success. The project participants believed that was due in part to the definition of and agreement on the success criteria.

Due to the fact that previous research has considered mainly the views of project managers and because project managers mainly focus their attention on meeting timescales and budgets, they concentrate particularly on planning in detail the project (using a multitude of tools and techniques) and not on involving the users in the development process. Successful projects need to have the right amount of planning, not too much, not too little. Furthermore, the planning needs to be completed at the appropriate time, strategically, tactically and operationally. Additionally, the leadership of the project must come from senior management and from project managers themselves, making sure that the users are with them and that the project managers involve the users from the outset.

After agreeing the success criteria, the factors need to be selected in order to deliver that success criteria. Different success criteria will mean different factors, primary and secondary, need to be employed. The author has developed a matrix model (see Table 4-8) identifying the success criteria and, depending on the criteria, the appropriate success factors, of primary and secondary importance, that need to be addressed when undertaking an IS/IT project.

The criteria in the matrix are taken from the first section of the questionnaire (see Appendix A). After examining previous research and the author's responses from the

questionnaire, a list of factors have been identified and used in the matrix. The categories of criteria can be broadly divided up into 4:

(i) satisfying time and cost constraints, thereby creating a profitable project;

(ii) satisfying quality constraints;

(iii) satisfying the needs and specification of users and other parties;

(iv) satisfying the objectives and purpose of the project.

		CRITERIA								
	Success	Comm User	Meets Budget Reqs.	Meets Users	Happy Purpose	Achieve Time	Meets Sponsor	Happy	Meets Quality	Happy Team
	Leadership				S			S		P
	Motivation				S					P
F	Planning	P	S	P	S	S	P	S	S	S
A	Dev. method	P	S						P	
C	Monitoring	P		P			P			S
T	Mgmt. method		S			S				P
O	Delegation				S					P
R	Communication		P		P			P		P
S	Clear objectives	S	P			P			S	
	User involvement	S	P		P	P		P	P	
	Top mgmt. support	P		P			P	P		

P = Primary S= Secondary

Table 4-8 - Criteria/factors matrix

(i) satisfying time and cost constraints, thereby creating a profitable project

Projects are completed to produce a product, which delivers some benefit or purpose. The project must be developed as part of the overall business and IS/IT strategy for the organisation. IS/IT projects need to be undertaken to help achieve the desired objectives of the strategy. The earlier the objectives are achieved and the less the project costs, the greater the benefits accrued and the more profitable will the project be, provided it achieves its functionality and purpose. The predominant factors for satisfying time and cost, and (following on from that) the commercial success of the project are planning and control. Furthermore, the project will need an appropriate development method and the full support of top management to ensure that all resources are available.

(ii) satisfying quality constraints

The measurement of meeting time and cost constraints is objective. However, quality is a more subjective issue. We identified in Chapter 2 that different people will have a different meaning for quality. Furthermore, producing a good quality product does not necessarily mean producing one of the highest quality. However, there needs to be a definition of quality for the product, again made at the outset of the project in order that all parties know what kind of quality is being aimed for.

When assessing the quality of the product, the project manager and the users need to define the quality constraints, alongside the objectives, at the outset. The users may alter their views on quality as the project progresses. To cater for this the project manager needs to concentrate on communication and user involvement where, as a team, they work together to attain the required quality.

All projects identified in the interviews as successful defined and followed a life cycle approach but this approach does not have to be a structured methodology. Many structured methodologies tend to stifle the creativity of team members, an important attribute when undertaking a unique exercise and producing a novel product. However, the approach needs to incorporate Quality Assurance (QA) to essentially prevent defects and errors happening and Quality Control (QC) to identify and eliminate variances from the defined quality. The CAD system at London Ambulance Service was an example of the potential results if QA and QC are either not implemented or not implemented effectively. Furthermore, the project needs to have staff who are familiar with the processes that are employed to assure quality.

(iii) satisfying the needs and specification of users and other parties

Any IS/IT project involves change which affects predominantly the user community. The project is needed to achieve business objectives and these objectives take many guises. For example, there could be a need to rationalise the business or there could be a requirement to reduce staffing levels. Inevitably, the

organisation will change as will the roles and job descriptions of people within the organisations. Some users may not have a job at the project implementation! Consequently, there is likely to be resistance to change.

The project manager, therefore, needs to pay crucial attention to the communication aspects in managing the change. People are often as concerned and unhappy when they are not involved in the change process as when the final product does not meet the requirements and functionality. For example, I had an extension built onto my house. The work for the extension was very efficient and of a particularly high quality in my view. It was implemented a little late but I did not feel that that was particularly important. What was important, however, was that I was not kept informed as the work progressed. The project manager did not communicate with me when, for instance, roofing contractors did not arrive on the appointed date. In short, I would not choose the same builder again! The same issues apply when a software system is developed. If clients and users are not kept informed, they have little confidence in a system and expect it to fail rather than will it to succeed. The contractors may not get another contract. Consequently, the predominant factors for satisfying the needs of project participants are user involvement and communication (particularly for users and sponsors).

However, effective communication and user involvement will not be enough. They may satisfy the needs of users and sponsors, but not the needs of the project team. The project manager will need to provide a high level of leadership and direction. He/she will need to build a cooperative project team, involving all parties in the development process and to motivate the project team. Additionally, he/she will need to delegate tasks to the project team. This does not mean that planning is not important. Planning needs to be carried out but detailed levels of planning will not help satisfy the needs of the various parties at the end of the project - good communication, leadership and motivation will!

(iv) satisfying the objectives and purpose of the project.

In requiring a project to achieve its purpose, the project manager must place the emphasis at the start of the project by clearly defining the objectives - what is the purpose of the project, what benefits are required, what is to be delivered from the project and what activities are needed to achieve that purpose. Again, the project needs to be carefully planned, strategically at first and moving to a more detailed plan at lower levels at the appropriate time. The project also needs to have a high level of user involvement (and top management involvement, if necessary) in order to keep focusing on the purpose, deliverables and benefits of the project.

The model (see Table 4-8) does not mean that factors which are neither primary or secondary are unimportant. However, the project team must concentrate mainly on the factors identified as primary and secondary. This is an essential input to the Health Check (see section 7.3 and Appendix G). Project managers need to use this when dealing with problems on the project. Furthermore, the importance of these factors does not imply the use of automated tools to achieve a successful project. What it does mean is that there is the proper and appropriate level of planning (strategic, tactical and operational). If automated tools (to effectively support the management and development process) can be used, then project managers should encourage their use. If not, then use manual methods.

It is important to note that the project manager needs to be aware of using factors which are 'appropriate'. These factors will vary in their appropriateness depending on the success criteria defined. However, the art of project management is to understand when it is appropriate to apply certain factors. This will be developed through experience, certainly, and through training and education. Aspects of project management development will be addressed in Chapter 6.

However, identifying the success criteria and factors is not enough. The use of methodologies, life cycle approaches, project management tools and techniques have been alluded to in assessing the appropriate factors for success. Consequently, there is

the need to assess the various tools, techniques and methodologies, examine the functionality of the tools and where they do not provide the required functionality for managers of IS/IT projects.

CHAPTER FIVE

Analysis of results: 'Systems for success'

Contents

5.1 Introduction

Having defined the success criteria and identified the factors that affect the success or failure of IS/IT projects, it is necessary to examine the tools, techniques and methodologies available to developers to see whether the use of these will help the development and management process towards successful projects. Are these various tools helping or hindering the development and management process? Are the tools being used and, if they are, are they being used correctly and effectively? The next research question that needs to be answered is

> *what tools, techniques and methodologies are available for the development and management of IS/IT projects and how much are they used in implementing success factors and delivering the system?*

This chapter will look at the tools, techniques and methodologies that are used in industry and whether they can help to overcome the problems of IS/IT projects.

5.2 Research results

5.2.1 Questionnaire results

The sections of the questionnaire focusing on the tools, techniques and methodologies were addressed directly at project managers and systems analysts, examining the development tools, techniques and methodologies applied in IS/IT projects. Respondents were requested to detail their experience and the tools, techniques and methodologies used by their organisations.

Project managers were asked to say how long that they had been managing projects. The majority (61.5% of project managers) had managed projects for up to six years (see Figure 5-1). The number of years and months were specified. If the respondent specified 3 years and 6 months, this will be included in the 3 - 6 year total. The majority of respondents had been project managers for a relatively short period of time but an average of 6 years does indicate that the project managers have worked on a variety of

projects and have experienced many of the problems in project management. However, other responses indicated that there was a wealth of experience - 1 respondent having been managing projects for over 18 years. With this wealth of experience, the responses should be seen as reasonably indicative of current practice.

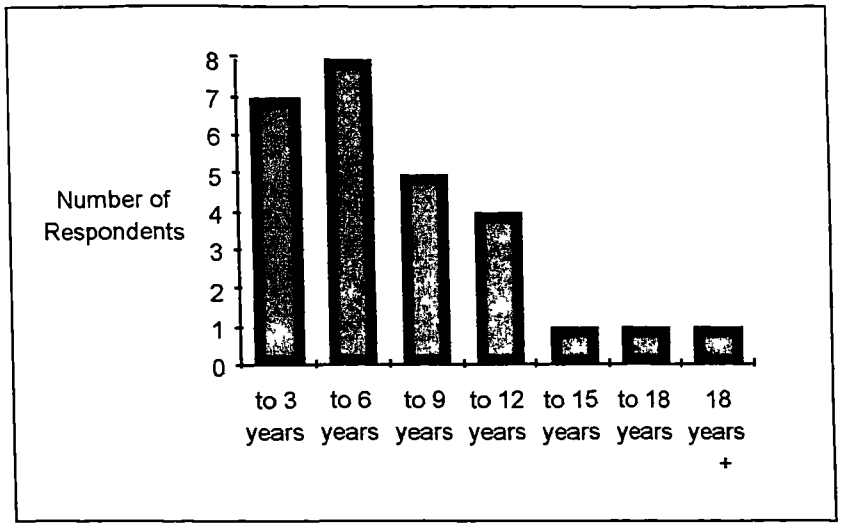


Figure 5-1 - Project managers' experience

Systems analysts were also asked for their experience in the role. They were as experienced in their role as project managers. The average number of years experience was 6. Again, despite the low number of responses from systems analysts, the respondents were relatively experienced.

Having established the relative experience of the respondents the questionnaire asked for the amount of time that they spent on project management. Although the respondents may be considered relatively inexperienced in the project management field, they do spend varying amounts of their time on project management (see Figure 5-2) - as low as 10% (although the current job title of this respondent was 'Director') and up to 100%.

Again we see reasonably experienced managers spending the majority of their working day on management of the project. This again emphasises the fact that the responses can be looked upon as accurate reflections of the current situation and industry practice.

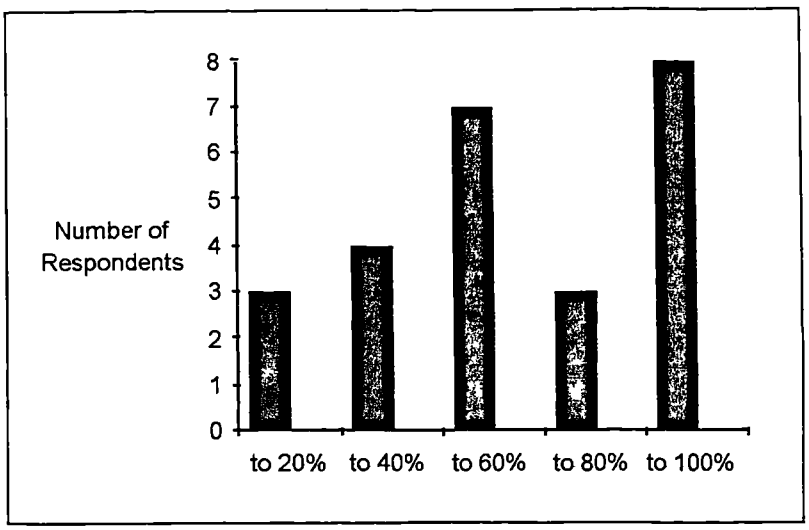


Figure 5-2 - Time spent on project management

In recent years there has been a great increase in the number of project management software tools. Most organisations (some 88% of respondents), it appears, now use project management software during the development of IS/IT projects. Project managers see this software as helping in a number of areas (see Figure 5-3).

Primarily, as expected, the software is seen to help the planning and controlling of the project. However, other areas are seen to be enhanced when using software to help the management of projects.

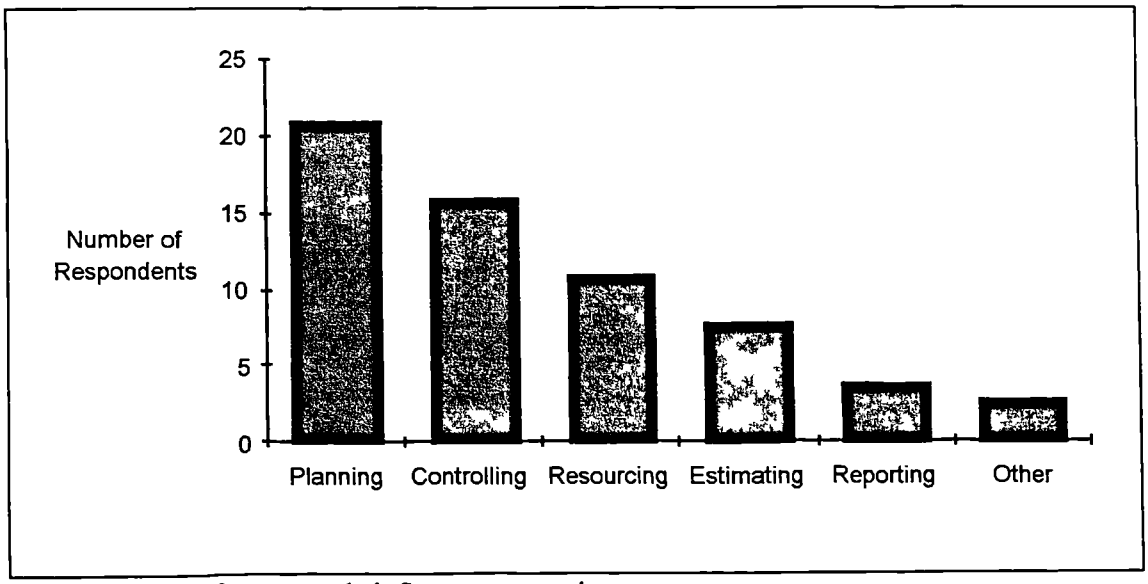


Figure 5-3 - Software tools influence on project management

Organisations use many different automated tools to help manage projects - the most popular being Project Manager Workbench (PMW). One respondent stated that no project management software has been adopted by the organisation since no software meets:

'quality and operational requirements'.

The tools themselves do not always offer a complete answer to the project manager in planning, scheduling, controlling, estimating and reporting the project. The consensus is that they generally help to manage the project better. However, very few project managers viewed that the project management tool available provided all the features required. As regards the functionality and features provided by the software package, the responses (see Appendix A, question 2.9) highlighted that software packages provided only 3.79 (on a scale of 1 to 5) of the features required to manage the project effectively. Furthermore, how much better would be the management of the project if the tools provided the required functionality and features? The question of whether an appropriate tool, providing all the features, would convert a failed project into a successful one is extremely doubtful. A tool can only help in the management of projects and the decision-making process. It cannot make decisions for the manager but having an automated tool which complements the development and management process would be helpful

The respondents were required to give the number of projects on which they had previously worked. There were all sizes of projects but most respondents, project managers and systems analysts, had worked predominantly on smaller type projects (up to 6 man months). The nature of the projects specified were of two types:

- technical (for example, integrating hardware, developing hardware solutions);
- commercial/business environment (for example, MIS/Executive reporting, Accounting, Data entry, Material Requirements Planning (MRP), System implementation).

48% of the respondents said that the projects were developed for internal use.

Most respondents replied that they use a structured methodology for systems analysis and design. The most popular was SSADM, although Yourdon and Object-Oriented were mentioned. The use of a methodology clearly helped the development process as the majority of projects that were reported by systems analysts were defined as successful and of those projects that were successful, the majority used a structured methodology.

The main points which are apparent from the questionnaire research are that:

- most organisations use tools to support the project management process;
- the tools themselves are perceived as useful aids to the management of projects;
- most organisations use a structured systems analysis methodology;
- these methodologies help projects to be successful;
- the methodologies, tools and techniques cannot be used in isolation to produce successful systems.

There still appears, from the viewpoint of the users, to be a lack of user involvement in the development process. Therefore, the use of these different methodologies must encourage communication, participation and involvement in the development process. The emphasis on prototyping as a development approach (prototyping has its own place and procedures in SSADM Version 4) has brought the question of user involvement into sharper focus. It appears from the questionnaire results (and other reports) that, despite using a structured methodology, projects still are not particularly successful. Users identify that the lack of involvement is a major factor in project failures. The use of a prototyping approach in a Rapid Applications Development (RAD) environment will inevitably involve the users in the development process. The evidence of supporting interviews and discussions with project managers and users in industry point to the fact that prototyping is one major way of getting user involvement and helping towards project success.

However, although project managers and systems analysts may view a project as a success, a user on the same project may not. Therefore, in the same way as the criteria and factors for success were assessed by examining individual projects, the tools,

techniques and methodologies were examined to assess their effectiveness on individual projects.

5.2.2 Interview results

The reviewed projects showed a number of similarities. All projects used a project life cycle approach of some kind and many projects incorporated prototyping as part of that life cycle approach. Furthermore, prototyping was seen by many project managers and users as an integral part of the development process, particularly to gain user involvement and good communication between all parties. Furthermore, users of the reviewed projects felt that the prototyping approach was particularly beneficial to the overall success of the project, in terms of their happiness as the project progressed and on implementation.

Although methodologies, tools and techniques were available, they were not used to any great degree. The emphasis of project managers in many cases was on the user aspects of the project (communication and involvement) rather than the planning aspects. Some projects placed much importance on the establishment of an appropriate project team structure (see Appendix D.1 and D.8) and these were relatively successful. There was a feeling that the establishment of a good project organisation would help projects towards success (see Appendix D.12). Automated tools for project management and system development were also employed but again not to any great degree. These tools are available to system developers and project managers in organisations (previous research and the questionnaire results suggest that they are very prevalent) but they are often not seen as helping to develop a successful system although some projects made use of CASE tools and project planning and scheduling software (see Appendix D.10). Where time constraints were important, it was apparent that the lack of strategic planning (see Appendix D.4 and D.8), the emphasis on detailed planning (see Appendix D.4) and the use of the various tools, techniques and methodologies (see Appendix D.4 and D.10) seriously compromised the success of the project. Too much time was spent on the tools and techniques involved in system development and project management.

A number of projects used certain techniques like WBS to break down the project to manageable levels of detail and manage the scope of the project. Some projects used other techniques (PERT or CPA) and associated tools (network or bar charts) for managing time aspects. Other projects used particular estimating techniques such as Function Point Analysis (FPA) to manage the cost aspects of the project. All these tools and techniques were seen as useful in the management of the project but less emphasis was put on them than on the other aspects and factors such as communication, user involvement and the definition of the project objectives. The use of electronic mail as a tool for facilitating communication was seen as a positive aspect (see Appendix D.6).

Whether a project was a success or not, there was not a great emphasis on the methodologies available to manage and develop an IS/IT project. Where methodologies were implemented, it was a hybrid one which proved to be more successful (see Appendix D.6). Where a standard methodology was followed 'to the letter', it was felt that too much time was spent on the techniques, although it generally produced good and comprehensive documentation (see Appendix D.10). Where a company used its own standard design methodology, it experienced difficulties when contract staff were employed on the project. (see Appendix D.9). These risks must be assessed and contingencies developed (see Appendix D.1).

Therefore, the conclusion can be drawn that the widespread use in the past few years of structured methodologies does not substantially increase the chances of success. The evidence of the interviews is consistent with the results of the questionnaire in that many companies have techniques and tools available to use in managing and developing IS/IT projects but they make selected use of them. The conclusions of the interviews can be summed up as follows:

- employ a project life cycle approach but use it as a starting point and adapt it to the requirements of the project;

- use prototyping, when appropriate, to create versions of systems early in the life cycle;

- use tools, techniques and methodologies for planning, estimating and controlling the project but they must be used in an appropriate fashion to deliver the success criteria defined;

- automated tools are useful but project managers do not rely on them to make decisions; they are used to support decisions;

5.3 Comparison with previous research

It was noted that there were some authors who believe that the use of a methodology is a factor in project success (Weitz (1989), Walsh and Kanter (1988)). The successful projects were those which made judicious use of these methodologies. This research suggests that their use is not a major success factor. What is important is that the methodologies are available to project managers and systems analysts but are used appropriately on projects.

Nevertheless, there are tools and techniques which should be employed on all projects. A Work Plan (as advocated by Cori (1989)) is an essential feature of any project and this plan needs to include the WBS. The project team need to make estimates of the required activity durations - both Baker *et al.* and Philips survey (see Tables 2-2 and 2-3) highlight estimating as a factor in successful projects. Furthermore, managers and teams need to identify, assess and manage project risks. Planning is required to minimise the risks (Tripp and Wahi (1980)) and using established tools and techniques, when appropriate, is vital.

In the quest for cheaper and more effective methods of system development there has been an increase in the use of prototyping as a development technique. Prototyping was used on a number of projects and it was felt to be particularly useful in aiding communication and clarifying requirements and objectives. However, there were projects where prototyping was felt to be inappropriate and they were no less successful.

What has been apparent from this research is that there is no one methodology which is applicable to all IS/IT projects. This result supports other research (Hilal and Soltan

(1992), Dos Santos (1988)) where it was identified that each project and its environment are unique and the approach to development and prototyping taken must be considered in the light of the project.

There have been many attempts at producing a project life cycle model which can be employed on all projects. The general consensus of the previous research is that every project should follow a life cycle approach. However, there is little agreement on which model to use. This research clearly points to the fact that the life cycle adopted is dependent on the project itself and should be adapted as circumstances arise. Evidence from the interviews shows that organisations are continually evaluating the system development process as a result of experience and adjusting the process accordingly, even if they do not undertake a formal review of the project. They are developing in terms of software maturity (Humphrey (1990)). However, the interviews indicate that organisations have not progressed beyond the Repeatable Process (level 2).

As has been noted from the questionnaire results, most organisations (88% of respondents) use a project management software package. Wall (1988) noted a slightly higher percentage - 93%. His conclusions are that the microcomputer can be used as a tool for planning, monitoring and control; it will not manage the project for you. He additionally feels that there is a danger of relying too much on the software and not enough on the other aspects of the project. The evidence of the author's research, from questionnaires and interviews, supports this notion. The important point to make is that software tools need to be employed to aid the project manager to make the correct decision (Hurst (1987)) and ensure that users are not left in the dark about the project (Radding (1990)).

However, if the automated tool does not provide the facilities that a project manager needs, can it help? The questionnaire results (see 5.2.1) highlighted the fact that the packages mentioned did not provide all of the functionality and features required by project managers. Additionally, they do not support configuration management. The indication here is that computer-based PMIS need to do more in order to provide the functionality required to manage IS/IT projects. To provide the required functionality organisations may have to design their own package. Alternatively, suppliers of the

software packages will need to focus on the necessary functionality in order to help project managers.

In summary, structured methodologies are seen by some authors as essential for any project to be successful. The evidence of this research indicates that this is not necessarily the case. The interviews (see Appendix D) demonstrated that life cycle approach was followed but a more structured approach, although available, was not used, not to the detriment of the project and its outcomes. It is seen as important to follow a life cycle approach (contrary to the view of Gladden (1982)). However, an appropriate life cycle must be applied as the project demands and a strict standard not followed (contrary to the view of Gordon *et al.* (1987)).

The use of automated tools have been identified by authors as important for decision-making and communication. The evidence of this research indicates some level of agreement with this but that very often on small projects the use of an automated tool was seen as too time-consuming for the benefits that it would give. It is the techniques which are important, not the tools.

However, an important aspect of the implementation of project management software, highlighted by some respondents in the questionnaire, is the communication and reporting of the project. Many authors feel that there is the emphasis, on the part of project managers, to concentrate on the techniques and tools to meet budgets and timescales, rather than concentrate on the other factors, and other criteria, for project success. The evidence of this research supports this sentiment. Planning and scheduling are important factors. The techniques, tools and methodologies play their part in achieving project success but they need to be complemented by other factors that are not technique-based.

5.4 Conclusion

The description above leads us to formulate a number of conclusions. The emphasis for organisations should be for small projects (or a programme of projects) rather than the large projects that have been a major feature of the past. The overriding emphasis,

however, should be for delivering the defined success criteria using the appropriate factors. Managers must, therefore, be conversant with the tools and techniques of project management and apply them in an appropriate fashion as the situation dictates. If time is not a concern, there is no need to spend a great deal of time on the planning process and producing comprehensive network diagrams and bar charts. Only after understanding the principles of the disciplines can the project manager utilise computer tools to carry out the routine activities or complex tasks of the project.

However, there are some basic activities that need to be carried out on all projects. To embark on a project without a plan or without defining the objectives and goals is extremely foolhardy. To fail to understand the scope of the project and not assess fully the risks is a first step to failure. Therefore, a model (Figure 5-4) showing phases of the project life cycle and the steps that need to be taken in those phases is proposed. The steps are defined as either project management or system development and these activities need to be carried out for all projects, irrespective of the criteria set. The steps also allow for feedback and a return to previous steps, if required, in order to correct previous errors and misunderstandings. The model follows the traditional waterfall model approach but implicit in it is the features from the V-model where certain deliverables are useful for subsequent phases - the outputs from the early phases (the success criteria and requirements specification) are used as inputs to the testing, implementation and review phases.

Project managers need to put the major effort in the early stages of the project life cycle but not compromise their responsibilities to the client as the project progresses. Initially the success criteria needs to be defined in addition to the objectives and the purpose of the project (what problems are to be addressed, what issues are to be resolved, what benefits are required). In order that the purpose of the project is achieved, it is necessary to identify the scope and boundaries of the project in order that the work to be done is known and any unnecessary work is not completed.

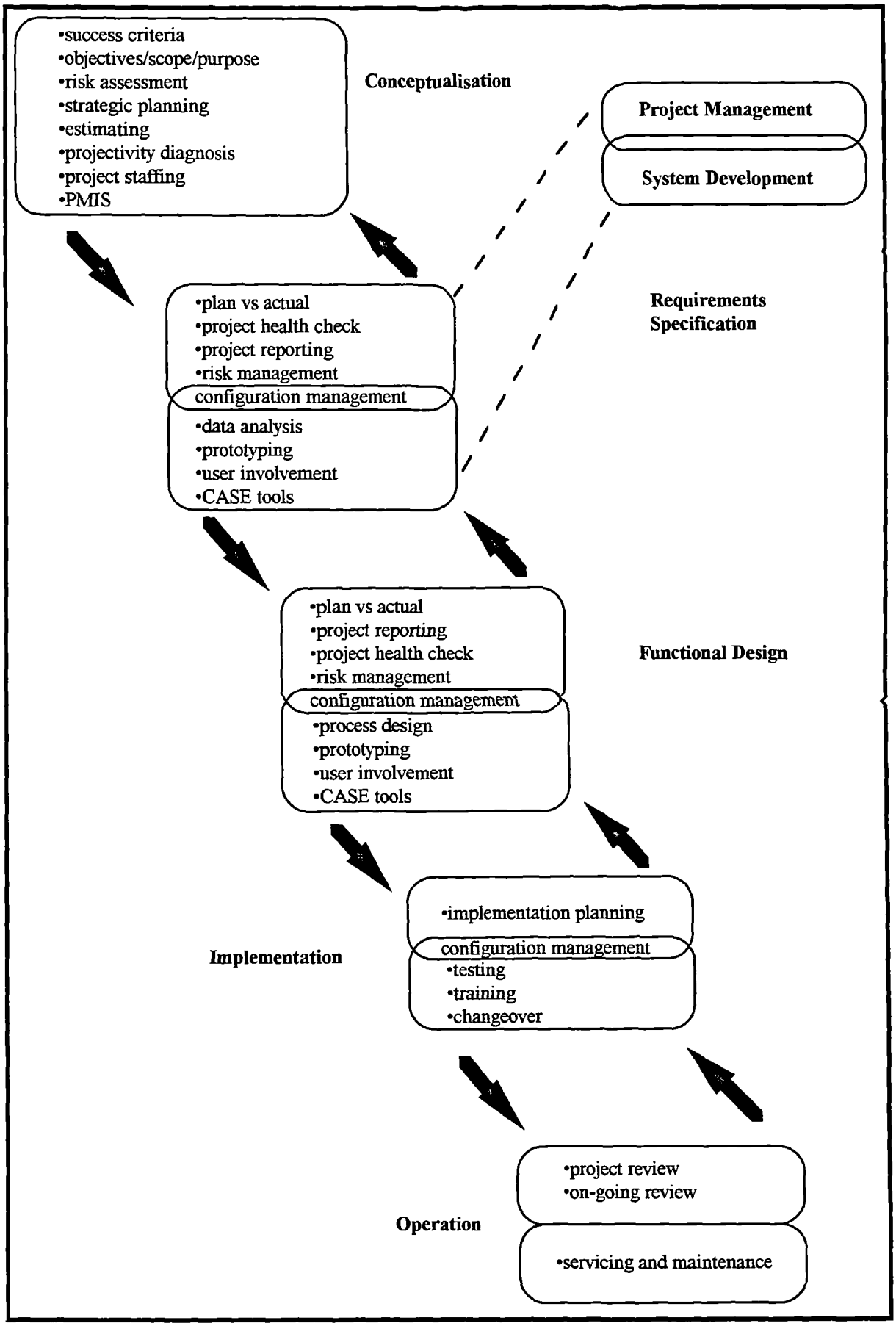


Figure 5-4 - Model of project life cycle

Risks are an inevitable part of undertaking any IS/IT project and the risks need to be assessed and managed throughout the project. There may be no alternative but to attempt a high-risk strategy, but those risks must be assessed at the outset of the project. Project managers must devise methods for avoiding, deflecting (through formulating contracts or insurance) or allowing contingency and the risks must be managed throughout the project. As *Murphy's Law* states:

'If something can go wrong, it will.'

As was shown from the interview results (see Appendix D), the most successful project held a start-up meeting where the risks were identified and assessed and arrangements were made for the management of those risks throughout the project. However, project managers, in their attempt to eliminate risk, tend to stifle or eradicate creativity. Creativity implies risk - a high degree of creativity equates to a high level of risk. It is an understandable, but in many cases a misguided, action. Project managers need to provide clear and inspirational leadership in recognizing and encouraging individual's creative instincts for the benefit of the project and the organisation.

The project team needs to focus on the results of the project. Therefore, the user specification needs to be defined and the deliverables need to be identified and managed. A PBS must be developed and communicated to all parties in order that they can focus on the results of the project. Additionally a WBS must be developed, dividing the project into 'work packages', in order to better manage and control the project. However, the project needs to be planned at the strategic level first with only broad estimates of work at the work package level. Accurate estimates for lower-level work can only be drawn up when information about the work is known. Furthermore, the project team must be provided with realistic work (realistic in scope, taking account of people's inexperience or lack of training in particular areas and realistic in time allowed to complete the piece of work). A failure on the part of project managers to provide this out very quickly lead to de-motivated staff, conflicts and an ineffective project team.

The staffing of the projects - getting the right people on the projects at the right time - was identified as one of the main reasons for the perceived success of the projects. All the planning and estimating may prove fruitless if the right people are not allocated to work on the project. Further expenditure could be wasted, or opportunities missed, if they are not allocated to the project at the right time. Therefore, great care must be taken in staffing projects where the resources are taken from a pool and where the necessary skills are not available within the pool of resources. Projects may not need the 'best' technical programmer or systems analyst, but it does need the right people who can work together as a team to deliver the product and the benefits required.

Having defined the objectives, scope, risks, quality, time, cost and resources for the project and produced a strategic plan, the work to deliver those objectives needs to be carried out. Here the project team will analyse, design and construct (program) the new product or system. Evidence has shown that prototyping can have a very beneficial influence on the project, particularly when the involvement of users in the development process is required.

In parallel with the development activities project managers need to control the project and report any variances from the plan. These variances can be best addressed by having regular meetings. If a project starts to deviate from the plan, the project manager needs to take considered action. Very often solutions are generated instantaneously without due consideration (Brooks (1974)).

Project managers need to look carefully at the reasons for the variance and review the reasons with the project team. Managers and teams together need to examine all options for a solution and implement the best solution. I am reminded of the quote from Conan Doyle (1966), attributed to Sherlock Holmes:

> *'when you have eliminated the impossible, whatever remains, however improbable, must be the truth.'*

In the same way, the alternatives must be weighed up. Any that are impossible for whatever reason must be discarded. The option that is left must be the action that needs

to be taken. If the best solution is to terminate the project - to achieve the benefits, organisations need to start again, having learned from the mistakes - then so be it! However, the smaller and less complex the project, the less likely is this scenario. It may be necessary to redefine the success criteria. If so, do it but take into account the factors to achieve the revised criteria (see Table 4-8). Again, the smaller and less complex the project, the less likely this is to happen.

Throughout the project managers must concern themselves with keeping track of all the changes to the products and deliverables. They must have a disciplined approach to this and configuration management (see Appendix F) should be the strategy to ensure changes are made in an orderly manner. Configuration management will affect both the management and the development of the project.

They must also continue to monitor the 'health' of the project and constantly assess the progress of the project against the agreed success criteria. Any apparent problems within the project which are identified by the 'Health Check' (see 7.3 and Appendix G) must be dealt with immediately. Only by reviewing the project as it progresses can the project manager understand and deal with problems in order to deliver a successful project.

Very often the crucial time of any IS/IT project is the implementation phase (testing, training, changeover). Many projects have failed because of a lack of thorough testing (of hardware and software) and user training. The testing phase is rushed (because the deadline is fast approaching) and there is no adequate user testing of the system. Testing is carried out by systems people with little or no knowledge of the true nature of the data that is to be held by the system. This testing phase will be more effective and efficient if the users are involved throughout. This will have a dual benefit of introducing the users to the system (if prototyping has not already made them familiar) and enabling the training process.

However, there will inevitably be a need for enhancing the product in line with new business, strategic, tactical and operational requirements. The process outlined does not address the maintenance phase of the life cycle but if the steps have been followed and the criteria defined (particularly in relation to software quality), system enhancements

should be achieved speedily and effectively. Configuration management has to be a continuing process. Past history has seen design specifications get gradually out-of-date as new enhancements are implemented, thus devaluing the investment in the system and making further modifications more difficult. Consequently, design specifications must be updated as programs change.

In addition to the servicing, maintenance and enhancements of the product, project managers need to learn from the mistakes (and successes) by carrying out a detailed project review. Large amounts of data have been collected during the project - usefulness of development tools, team performance, individual needs. This data needs to be collated and analysed in order that information can be passed on for future projects. Above all the review should not be looking to apportion blame. If there are weaknesses identified in the tools or techniques used or within the project team, they should be highlighted in order that future projects can learn from the experience and organisations can improve their system development process (Humphrey (1990)).

This research indicates that project managers are not only using the wrong tools in the management of IS/IT projects but also they are using them badly. They are spending too much time on planning a project using automated tools (defining PERT charts and histograms) rather than concentrating on delivering success criteria. Until project managers identify clearly the success criteria, particularly in relation to users and sponsors, projects will continue not to meet expectations and deliver benefits however good the plan is! After all, it is the users' system and they have to cope long-term with the effects of the system.

Furthermore, any systems development inevitably involves change. The systems analyst is the agent of change; the project manager's responsibility is to manage that change. Change must be controlled in order to avoid trying to hit a 'moving target' and in order to overcome the many problems which have dogged system development for the past decades. Changes can be to the organisational environment; they can also be to the products and deliverables within the project. Furthermore, the product (or system) will continue to evolve and change after the project has finished. This involves project

managers developing a strategy to view the long term and being flexible in dealing with change.

Therefore, what tools and techniques are needed to deal with this change and to implement successful IS/IT projects? These have been divided into three areas:

- project management;
- system development;
- configuration management and life cycle

A model is shown in Figure 5-5. All too often project management and systems development are seen as separate entities but there are several common aspects in the two disciplines. There is a tool which provides the link between them. That tool is Configuration Management which manages the deliverables by specifying the baselines, the auditing of products and the authorisation for change. Its central feature is the controlling of the products in the IS/IT environment with the understanding of the impact of change on other areas of the project.

Each area has to be considered throughout the implementation process and each is complementary to the development of successful IS/IT projects. With the tools, techniques and methodologies in these three areas being used effectively, although not required on every project, any IS/IT project will have a more realistic chance of success.

We will discuss the techniques (see Figure 5-5) that are important for project managers and system designers to implement. The roles and responsibilities of project managers and system developers are different. However, both need to focus on configuration management (see Appendix F). It helps in a number of ways:

- planning the objectives by identifying the project deliverables;
- delivering the objectives by ensuring that each component (or configuration item) meets its design objectives;
- communication and user involvement by controlling any changes and informing users of changes and the implications of changes on the system.

These factors (planning, setting objectives, communication and user involvement) are critical in delivering many success criteria (see Table 4-8).

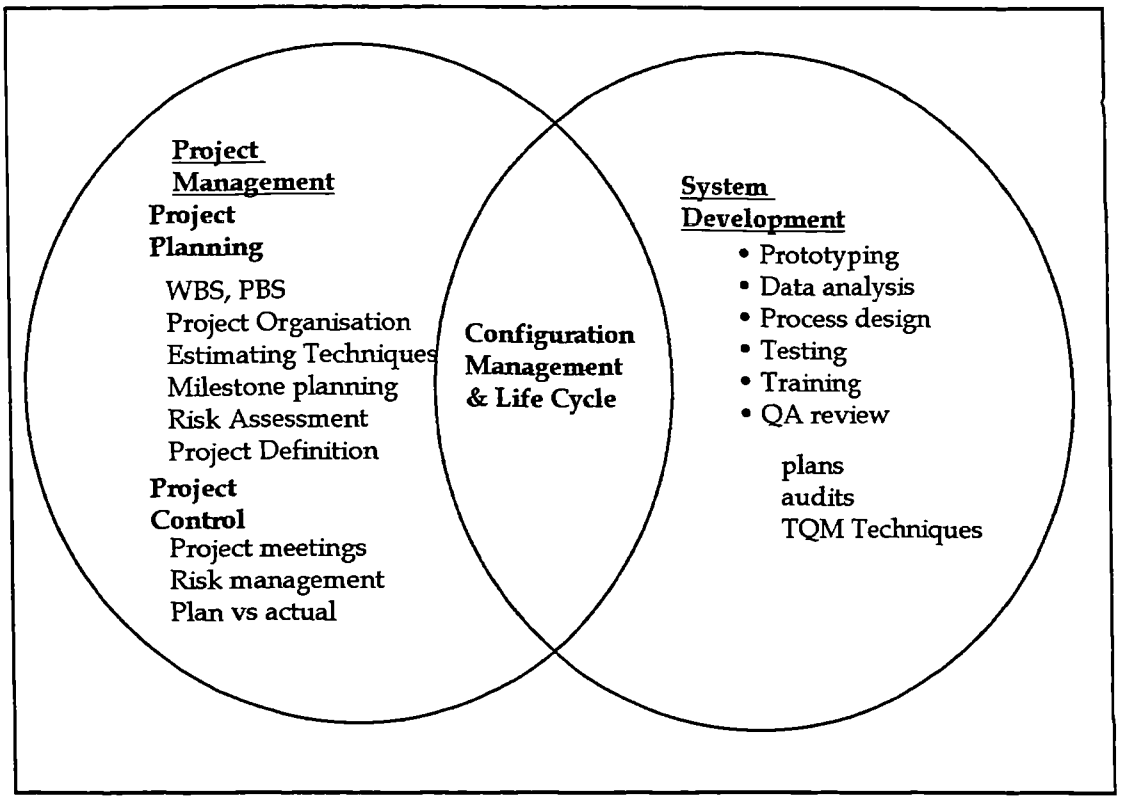


Figure 5-5 - Tools and techniques

a) project management

Two of the major elements of project management are planning and controlling. It is important to have a plan for the project and the development of that plan will incorporate a number of tools and techniques. Project managers need to define the work and the products that are to be delivered. An appropriate organisation structure needs to be in place. Project managers also need to use an estimating technique (although the particular technique employed is relatively immaterial as each has its merits) and assess the project risks at the outset. A start-up meeting has to be held to assess these risks and define how they are to be managed throughout the project. Having planned the project, what actually happens has to be compared with the planned activities to identify variations from the plan, using regular project team meetings.

The project manager has to above all manage change, particularly the changes to requirements as the project progresses. It is one of the most important activities of project management. Changes to requirements have repercussions throughout the project life cycle - design, coding, testing. Consequently, there must a formal change management system, that is, configuration management.

b) system development

All projects need to employ a life cycle approach. The projects that do not take their first step on the slippery slope towards failure. It is important that project managers choose the life cycle approach which suits the project. However, a valuable part of any life cycle approach is the ability to utilise prototyping in order to establish and maintain the involvement of users in the project. We have seen that prototyping may not be appropriate in all cases, after all every project is unique, but where the needs of the users and sponsors are important, the project team must consider prototyping.

There are some development principles (such as data and process modelling) that are important in any IS/IT project. The major techniques used to carry out this modelling exercise are standard in many Structured Systems Analysis and Design Methodologies. These techniques need to be used in appropriate circumstances during the execution phase of the project life cycle (Adams and Barndt (1983)).

In addition, the project needs to produce a quality product. If a system is poor in terms of quality, does not meet user requirements and contains numerous errors, the user will be dissatisfied, with the associated implications for the supplier. The technique best suited to this process is QA. Most methodologies advocate this approach and have QA review products as major deliverables in the development process. Software products need to be error-free, reliable, maintainable, flexible and efficient. QA techniques are the best method of delivering a product which meets these qualities.

> Having completed the design of the system, the project team needs to program the solution and implement the system by thoroughly testing it (using different levels of testing - unit/module, integration, system and user acceptance) and training the users of the system. The cost of failure can be very damaging for organisations and the implementation process needs to be planned carefully and carried out effectively. Any changes made to any facet of the project (the requirements, design, code) must be controlled by the configuration management system.

Trying to control the software and documentation changes and managing the deliverables, in a very volatile situation, is recognised as a particular problem for many project managers. Tools have been developed over the years by manufacturers to help with program debugging and code generation. However, these tools have not helped the project manager have control over the deliverables and enhance the quality of the product. Project managers have tended to concentrate their attention on the tasks and activities that need to be undertaken and completed rather than the deliverables that make up the final product. To this end, project managers have to look at implementing configuration management which is the link between project management and system development (see Figure 5-5 and Appendix F).

All of these three areas (project management, system development and configuration management) are complementary and tools and techniques are required in each area in the quest to develop and implement successful IS/IT projects. A core set of tools and techniques have been proposed. In recent years, this core set has been translated from a paper-based into a computer-based activity. Now all the project data can be held on a small micro-computer and interrogated using computer-based project management software. However, the increased automation has not substantially helped the success of IS/IT projects. Therefore, what functionality should an automated tool give a project manager?

Many project managers appear to be concentrating too much on the computer tools and not on other areas of project management (leadership, communication, consultation). As Turner (1993a) points out:

'Unfortunately, there are people who view project management as a computer-based exercise: some who say that project management is solely critical path analysis on computers; and some for whom the computer models become more important than reality.'

He continues to give anecdotal evidence of this. Many automated tools concentrate on the planning aspects of the project and neglect configuration management, risk management and the controlling and reporting aspects. Project managers need more comprehensive mechanisms for resource allocation, project reporting and to ability to import/export data from other applications. This becomes more pronounced when managers are working in a multi-project environment.

Experienced project managers in particular will find themselves managing several projects at the same time. Projects need not only to share managers but also to share resources. There is the problem here of setting priorities for each of the projects and allocating resources based on those priorities. Most computer-based project management tools do not have the facility for effectively allocating resources under these conditions. They usually allocate resources to the highest priority project and then the next and so on. The lower priority projects are starved of resources or receive ineffective and unsatisfactory resources. To overcome this problem there needs to be a more complex system such as a *master project schedule* (Turner and Speiser (1992)) where a high-level plan is drawn up and project managers are required to negotiate resources required. Additionally, the software needs to provide comprehensive reporting to ensure that project plans are being controlled effectively and the current project status is being communicated.

With the belief that there should be a move to smaller projects and the need for these projects to share resources, there needs to be the emphasis on providing *'what if'* analysis in order that project managers can see the impact across multiple projects and weigh up the trade-offs between cost, time and resources. Very few packages provide risk analysis as a feature of the system. Consequently, risk analysis needs to be a standard feature of all project management automated tools.

Because feedback is an important consideration on IS/IT projects, there needs to be a mechanism for provide 'loops' to satisfy this feature. Established techniques do not allow for this (Dawson and Dawson (1995)). Therefore, the use of PERT and CPA in developing timescales for IS/IT projects would appear to be inappropriate. Even the most clearly defined project is likely to have changes to requirements which involve some kind of feedback and some return to a previous stage of the life cycle.

Therefore, the conclusions point to a number of considerations:

- there is a central core of activities that need to carried out on all projects (see Figure 5-4);

- project managers need to concentrate on techniques that are part of this central core of activities to deliver success criteria;

- project managers need to consider three complementary areas - project management, systems development and configuration management (as defined in Figure 5-5) - when implementing a system;

- tools, techniques and methodologies are being poorly applied. Project managers and other members of the project team (systems analysts, users, programmers) need to receive in-depth training on tools and techniques and to be encouraged not to rely excessively on the tools to deliver successful projects.

- there must a move away from the traditional deterministic approach to project planning (using PERT and CPA). IS/IT projects often follow an iterative cycle (Boehm's spiral model illustrates this) and planning tools need to take this into account. Traditional planning techniques are not appropriate for many IS/IT projects. Automated tools need to provide this iterative facility to be effective in supporting IS/IT projects;

- there needs to be a greater emphasis in project management tools on the aspects of risk assessment and risk management;

- project managers need to consider more the reporting and communication of plans to all participants in the project. If the automated tool does not help, do it by hand! However, a computer-based PMIS needs to provide more comprehensive and more user-friendly reporting capabilities in order that project management can make informed decisions for the future direction of the project. These reporting capabilities need to incorporate *'what if'* analysis, graphics and other presentation methods to enhance 'the quality of the report presentation';

- there is a need for a totally integrated project management system incorporating planning, controlling, reporting and configuration and risk management;

Having discussed the tools, techniques and methodologies for projects, and having highlighted the need for training, it is necessary to examine the problems that project managers have in IS/IT projects, what they view as factors in successful project management and how they can acquire the skills required for effective project management.

CHAPTER SIX

Analysis of results: 'Project Manager Profile'

Contents

6.1 Introduction

The last objective of the research was to discover the qualities and the skills which project managers believe that they need to be successful. The objective was then to explore how they would acquire these skills. The questions that need to be answered are:

What is the role of the project manager and what qualities/skills should a manager of IS/IT projects possess?

How can a manager become a better manager to help towards the success of IS/IT projects?

The third part of the questionnaire was completed by project managers. They gave their views on the competences required in successful project management, the most difficult problems encountered and the areas where they felt that they could improve. Additionally they indicated the way in which they had acquired their current skills and qualities.

6.2 Research results

6.2.1 Questionnaire results

As we have seen, project managers needed to record their experience in management. The term 'manager' is fairly broad and project managers could be at various levels of an organisation with various levels of authority. However, there was a wealth of project management experience (see Figure 5-1) and the responses should be seen as representative of current views.

i) Project manager competences

The rationale behind the question regarding the competences is that the answers would indicate what areas were seen as important by project managers in striving for the successful implementation of IS/IT projects. Comparisons could then be made with the

success factors given in section 2 of the questionnaire. The views on the competences that contributed to successful project management was an open question and consequently there was a wide range of answers and responses. Examples of the comments in each category are shown in Table 6-1.

These responses were classified into the following categories:

- Inter-personal;
- Personal;
- Administration;
- Organisational;
- Technical;
- Team/Group-oriented.

Category	Comment
Inter-personal	'Prediction of problems and rapid action to prevent them'
	'Keep the customer happy'
	'Leadership'
	'Good communication on going through the project'
	'Man management skills'
	'Ability to influence people'
Personal	'Be confident with the timescales you are working to'
	'Decision-making'
Administration	'Constant monitoring'
	'Change control that is effective'
	'Project planning'
Organisational	'Clear definition of task and requirements'
	'User and senior management involvement'
	'Scope'
Technical	'Technical understanding'
Team oriented	'Delegation'
	'Be able to motivate your staff'
	'A good feel for the project despite what you are told'
	'A well motivated project team'

Table 6-1 - Categories of Project Competences

The main areas of note were in the categories of administration and organisation of the project (see Figure 6-1). This result supports the view that these categories, if done badly or not at all, cause projects to fail (see Table 4-4).

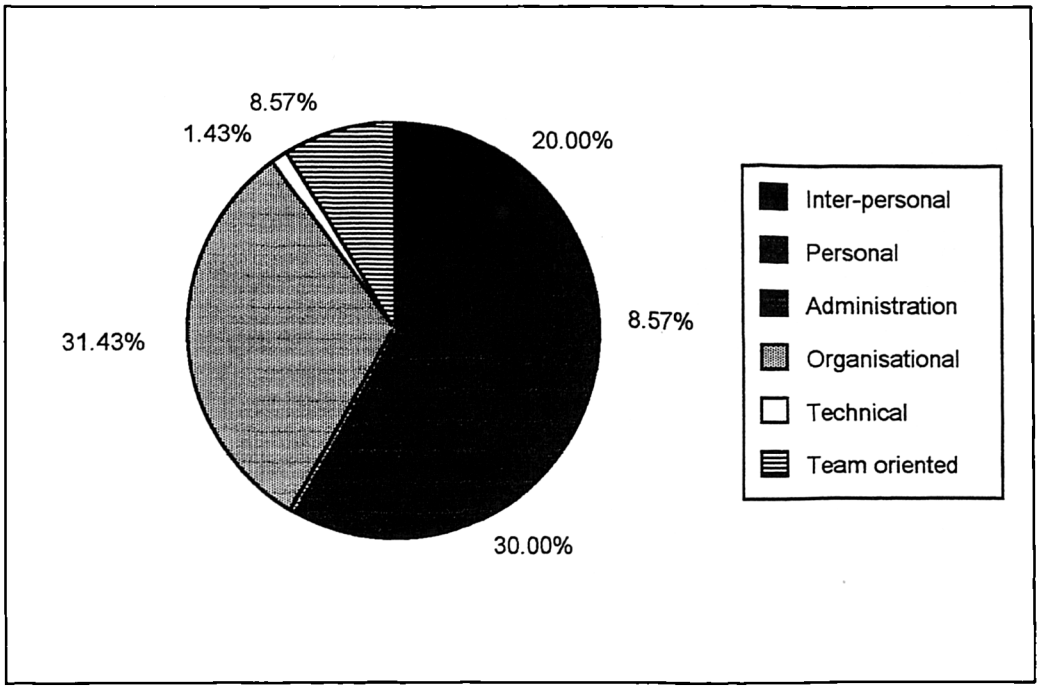


Figure 6-1 - Project competences

Project managers see the early stages of the project as of particular importance and are paying great attention to competences (such as defining objectives, defining scope, setting the organisational structure and project planning) relative to these early stages. However, given the poor success record of IS/IT projects, it would appear that project managers are concentrating too much on the planning aspects (to achieve timescales and budgets) at the expense of other factors. Early planning and defining objectives are necessary conditions for success (see Figure 5-4) but they are not sufficient conditions for success. If project managers do not get it right at the start, the project is almost bound to fail. However, other factors will play a part (see Table 4-8), depending on the criteria. In addition, project managers need to continually refocus on and update the objectives and user requirements; then they have to deliver the new objectives.

There is a view that the inter-personal skills would help towards successful project management. This supports the users' view that bad communication and the lack of user involvement are fundamental causes of project failures (see Table 4-4). Users feel communication is necessary; project managers appear to disagree but are indicating here that they need communication skills. To illustrate this, if we were to add together the 'inter-personal' and 'team oriented' figures, communication would be seen as a major competence (mentioned by nearly 30% of respondents) - but here communication is

defined as relating to all participants in the development process - users, systems analysts, sponsors and support staff.

We saw in chapter 4 (see Table 4-4) that project managers viewed 'weak leadership' as the major possible cause of failure. However, project managers identified that leadership was not the major competence for successful project management. This tends to confirm the earlier observation that project managers view leadership as synonymous with senior management support. Furthermore, project managers believe that getting senior management support for, and involvement in, the project is important for success.

As with the criteria and factors, there does not appear to be agreement on the competences required for successful project management. Managers working on different types of projects encounter different types of problems. If the objectives and requirements have been very clearly defined, it may not be necessary to have excessive user/client involvement (although no involvement would certainly lead to problems). Consequently, managers will not need the inter-personal competences as much. However, if the project is the development of a system where goals are not well defined (or not known) the inter-personal and team aspects will come to the fore. Consequently, the objective-setting at the outset of the project is crucial to the problems that are inherent in IS/IT projects at the moment.

We will only understand part of the reasons why IS/IT project fail if we address the project management competences. Project managers experience major problems in developing and delivering projects and knowledge of these potential problems and the causes of failure identified in Chapter 4 should indicate where project managers are going wrong and what areas they need to address.

ii) Problems in managing projects

The problems encountered in managing projects was also an open question and again the responses were divided into categories as follows:

- User-related;

- Team/group-related;
- Organisation;
- Technical;
- Administration;
- Personal.

The results are shown in Figure 6-2. Examples of comments in each category are shown in Table 6-2.

Category	Comment
User-related	'Not enough time/resource provided by the users'
	'Stability of requirements'
	'End users lack of knowledge'
Team/group-related	'Technical team members building increased functionality'
	'Team motivation'
Organisation	'Uncommitted senior management'
	'Poorly defined goals'
	'Line/matrix organisation conflicts'
Technical	'System and Acceptance testing'
Administration	'Accuracy of work estimates'
	'Controlling variation'
Personal	'Lack of understanding of Project manager'
	'Getting a clear picture of what people are actually doing'

Table 6-2 - Categories of Project Problems

The main problem encountered (over 31%) in managing projects was in the category of 'Organisation' - the setting of project objectives and senior management commitment - although many project managers felt that the user problems were of particular importance. This further confirms the view that the defining the project mission and getting senior management support for the project are paramount (see Figure 6-1). There was little feeling that technical issues were problematic, this again confirming earlier views.

Motivation and delegation which were categorised under 'Team-related' were not seen as major problems in IS/IT projects, confirming the results of the questionnaire (see Figure 4-5). Additionally, administration was not perceived as a major problem. This is understandable as project managers get enough practice at it!

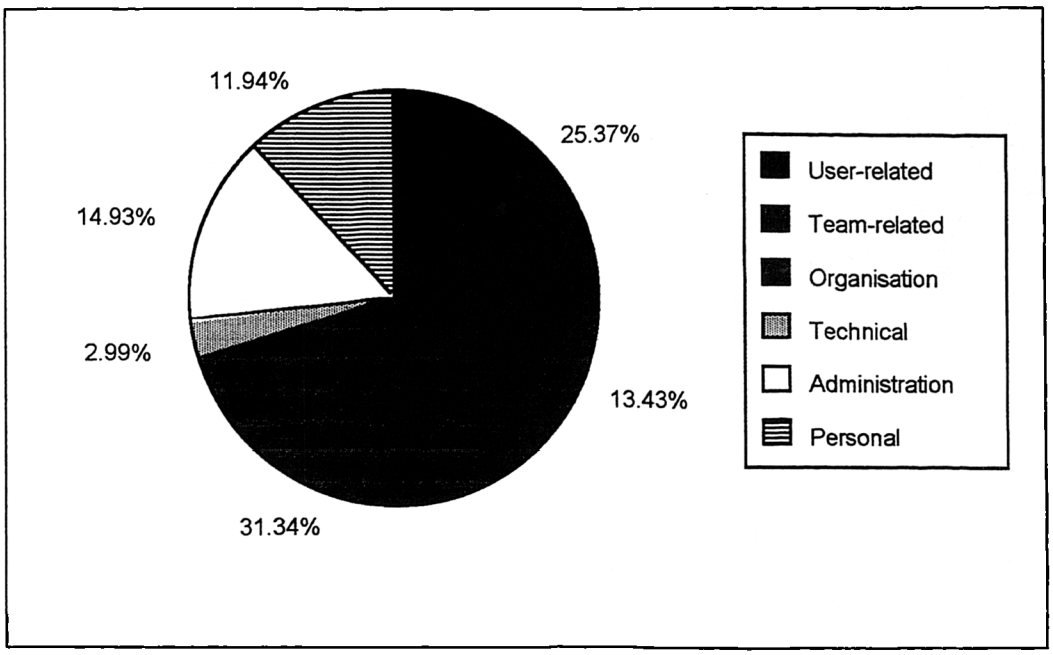


Figure 6-2 - Project problems

When we examine individual problems, managers note that changes to requirements and objectives are the major problems in managing projects. Project managers will, perhaps, point to user changes during the development if the project does not meet timescales and budget (and is then perceived as a failure) but they should be accommodating these changes to requirements and make users fully aware of the implications to timescales and budgets, should the changes be implemented. This highlights the importance of configuration management in the development process to control and manage the changes.

The results shown in Figures 6-1 and 6-2 are very much in line with each other - the organisational and communication aspects are important and are seen as major problems; technical aspects are not major competences and are not major problems. Having gained a picture of the problems of managing projects (albeit from the project manager's viewpoint), what improvements do project managers feel they need to make managerially in order to develop successful projects?

iii) Managerial improvements

Respondents were asked to identify which areas they felt that they could improve managerially. This again was an open-ended question. Examples of comments in each category are given in Table 6-3.

Category	Comment
Inter-personal	'Promoting the project and presentation skills'
	'Marketing skills'
	'Better communication'
	'Attention to detail'
	'Negotiation skills'
Administrative	'Better QA procedures'
	'Paperwork'
	'Computer project management packages'
Personal knowledge	'Strategic planning'
	'Financial control knowledge'
	'Risk analysis and management'
Personal Management	'Better management'
	'More self discipline'
	'Become more people aware'

Table 6-3 - Categories of Areas for Improvement

The responses have been categorised as follows:

- Inter-personal;
- Administrative;
- Personal knowledge;
- Personal Management.

The overwhelming category of improvement was inter-personal (see Figure 6-3). It can be deduced from the results that project managers feel that the inter-personal aspects (user and team communication) are particular personal weakness but they do not feel that these aspects are major problems (see Table 4-4). There appears to be a conflict here. However, this would indicate that project managers are perhaps now realising that their preoccupation of project planning in order to achieve time and budget constraints is flawed and they are coming round to the view that the users' satisfaction with the product is particularly important. Project managers are taking account of what users say and their views are converging.

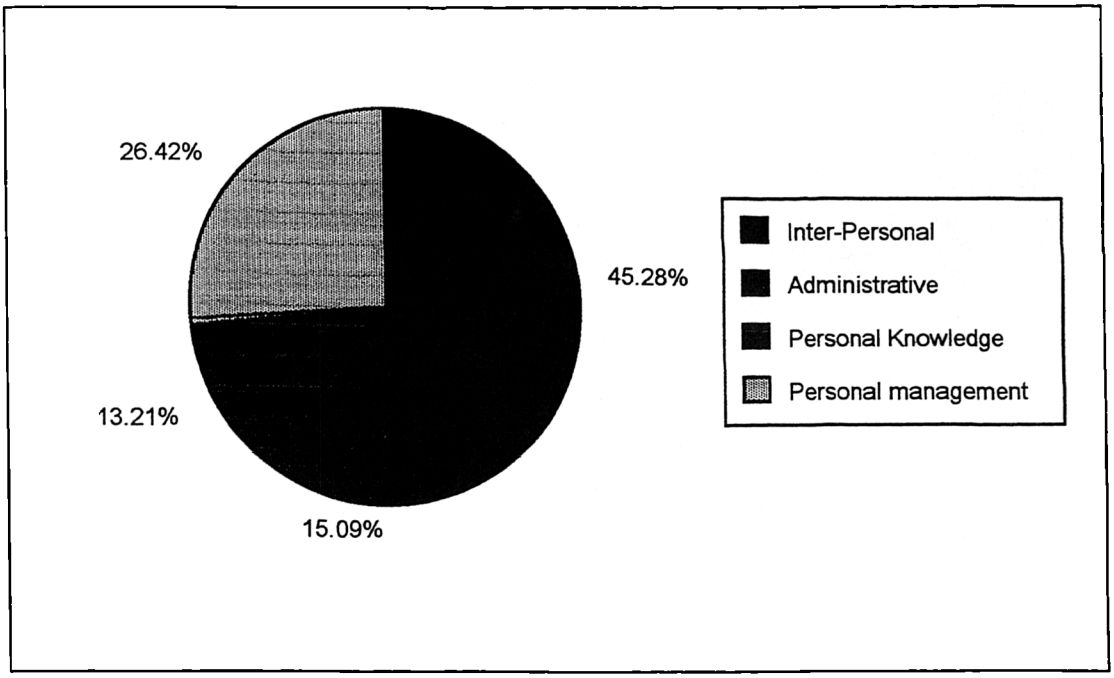


Figure 6-3 - Areas for improvement

However, it is not surprising that project managers do not see communication as major success factor. If they are concentrating on time and budget as success criteria, they would obviously be concentrating the administrative aspects of the project. What if their projects were judged on the happiness and satisfaction of the user and sponsor? Communication and inter-personal skills should in this case come to the fore. Project managers are concentrating on the wrong criteria in taking a narrow view of the objective issues rather than the wider view of the different participants.

To draw conclusions on training the respondents were asked to comment on how project managers acquired their management skills. Almost everybody who completed this question identified that their main source of project management skills was experience. The second most important source of skills was training courses. Training courses (whether they be professional project management/leadership courses or MBA programmes) are an important source of knowledge and perhaps are underutilised as a method of acquiring skills. One area that seemed particularly to be neglected was the use of conferences and seminars. Perhaps these are seen as academic exercises rather being geared to practical project management. This situation must be addressed as they are also an important source of knowledge and experience.

The questionnaire results have indicated the perceived competences, the problems in managing projects and the areas of improvements. The outcome of the interviews and project reviews should shed more light on these areas and indicate the way forward in delivering successful IS/IT projects.

6.2.2 Interview results

Projects are unique and different project management skills need to be employed under different circumstances. Examining particular projects in the interviews, there were two skills that were mentioned in almost every case:

- the ability to staff the project correctly;
- the ability to communicate with users and the project team.

Users, project managers and other members of the project team suggested that it was of paramount importance to get the 'right people on the project at the right time' - staffing the project correctly. Furthermore, it was seen as important that the project team should be a united group, striving to deliver the project objectives, rather than a collection of individuals. When circumstances occurred that disrupted the make-up of project team (such as a member leaving), project managers appointed the right replacement promptly and integrated the replacement into the project team. This was seen as one of the major competences required by project managers.

However, the use of contract programmers and inexperienced staff caused some problems in communication and achieving a successful outcome (see Appendix D.3). The reason for using consultants or contract staff was because there was insufficient expertise within the organisation to carry out certain project activities. This highlights the situation of a particular lack of qualified staff to carry out system development activities and the problem for project managers to adequately staff their projects. It further indicates quite clearly the need for better and more appropriate training for programmers and systems analysts, in particular. It was felt that the use of contract staff and consultants could jeopardise a potentially successful project.

The various participants on the project felt that the communication aspects above all contributed to the success of the project. The establishment of good communication channels was seen as crucial to its success. Conversely, where communication and the management of that communication was poor, the project invariably was seen as a failure.

The results from the interviews support the questionnaire. The major project management skills can be summed as:

- communication and user involvement; project managers must develop their inter-personal skills (delegation, motivation) and their team building skills (getting the 'right people' on the team at the 'right time');

- organisational skills; project managers must create the right project structure and development framework;

The other issues and problems were highlighted thus:

- internal staff, as far as possible, must be used in order to minimise potential communication problems.

- the definition of goals and senior management support for the project is vital;

The overriding conclusion is that the organisational, inter-personal and communication aspects are far more important to deliver successful projects than administration. If only project managers' views of success measurements are taken into account, then the administrative aspects appear to be paramount. However, we have seen in Chapter 4, with the views of users and sponsors, that user involvement and communication are seen as essential features in any successful project. Project managers, therefore, need to concentrate on these inter-personal skills and make sure that the right people are allocated to the project.

6.3 Comparisons with previous research

We have seen from the previous research carried out by Slevin and Pinto (1986), Baker *et al.* (1983) and others (see chapter 2) that they have identified the importance of communication in the success of projects. Slevin and Pinto (1986) demonstrated the importance of communication in the framework model of project implementation, developed by Schultz and Slevin (see Figure 6-4). As they suggest:

> *'Communication is a key component in every factor in the implementation process and must be all-pervading.'*

Previous research has also demonstrated the importance of planning, scheduling and controlling the project. This research, however, has identified that project managers, in concentrating on the time and budget constraints of the project, are placing the emphasis, in trying to achieve these criteria, on the administration of the project, rather than the inter-personal and team-building activities. Project managers consider that the administration of projects is of paramount importance and are, therefore, concentrating their efforts in these areas.

However, users feel that the communication aspects of project implementation are of far greater importance. Furthermore, project managers identified that the major problems of project management were organisation and user-related issues. Project managers additionally identified that their major shortcomings were in the inter-personal aspects of project management. This clearly indicates that project managers are concentrating on the wrong factors in their attempt to achieve successful project implementation. They are not addressing their acknowledged concerns of the inter-personal aspects. They are not concentrating on the user-related issues but are looking particularly at planning as the major success factor to deliver their perceived success criteria, namely budget and timescales. Project managers need to enhance their inter-personal and communication skills and concentrate on the organisational behaviour problems (Lucas (1975)). Furthermore, they need to be trained in the vital areas of communication and behaviour. The second set of interviews showed that successful projects benefited from good communication and good inter-personal skills on the part of the project manager. These

skills can rarely be learned from experience. Too many serious mistakes will be made if there is no formal training for project managers.

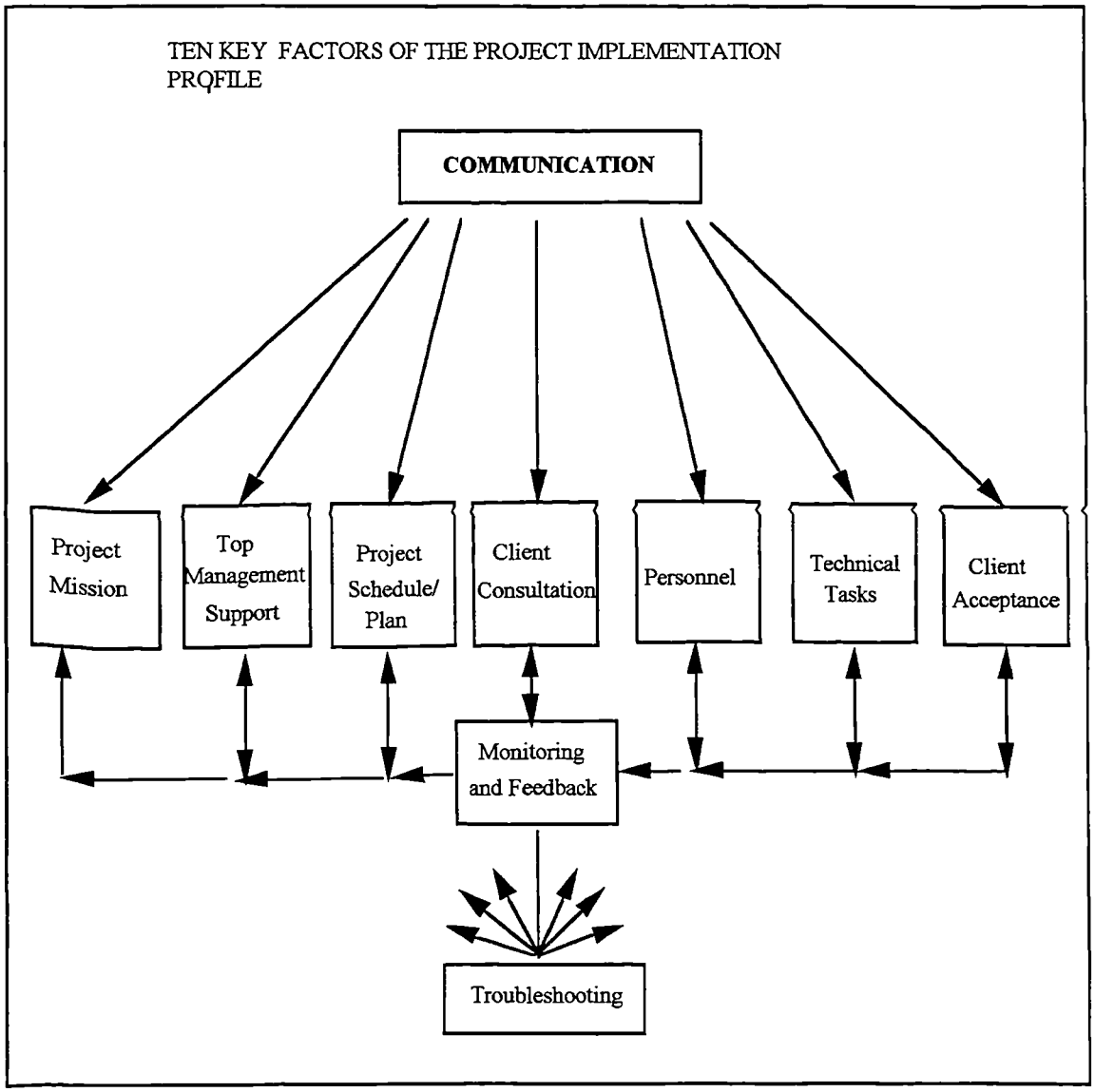


Figure 6-4 - Process Model

In summary, the results of the research confirm that project managers are relying too much on the administration of the project and not enough on the organisational and communication (with users and team members) aspects of the project. Adair (1984) advocates that there should be a balance between task, team and individual. However, this research points to a more people-oriented and product-oriented approach to managing IS/IT projects. Indications are that managers need perhaps to be less task-oriented, and more people- and product-oriented.

From the interviews carried out, there are two important areas that need to be addressed:

- to ensure that the right people are available for the project team at the right time (Pinto and Slevin's 'Personnel' factor and Fayol's 'Staffing' function);

- to ensure communication channels are established throughout the project (Pinto and Slevin's 'Client Consultation' and 'Communication').

Attention to these two areas (particularly the second) will bring project managers much more in line with the views of the user community.

The application of these factors will not reverse the current trend of project failures unless project managers receive appropriate training. There are a vast number of companies providing training courses. Experience is seen as important but it needs to be supplemented by professional training courses (Adair (1984), Schlick (1988) and Adams and Kirchof (1983)). There is scope for the increased use of seminars and conferences for developing project management skills. Above all, companies must commit themselves to a development programme for every person in the IS/IT project domain in order that project managers are able to acquire a portfolio of skills or competences and use these skills at the appropriate time in the appropriate situation.

6.4 Conclusion

The manager is probably the single most important influence on a project. If he/she lacks important characteristics or ability in project management skills, the project is very likely to fail. It is his/her team building skills which research shows is of particular importance. As Doughty and Kliem (1987) suggest:

> *'The value of a project manager lies not in his technical contribution but rather in his ability to bring all components together into a team and to do so in a controlled fashion'*

When projects start to go wrong, the project manager looks for some other reason than project management: 'not enough money', 'higher priorities have used resources', 'the customers keep on changing their minds'. However, it is very often the project manager who lacks the required skills or applies the skills inappropriately.

There are many differing views on the skills and competences required by project managers. There are different courses, qualifications and Bodies of Knowledge, all with conflicting ideas. All these views have been considered and a model of competences has been developed (see Table 6-4).

Stage 1	Stage 2	Stage 3	Stage 4
Systems Dev & Mgt		Organisation knowledge	Leadership
Project Life Cycle		Staff development	Multi-projects
Project Feasibility	--------->	Project environment	Delegation
Project Evaluation		Project strategy	Business strategy
Project success/		Negotiation	Conflict management
failure criteria		Team building	Law
Technical knowledge		Configuration management	
Systems & procedures		Risk management	
Project quality	--------->	TQM	
Planning techniques		Industrial relations	
Control techniques		Project politics	
Scheduling techniques		- people	
Estimating		- process	
Risk assessment		Stress management	
Business functions	--------->	Management of change	
Political environment		PMIS	
Time management			
Communication			

Table 6-4 - Stages of skills acquisition

The model demonstrates that these skills need to be developed over time, starting at the undergraduate level or in early working life. The skills gained at undergraduate level form a basis for subsequent development of skills during the individual's career. These basic skills can be acquired at an early stage when undergraduates have perhaps no inclination to move into project management. However, it is important for them to understand these principles when they move into organisations after graduation.

Project managers need to develop their portfolio of skills and competences throughout their career. Future project managers will gain the initial skills and competences for project management as undergraduates. That is not to say that undergraduates,

programmers or systems analysts will immediately become project managers. There will be some time, perhaps years, required for individuals to understand the business and have exposure to working as part of a team in organisations.

For potential project managers, the undergraduate programme needs to be placed in the context of overall systems development as many of the skills are important in both disciplines. He/she will be part of systems development (as a programmer or systems analyst) for a period of time until further skills, competences and experience lead him/her to move into a junior project management role.

As has been noted, people must have:

- the innate intellectual and physical ability;
- desire and opportunity;
- initial training and development;
- training and coaching to improve themselves.

Assuming that people have the abilities and the desire to be successful, organisations need to provide the opportunity and training to help individuals become successful project managers delivering successful projects. The learning progression of project managers can seen seen in four stages, leading to an experienced and successful project manager:

- University/college;
- System development in an organisation;
- Junior/inexperienced project manager;
- Experienced project manager.

Each stage needs further explanation:

(i) Stage 1 - University/college

This will be the initial introduction into project management for many people. It is important to note that not every aspect of project management will be taught to

undergraduates. It is impossible for the vast majority of undergraduates to understand fully the human aspects (leadership, conflict, motivation) of project management. A knowledge and appreciation of these aspects can only be gained from experience in the workplace and undergraduates generally do not have this experience. However, it is important to give undergraduates exposure, in a limited way, to many of the competences that are vital to a successful project manager. The course also needs to focus on systems development and place project management in the overall environment of an IS/IT project. Undergraduates can learn the techniques and tools of project management, the business and political environment, time management and the major communication methods.

For certain skills and competences to be taught at this stage, undergraduate courses need to incorporate an environment where students can use these acquired skills in a practical way. This environment may involve a 'live' project for a customer or a series of project activities. These skills need to be built up during the course with these project activities reinforcing the skills. This is not to suggest that this undergraduate course is for training purposes only. Undergraduates need question current views and ideas. However, with any practical product there needs to be a certain amount of practical experience.

There is a particular lack of this type of course in U.K. universities at this time. These graduates will be employed in businesses of the future and they will be managing the projects of the future. They need to gain the basic skills of project management at an early stage and to develop those skills as they mature.

(ii) Stage 2 - System development

Having graduated (or during their early working life if they are not graduates) individuals need to develop their skills in a practical way within organisations. Prospective project managers need to enhance their skills, learned at undergraduate level, in organisations. Typically their role will incorporate programming, analysis and consultancy. They will almost certainly not be managing people but they are

being managed and will be involved in the development process as part of a team. They should be encouraged to use their skills and competences in their role.

For those individuals who have the desire, aptitude and intellectual ability, there is the opportunity for organisations to further develop these skills and competences as a programme of development tailored to specific needs. For those who show the desire, aptitude and ability for managing projects but who have no previous experience of management methods, tools and techniques, this will be the opportunity for learning these competences.

(iii) Stage 3 - Junior/inexperienced project manager

Newly-appointed project managers need to be given only small projects or ones with a fairly low complexity to manage. The project manager would initially concentrate on activities that used the tools and techniques of project management, rather than the people and organisation skills. However, the project manager will gain more experience and, alongside the training development programme, will learn how to deal with more complex issues (such as team building and project politics, strategy, staff development). As the project manager gains experience, he/she will learn stage 4 skills (managing multiple projects, leadership, conflict management, legal issues). Most importantly, he/she will begin to be able to identify the skills that will be appropriate in particular project situations.

(iv) Stage 4 - Experienced project managers

Experienced project managers will be managing many projects and many teams of individuals within those projects. All too often project managers are reactive in troubleshooting and crisis management. With a proper programme of skills development they will become proactive in anticipating problems and providing effective solutions. They would have skills in all areas that would be appropriate for the management of successful projects. However, those skills would need to be enhanced and 'topped-up' throughout their career. Experienced project managers

should not be seen as experts in the discipline with no need for training. There will always be the need for more training to acquire competences at a higher level.

The competences of a project managers can be likened to a complex jigsaw puzzle that will never be complete. Project managers will piece together the puzzle, starting with the outside of the puzzle (the basic competences developed at undergraduate level and in early business experiences). To develop the overall picture, the inside of the puzzle (further skills and competences) will gradually be completed, attaching these pieces to the outside. Project managers may need to refresh or renew their basic skills. They must return to the outside and adjust these outside pieces.

As project managers gain more experience and skills, more pieces are placed together to formulate the puzzle. They will continue to learn about project management and there will always be pieces to add (new skills to acquire), reinforcing the view, put forward by Thamhain (1983) that:

'Lifelong learning . . . is a prerequisite for managerial skill building and career development'.

Different skills and qualities need to be displayed by the project manager to deliver project success. Therefore, project managers need to select parts of their puzzle to accomplish the task successfully. The skills in Stage 1 of the model in Table 6-4 are the border of the puzzle. They are fundamental skills that need to be considered on all projects. Project managers will need to employ these fundamental skills and then apply other skills as the situation arises. The level and complexity of the project will be applicable to the level and skills of project managers. The distinctive feature of a good project manager is to recognise what skills to apply and when they are most appropriate. Consequently, project managers need to understand the objectives of the project and the criteria for judging the project to be a success and, having recognised that, to apply appropriate development and management factors to achieve that success.

The results of the previous and this research point to the fact that project managers need a 'portfolio of skills' to enable them to implement the appropriate factors to deliver the

success criteria. The implementation of these skills will vary from project to project. Project managers cannot expect to acquire these skills and qualities instantaneously. Project management is a lifelong education and as the phrase suggests:

'You learn something new every day'

The results of this research show the problems that are frequently encountered by project managers and where they perceive their weaknesses. The skills highlighted in Table 6-4 address these problems. Formal training will be required for project managers to acquire the portfolio of skills if there is a weakness. Project managers can then acquire skills at stage 3 and 4, through formal education and training, and not only by experience. That is not to suggest that experience is not valuable. For example, a successful rugby or soccer team usually requires a mixture of youth, with exhuberance, flair and creativity, and experience, to provide leadership and knowledge when problems occur. The captain of the side needs experience and all the other skills (organisational and inter-personal) to create and maintain a winning and successful team.

There have been many examples of the combination of youth and experience in successful sporting sides. This was very apparent in the Australian Rugby World Cup winning side of 1991. It had an experienced captain - Nick Farr-Jones; it had some very experienced international players - David Campese and Michael Lynagh; it had some exuberant youth that brought flair to the side - Jason Little and Tim Horan. England, too, had a mixture of youth (Jeremy Guscott, Jason Leonard) and experience (Rob Andrew, Brian Moore, Wade Dooley, Peter Winterbottom). Perhaps the inexperience of Will Carling, the England captain, and his inability to adjust the tactics when problems occurred contributed to the defeat?

Project managers are the team captains. They need to plan their course of action and constantly monitor that plan against what actually happens. They need to instruct their team to adapt their actions when problem situations occur. Very often, if the communication channels are not established properly, project managers experience confrontational problems - the 'them and us' syndrome - like two opposing rugby teams.

Project managers need many qualities and skills and they will not be learned from experience alone.

Organisations must put into place a programme of skills development for all employees. However, project managers play a crucial role in a project and it is particularly important for managers of IS/IT projects to have this development programme. Project managers must acquire these skills but, most importantly, they need to recognise the factors that will be required to achieve project success and apply appropriate competences and skills to deliver that success.

CHAPTER SEVEN

Conclusions

Contents

7.1 Introduction

There has been much work in recent years on the reasons why IS/IT and other projects fail and suggesting ways in which these projects can succeed. Some (Slevin and Pinto (1986), Baker *et al.* (1983), Hastings (1993)) propose implementing certain factors to achieve success; others (Abdel-Hamid and Madnick (1990), Pitman (1991)) encourage learning from experiences in order that future projects can succeed. However, there are certain shortcomings of the previous research, highlighted as follows:

- there is no consensus on the criteria for success, except for three standard criteria - meeting time, meeting budget, and meeting user requirements. Furthermore, there has been little research on how success is judged and what criteria ought to be set to judge IS/IT projects as successes or failures;

- there is some, but by no means universal, agreement on the factors that contribute to a successful project (see Table 2-6);

- the previous research results have been derived mainly from the views of project managers, not users and sponsors, in a variety of industries and sectors and not specifically from examining IS/IT projects. We have seen that IS/IT projects show distinctive differences from projects in other industries;

- there has been almost no attempt to match the factors for success to the success criteria. Certain factors will be appropriate to deliver certain success criteria. There has been little research to examine the success criteria and define which factors will be most appropriate to deliver successful projects;

- there has been no assessment of the effectiveness, functionality and applicability of tools, techniques and methodologies in the success of projects. Despite the increased use of methodologies in recent years, they have not brought about a commensurate increase in project successes;

- there has been no evaluation of the relationship between the size of the project and the perceived success. We have seen from the examples of project failures that these are mainly large-scale software projects classified as 'software runaways' (see Chapter 1). The indication is that smaller projects have a better chance of success;

- there is little agreement on the skills and qualities that a project manager needs to deliver a successful project implementation despite the plethora of research and articles on the subject. Chapter 2 assesses the ideas of different researchers and observers and identifies current thinking on project management competences;

- there has been little attempt to examine project management skills and to define a programme for learning these skills. There are Bodies of Knowledge, courses and skills development programmes. However, there is a need to develop a formal package of project management learning.

This research has focused on the views of the different participants in the development of IS/IT projects and the differing views of these participants have been detailed in earlier chapters. In addressing the area of defining certain factors to deliver success criteria, the author has provided a matrix (see Table 4-8) of factors and criteria, showing the factors which are of primary and secondary importance in the attempt to deliver the criteria and achieve project success. Project managers will be able to examine the success criteria for their particular project, defined at the outset of the project and constantly reviewed, and apply the relevant factors to deliver that success.

Methodologies, tools and techniques can be used to deliver a successful IS/IT project. These aspects were examined and a model (see Figure 5-5) was developed, examining the two areas - project management and system development - which are crucial to project success and configuration management which is the tool which helps manage IS/IT projects. Projects, by definition, are unique. However, there are certain activities that need to be carried out on all projects and these activities are shown in Figure 5-4. The skills required by the project manager were also discussed and a model (see Table 6-4) was proposed for the acquisition of these skills over time.

This research has indicated that there is little opportunity for project managers to see how the project is progressing. Project managers can hold meetings and have discussions in order to monitor project progress but there is a need for some diagnostic analysis of the project in order that the project manager can see whether the project is progressing satisfactorily and whether the factors employed are likely to achieve a successful project. Consequently a project 'Health Check' (see Section 7.3 and Appendix G) was developed in order to enable the project manager to understand the nature of the project and what steps need to be taken if the project was unlikely to deliver the success criteria.

The research conclusions and recommendations have indicated that there is some further work to be carried out in order that IS/IT projects can improve their success rate in the future (see section 7.4). The results of the research and the messages emanating from them must be communicated to project managers in industry. Different ways in which these messages can be communicated are proposed.

7.2 Key Elements in IS/IT projects

There has been little research on the correlation between the success criteria and the factors required to deliver that success. A major challenge for the 1990s and early 21st century is to deliver successful IS/IT projects in order to achieve strategic business objectives. Past history has shown IS/IT projects very often fail disastrously with grave implications for companies, the taxpayer and the general public. Some projects have never been implemented, others have not achieved their purpose or functionality and, if they have been implemented, have not met the required quality.

Organisations have been very dissatisfied with the outcome. Projects in the public sector have wasted taxpayers' money, projects in the private sector have not provided any benefit to interested parties. Furthermore, many projects, in addition to all these problems, have been delivered late and over budget and have not been commercially successful.

However, there have been successes and, by analysing and reviewing these successes, the way to developing successful projects in the future should be indicated. Project reviews were carried out in order to confirm the results of the initial data gathering of the research, in terms of interviews and questionnaires. The conclusions of this research can be summed up in 8 key elements as follows:

(i) Define success criteria

Organisations want to implement successful projects; they want to achieve the strategic and tactical benefits of implementing systems. They do not want to implement systems which are seen as failures.and incur the costs and the loss of confidence which delayed and ineffective projects or unhappy users are likely to bring. To achieve that aim organisations need to define how the project is to be judged a success, not only from their point of view but also from the point of view of the users, sponsors, project managers, the project team and others who have a stake in the project. In chapter 4 it was shown that projects were more successful when the criteria were defined and agreed by all participants at the outset.

Consequently, the initial task is to define the criteria for success and understand the relative importance and weighting of each criteria - which is of paramount importance (the criteria which must be achieved) and which criteria is important (but not mandatory) or not important at all. We have seen the influence that the definition of the success criteria has on the success of the project (see Figure 4-6 and Appendix D.1). We have also seen the effects of project managers concentrating on a narrow set of criteria (see Table 4-1). Furthermore, the defined criteria must be realistic (sponsors should not specify impossible timescales for the project but should identify the importance of a particular end date) in order that a successful conclusion can be reached. A list of success criteria was proposed as follows:

- it is profitable for the sponsor/owner and contractors;
- it achieves its business purpose in three ways (strategically, tactically and operationally);

- it meets its defined objectives;
- it meets quality thresholds;
- it is produced to specification, within budget and on time;
- all parties (users, sponsors, the project team) are happy during the project and with the outcome of the project on implementation.

Many of the criteria stated can be seen as subjective and the successful outcome of a project may not be decided until some time after the initial implementation. However, the criteria are all definable and measurable. Consequently, this research has clearly identified that a start-up meeting needs to be held between the project manager and other key participants (the users and the sponsor(s)) in order to define the criteria by which the project will be judged. The evidence of this research is that there have been conflicts in the past with different participants aiming at different targets. Only when there is agreement on the success criteria will projects show substantial signs of reversing the current situation and start to become successful. These criteria will be monitored as the project progresses and will perhaps be altered. However, the alterations should be minimal if the project is on a relatively small scale, in terms of time and complexity. Only by defining the criteria unambiguously and by getting agreement from all parties on the criteria can the project move in a direction acceptable to all. Projects in the past have failed and will be doomed to failure in the future if the different project participants have different and conflicting targets at which to aim. Understanding the criteria and getting agreement in order that all parties are aiming for the same target is fundamental to success. It is the base on which a successful project is founded.

(ii) Apply appropriate factors to deliver success criteria

The major success criteria must be defined and agreed at the outset of the project and then the appropriate factors (see Table 4-8) need to be employed to achieve that success. The success criteria will inevitably vary from project to project and between different participants. This is not surprising as users will have a different agenda from project managers; sponsors will have different success criteria from operational users; programmers will place more emphasis on the technical issues

and delivering maintainable and technically sound software, rather than on the business and strategic objectives of the project and the organisation. It is also inevitable that the same factors would not be appropriate in all circumstances and will vary depending on the criteria defined. Different approaches to tackle the problems will be used, depending on the criteria identified and agreed. With all parties agreeing the criteria, the appropriate factors can be employed to achieve that success. With the emphasis on the part of project managers to meet time and cost (see Table 4-1), certain factors (planning and controlling) will predominate. However, this research points to the fact that time and cost are not the most important criteria for users and sponsors (see Table 4-1). Communication and user involvement must play a greater part in the process. What has been noted is that project managers are not only employing the wrong factors but are also doing them badly. The criteria will be different on different projects and so the factors that should be employed to deliver the success criteria will vary from project to project.

However, there are certain activities (agreement of success criteria, definition of objectives, planning, risk assessment and management) that must be carried out on all projects (see Figure 5-4). Very rarely are all these activities carried out on IS/IT projects. Such projects need to follow a broad life cycle approach but project managers need to apply an appropriate life cycle to the project needs. The evidence from this research has identified the need to adapt the project life cycle, the methodologies, the tools and the techniques to the needs of the project in order to deliver successful projects. All too often this has not been the case.

(iii) Keep projects small and develop programmes of projects with clearly defined and achievable milestones and objectives

It has been identified that many of the projects that are perceived to have failed in the past few years have been large complex projects, delivering very little until the final implementation. In some cases the project has been abandoned and has delivered nothing. That is not to say that large projects always fail and small- to medium-sized projects always succeed. They do not. Perhaps the large projects, which are usually critical to an organisation and are of interest to the general

public, have a higher profile. Therefore, the failure of such projects is more visible. Perhaps there is a serious lack of skilled and experienced project managers to run these projects. Perhaps there is a lack of skilled systems analysts and programmers. Perhaps users are poor at specifying their requirements. The results from the questionnaire indicate that there are an increasing number of small- to medium-sized projects. There were more successes than failures (see Table 4-6 and 4-7). The second interviews indicated quite clearly that the smaller projects with smaller teams were more successful (see Appendix D.1 and D.3).

Therefore, instead of developing and implementing large-scale projects, there needs to be a move by organisations towards a programme of small projects, delivering regular benefits. There is some support for this view (Gilb (1988), Gallagher (1995), Remenyi and Sherwood-Smith (1996)). The project team must focus on the deliverables (see section 5.4), by using the PBS, in order to deliver a successful product. The CAD system at LAS has now been successfully implemented (as of January 1996) by breaking the project into some 200 sub-projects. The benefits of this approach would be that:

- the chances of an alteration in the success criteria, and consequently the success factors, would be minimal;

- products can easily be delivered incrementally rather than producing a full implementation some years after the original specification;

- the chances of major changes to the specification will be again vastly reduced.

In short, the success criteria would be more certain and less prone to change. Consequently, the factors employed to deliver that success can be more assured.

(iv) Apply appropriate tools, techniques and methodologies for project management, system development and configuration management

We have seen that project managers are using inappropriate and/or applying badly the tools, techniques and methodologies for project management and system development. Configuration management has largely been overlooked and ignored in the past. This has contributed to the number of project failures over the past decades. Figure 5-5 shows the basic tools and techniques that need to be employed to achieve a successful project.

There has been a great increase in recent years in the number of methodologies (project management, systems analysis and design and programming) that purport to help projects succeed. In turn, these methodologies have been used increasingly by many organisations in an attempt to reverse the trend of delivering ineffective IS/IT projects. However, this research has shown that the increased use of these methodologies has not, substantially increased the success of such projects. The blame for this situation cannot be ascribed fully to the increased use, rather it is a lack of experience, training and knowledge on the part of project managers and developers which has led to these methodologies not being applied effectively to achieve the desired success.

Therefore, the use of a simple life cycle model would generally suffice for the development of IS/IT projects (see Figure 5-4). There have been many attempts at developing a life cycle model for IS/IT projects but any one model will not be necessarily appropriate for all IS/IT projects within any one organisation. Different life cycle models will be required for different projects. Project managers must, therefore, understand the project objectives, have agreement on the success criteria before starting the project and apply the appropriate factors (see Table 4-8) and life cycle model for the project. Requirements must also be understood clearly but requirements will evolve. Prototyping may be the appropriate way of defining clear requirements, particularly if the projects are relatively small in size and complexity but it may not be appropriate in all cases (see Appendix D.3).

The emphasis must be to plan at the outset of the project (using WBS, PBS, milestone planning and estimating techniques) but plan strategically (see Appendix D.1). Only after this initial strategic planning has been done can detailed planning take place as more information becomes available. All too often project managers, in striving for meeting timescale and budget constraints, plan in detail and give a definitive delivery date before much is known about the project.

However, project management is not solely concerned with planning and scheduling. Other areas - highlighted in Chapter 6 - are important. Building on the model produced in chapter 5 (see Figure 5-5), to implement systems successfully there is a fundamental need to have good configuration management. It is clear that the more complex the project, the more important good configuration management becomes. All the changes to the configuration of a system can be monitored and managed sensibly and accurately. Management must be able to track changes to a system configuration and report on the effects of those changes. IS/IT projects involve change and there is a particular need to control products, releases and quality, even on the smallest and least complex project.

The management and development process should also be helped by the use of automated tools. However, the smaller the project, the less impact an automated tool will be. A computer-based PMIS is, nevertheless, invaluable when dealing with a programme of projects where different priorities are given to each subproject and these subprojects need to negotiate resources. Unfortunately, available software products do not generally provide the features required by project managers (the questionnaire results indicated that software provided only 75% of the features required). In addition, the tools themselves need to provide the necessary functionality (see section 5.4):

- be able to show the inherent iterative nature of IS/IT projects;

- incorporate the ability to utilise configuration management in the automated tool;

- provide detailed and extensive reporting ('what if') capabilities within the tool;

- provide a more complex and effective way of allocating resources on a programme of projects.

Therefore, the value of a computer-based PMIS is diminished. Furthermore, the use of such systems has been hindered by the lack of adequate training and documentation. Learning by trial and error is not enough. It can lead to frustration, disenchantment and de-motivation. Project managers must be fully conversant with the automated tool so that it can improve the quality of decisions made.

In summary, methodologies provide a framework for managing, developing and implementing successful IS/IT systems. The evidence from previous research indicates that the increased use of methodologies has not in the past increased the instances of success. This research has shown that the successful projects use a methodology judiciously (see Appendix D.5). Tools and techniques that are part of methodologies need to be used appropriately.

(v) Apply appropriate project management education, training and development

Education, training and development is an important issue which has been overlooked in many organisations and on many projects in the past. Chapter 6 highlighted the perceived problems in project management (see Figure 6-2) and the areas where project managers felt that they could improve (see Figure 6-3). It also highlighted the fact that most project managers learn competences through experience rather than any formal training mechanism. With little or no training available, learning for project managers was done 'on the job'. However, experience of bad techniques, procedures and actions, will inevitably lead to their future use and replication. Today's project managers are still using the techniques of yesterday.With the emphasis on the part of project managers in achieving time and budget constraints, there was no time or resources available for training and personal development. Training was the first area which was cut. Project managers needed to be planning the project and monitoring its progress in order to report to

senior management; systems analysts and designers needed to be interviewing users and designing solutions; computer programmers needed to be coding or testing.

'On the job' training and experience should not be ignored. However, project managers are often judged on their ability to deliver systems on time and within budget. Consequently, they use techniques, learned through experience, to achieve those goals. Experience should not be seen as the sole source of skills for project management. Project managers also have opportunity and appropriate training to develop their skills.

The development of these skills needs to begin at undergraduate level or in the workplace with basics of project management (see Table 6-4). These skills need to be developed further in the early stages of working life where people will be part of a team, not necessarily managing projects but being able to appreciate and question the activities of their managers and leaders. Those people who show the aptitude and desire to manage projects will need to enhance their knowledge, particularly in the human, strategic and political aspects of project management. As the project manager gains more experience and there is the need to manage a more complex, multi-project, environment, further skills (such as business strategy, conflict management) will be gained.

The portfolio of skills required by project managers is huge. There will always be new situations arising and novel problems which test the project manager. Project management is a complex task. Organisations, therefore, need to commit to a comprehensive training and development programme for prospective, new and experienced project managers. This programme needs to follow the stages outlined in Table 6-4. Project managers cannot be expected to learn all these skills immediately. It is a long-term commitment on the part of the organisation and the project manager to acquire these skills for successful project management.

(vi) Promote ownership, commitment and communication

The review of specific projects clearly showed that ownership of, and commitment to, the project was seen to be an important factor in having a successful outcome (see Appendix D.6 and D.7). Other research has supprted this notion (Tampoe and Thurloway (1993)). The lack of ownership on the part, particularly, of middle management caused in many ways the project to be not completely successful (see Appendix D.7). All members of the team (systems analysts, programmers, support staff and users) must be fully committed to the project. Project management must foster that commitment. To get this commitment organisations need to get the highest calibre people and set them realistic objectives. The value of a structured approach to training is clearly seen here.

Commitment from all parties to the project is important but commitment itself will not deliver success. We have seen that users want to be happy (see Figure 4-3). Therefore, project managers need to listen to the views of, and communicate with, the system users. We have seen that users view the lack of involvement as the main cause of failure (see Table 4-5). Therefore, project managers must involve users in the development process.

The importance of communication in the project life cycle is very evident. All parties need to go in the same direction in order to achieve success and they need to communicate effectively at the outset of the project in agreeing the success criteria (see Appendix D.1). Effective communication too is necessary throughout the project in order that changes to the criteria and/or requirements can be monitored and accommodated. Furthermore, communication is also necessary after the project implementation in order that the lessons of the project, both good and bad, can be learned for the future.

(vii) Staff the project carefully

The comparison between the four sets of research analysed (see Chapter 2) identified that there was little agreement in the factors that contributed to success. However, one area of agreement among previous researchers was the importance of a qualified team (see Table 2-6). Kemp and Skeat (1995) noted that one of the main reasons for project failures is the poor selection of the team. In order that the ownership and commitment of the project team be enhanced, the project team has to be made up of the right people, with the right skills at the right time (see Appendix D.1, D.2, D.9 and D.11).

The importance of a qualified and committed team was borne out by the Payments Link project (see Appendix D.1). This project identified the appropriate personnel for the project at an early stage and gained their commitment for the project and was perceived as particularly successful, both in the process as well as the end-product. If personnel are not required at the outset of the project, then the right people need to recruited to and employed on the project at the right time. Again the Payments Link project (see Appendix D.1) highlighted this issue. Additionally, if team members leave the project for whatever reason, an appropriate replacement needs to be appointed swiftly and judiciously.

The project team needs to be complementary and not to encourage conflict. They need to work as a team, for each other, like any other team. A project manager should not be looking for people who are individuals and excel as such but for people who can work together for the team and project goals. However, conflicts will arise on the project and project managers need conflict management skills. These skills will be part of the project manager's armoury gained through the development programme (see Table 6-1). Project managers should not shirk addressing conflict situations, but it would be better not to have a conflict situation arise. The careful staffing of the project is an important step in avoiding these conflicts within the project team.

(viii) Review projects and measure benefits

Project managers must learn from their successes as well as their mistakes. In the quest for project success, there must be a project start-up meeting with all concerned parties to agree:

- the success criteria;
- the identification and assessment of the risks;
- the estimates and strategic plans;
- the identification and allocation of appropriate resources;
- the definition of the steps that are required to deliver that success.

It will be necessary to have constant monitoring to review the criteria as the project progresses and, consequently, review the factors to deliver that criteria. At the end of the project there must be a formal post-implementation review (see Appendix D.2, D.3 and D.8) to measure the success of the project against the stated criteria and to understand the project experiences. This review will not help a failed project become a success but it will help stop the same mistakes being made in the future. Too many organisations either do not carry out this simple task or pay lip service to process (by not taking it seriously enough) to learn from mistakes as well as successes. Projects not only undergo any post-implementation review but the benefits are not measured by assessing the effectiveness of the project and the return for the business (see Appendix D.8).

Like fraud or security issues, it is possible that only a few software failures are ever reported to the public. The companies do not want the adverse publicity that comes with disclosure. It is imperative, however, that organisations learn from their mistakes and carry out that learning process in a structured way. Therefore, a review process needs to be part of the project life cycle. This review process should not only occur after the project implementation; it needs to occur during the project in order to identify potential problems and rectify those problems at an early stage. The project 'Health Check' (see section 7.3 and Appendix G), if used

judiciously, provides the ability to examine the project in its early stages, thereby highlighting particular areas where problems are occurring.

Part of review must look at the initial criteria and the benefits required of the project to assess whether the project has achieved those benefits. The definition of the success criteria is vital in this process. Projects cannot realistically judged as a success or failure until this process has been carried out. The measurement of benefits cannot be left to conjecture (see Appendix D.8).

Therefore, the criteria for success need to be defined at the outset of the project and adjusted as the project progresses. Success criteria may change but, if the project is small, the chances of significant change to the criteria will be minimal.

Projects will continue to have perceived to have failed if the effort is not put in at the early stages of the life cycle to define the objectives and scope, identify the risks and strategically plan the project. Evidence shows that the correct project start-up sets the scene for the rest of the project and contributes significantly to a potentially successful outcome for the project (see Appendix D.1). If the steps shown in Figure 5-4 are followed, the chances of success will be greatly increased.

Project managers are crucial to this development and management of IS/IT projects. They need a wide range of qualities and skills but they need to adapt these qualities and skills as the situation demands. However, if projects are to concentrate more on the users (and their satisfaction), then project managers will need to concentrate more on the inter-personal aspects and develop those skills rather than spend time on the more administrative aspects of project management - the planning and scheduling of the projects.

The days of large, complex IS/IT projects should be over. The emphasis should be towards programmes or smaller subprojects. The most significant point is that the projects which were perceived to have succeeded:

- were relatively small;

- identified and agreed the success criteria;
- defined the objectives, purpose and scope of the project;
- assessed the risks;
- strategically planned the project;
- staffed the project well;
- controlled and reported the project effectively;
- tested the system thoroughly;
- trained the users well.

The results of this research confirms much of the previous research. However, it has developed the ideas further. The results point to the following conclusions regarding the management of IS/IT projects:

- there is an emphasis (on the part of project managers) on meeting timescales and budgets;

- with timescales and budgets being seen as particularly important, there is an emphasis on the administrative aspects of the project;

- there should be less concentration on the administration of a project, and more concentration on acquiring the right people to do the task at the right time, on communication, on user-related issues;

- leadership needs to be shown and it needs to come from top management in addition to project management within organisations;

- project managers need to demonstrate different skills in different situations. Project managers need a 'portfolio of skills' and they need to apply these skills and competences as the situation arises.

- project managers need a programme of training to develop their skills and to be able to recognise when to use particular skills in particular situations.

The contribution of this research can be seen in five ways:

- Identifying success criteria and matching factors to deliver the success criteria;
- The project 'Health Check';
- Links between project management and system development;
- Functionality of automated project management tools;
- Project management training.

(i) Identifying success criteria and matching factors to deliver the success criteria

The achievement of project objectives and the delivery of tangible benefits is clearly important in the success of projects. As important for users is that the project meets their requirements and expectations. This research has identified major conflicts in aims between different participants which need to be resolved. It is not surprising that different participants in IS/IT projects have different criteria for success. Therefore, projects must have an agreed set of criteria by which the project is to judged at the outset. This is fundamental for success. Factors can then be employed to deliver that criteria (see Table 4-8) and project managers can concentrate on the other key elements. This is the major contribution of the research.

(ii) The project 'Health Check'

The Project Health Check (see section 7.3) will enable the project manager to recognise where misunderstandings are happening and problems are occurring and take action to eradicate those misunderstandings and problems. Are all team members going in the same direction? We have seen that users have different success criteria from project managers and systems analysts. It will also be used to periodically review the project throughout its life cycle and addresses the issue of success criteria and the appropriate factors to deliver success (see Table 4-8). It will also be used to identify that appropriate methodologies are being used to deliver the stated criteria

(iii) Links between project management and system development

The disciplines of project management and system development are too often seen as separate entities. There are, of course, aspects which are the remit of the individual disciplines but there are areas of common ground. Configuration Management and the project life cycle are that common ground (see Figure 5-5). Project managers need to manage the life cycle and the configuration to be able to integrate the two disciplines in the quest for project success. The life cycle itself needs to define the success criteria and the benefits and input those to the review and benefits measurement process (see Figure 5-4). The research here has outlined these links and the processes.

(iv) Functionality of automated project management tools

Automated project management tools are being often used but are not having the desired results. Project managers have noted their dissatisfaction with the tools available. This research highlights some issues which need to be addressed in order to provide the required functionality for managing IS/IT projects. Projects must not be tool-driven; project managers must apply the tool to facilitate the project.

(v) Project management training

The last major contribution of the research is the recognition that project managers are crucial to the success of IS/IT projects. Project managers are too often focusing on different criteria and thereby employing the factors to deliver their perceptions of success. They are using out-of-date ideas, learned from experience. Organisations need to institute a formal training programme developed over time (a short course on project management would not be sufficient) in order that project managers are equipped with the necessary skills and competences to manage projects to success (see Table 6-4).

7.3 Project Health Check

There have been many attempts at providing a diagnostic tool for project managers to assess the relative success of projects. They stress the need to learn from project failures as well as project successes. However, many of these diagnostic tools are retrospective, thereby only helping future projects to learn from a failure. They provide no assistance to achieve a successful conclusion for the project which is the subject of the diagnostic process. Some others have been developed to provide technical support for the project manager. Others still have addressed the human, behavioural and managerial aspects of successful project management. However, there has not been a model that addresses all these aspects. There is a great need for providing a model that:

- provides feedback during the project on its current state;
- allows the project team to identify their important (and not so important) success criteria;
- provides feedback to the project manager on project issues and direction;
- gives an assessment of the team's views on the progress of the project;
- identifies the areas where improvements could be made before the project proceeds too far.

This model, or 'Health Check', based on the 'Projectivity Diagnostic' developed by Kristoffer Grude, should provide project managers with the ability:

- to monitor their projects in the early stages;
- to understand in outline what skills are needed on the project;
- to focus on the problem areas in the project;
- to anticipate problems;
- to rectify these problems that may have already occurred on the project.

It is a series of questions (see Appendix G) for all participants on the project to answer. This will enable the project manager and the team to identify the successful aspects of the project and also to identify the factors that need to be improved upon to avoid failure. It addresses the fundamental aspects of the project:

- the success criteria;
- the factors employed;
- the methodologies, tools and techniques used;
- the skills required;
- the project execution.

It allows the project manager to evaluate and appraise the project. The project manager can then identify and understand the strengths and weaknesses of the project.

The 'Health Check' needs to be completed by all members of the team anonymously at the start of the project. It would be appropriate for the 'Health Check' to be answered again at about one quarter to one third of the way through the project. The important aspect of the 'Health Check' is not the high or low score given but the variations by different members of the project team in the scores given to each question - where one person marked a statement as 5 or 6 but another person marked the same statement as 1 or 2. For some statements, a high score is good, for others it is poor.

Projects managers need to investigate these variations to see whether they are affecting the project. The spread of marks will indicate the agreement by the project team and stakeholders on different aspects of the project. The results must be discussed with the project team in order to understand the problem areas (if any) and focus on the aspects which need attention. Project managers need to identify where there are differences of opinion on the project and then try to bring those opinions closer together to ensure that everybody is moving in the same direction. Guidelines for the project manager in employing in 'Health Check' are given in Appendix H.

Part 1 is used to identify the important project success criteria and the understanding of the general goals and objectives of the project and how the project fits into the overall strategy. We have already seen the importance of all the project team understanding the goals and focusing on these same goals. This section allows for all project participants to define the important (and less important) success criteria as they perceive them. They need to say whether the success criteria were agreed and whether they agree with them.

Part 2 examines the various factors that are being used by the project to deliver the success criteria. The factors identified here need to be compared with the matrix shown in Table 4-8 to understand which factors are being applied and whether they are appropriate to deliver the success criteria defined in Part 1 of the 'Health Check'.

Part 3 assesses whether appropriate tools, techniques and methodologies for the development and management of the project are available, are being used by the project team and are being applied well. This part also examines the use of computer-based tools on the project and whether they are being used effectively.

Part 4 can identify the requirement for additional skills (for organising, planning, controlling the project and developing the system) which need to be implemented by the project manager and other members of the team. This part is particularly addressing the human aspects of the project.

Part 5 examines the execution of the project and whether appropriate methods are being used. It examines the resources on the project and asks whether they are appropriate. It also examines the problems on the project and whether they are addressed.

One of the major problems over the past decades is that project managers have not acted upon the results of the research which have been published. Very often projects are not reviewed, either as the project is progressing or retrospectively. If they are evaluated, all the lessons are not being learned. Project managers need a diagnostic device in order to monitor the project and adapt to new and changing issues in order to allocate resources to the project activities. The project 'Health Check' will go some way to solving the many problems of managing IS/IT projects.

This and previous research is wasted if project managers are not hearing the results. Consequently, the results of this and previous research need to be communicated to project managers in industry. If they hear and act appropriately, then more IS/IT projects in the future will be perceived to have succeeded. To 'spread the word' is the challenge for the future.

7.4 Further work

The conclusions and recommendations proposed in this research have been discussed with people (project managers, users, systems analysts) in industry working on IS/IT projects. The consensus is that the proposals put forward would help IS/IT projects succeed more often in the future. Organisations who have the majority of these proposals in place continue to produce successful IS/IT projects.

It has long been realised that the project manager has an important and pivotal role in the success or failure of IS/IT projects. This work has focused on the success of IS/IT projects and how to increase the success rate. There has been much research in the past examining the factors for success. However, IS/IT projects are still failing at an alarming rate (see Chapter 1). One of the major challenges in the immediate future is to spread the word to project managers in industry. Project managers are not heeding the results of the previous research and are concentrating on the time and budget constraints of the project and continuing to place great emphasis on the detailed planning of the project and using computer-based tools to plan and control the project.

As we have seen, managers have identified that they gain their knowledge of project management predominantly through experience. Their use of seminars and conferences is sporadic. It is not surprising, therefore, that project managers are continuing to use the same approaches to developing computer-based information systems as have been used in the past. Seminars and conferences must be placed in the forefront of project managers' minds. They should not be seen as academic exercises, suggesting nothing which is relative to the 'real world'. Practising project managers must be encouraged to share their concerns and learn from the research which has been carried out. The challenge is divided into two stages:

(i) Address practising project managers

IS/IT project managers must have the benefit of the current and past research into project management. Some professional courses are in place to train people in the

tools, techniques and methodologies; others examine the human and leadership aspects of managing projects. However, they are poor at identifying and disseminating the multitude of research in the area of project management. Postgraduate courses at universities and colleges are better at this but the take-up by project managers on these courses is small.

It is necessary, therefore, to conduct various seminars and talks with practising project managers. The subject audience for these seminars and talks would be members (initially at branch level) of professional bodies such as the APM and the British Computer Society (BCS). As there are few managers of IS/IT projects who are members of these associations, the word must be spread further to computer user groups. The outcome of this research must also be part of professional training courses and masters courses in project management at universities and colleges. It is one of the most important challenges to project management in the 21st century.

(ii) Publish articles aimed at managers of IS/IT projects

Refereed journals are an important source of information and knowledge. However, the vast majority of project managers do not subscribe to these journals and will not have access to them. Consequently, the outcome of this research must be communicated to project managers in journals and magazines which are more accessible to practising project managers.

Therefore, the target for articles would be magazines such as Computer Weekly or Computing. Project managers are far more likely to read these magazines rather than refereed journals such as the International Journal of Project Management (IJPM), the Project Management Journal (PMJ) or MIS Quarterly. There is a fundamental need to target magazines in order to get a greater circulation and a bigger audience for the views and outcomes from research. Project managers need to heed the lessons of the research and, furthermore, implement the recommendations of the 'Health Check'.

The analysis of the results of the 'Health Check' can only be carried out manually. Therefore, it would be understandable for project managers to resist the use of this diagnostic tool. It would be likely to add an even greater burden on the project manager to analyse the 'Health Check', discuss the results and communicate them to the project team. However, project managers would be wrong in taking this approach. There needs to be a tool developed which facilitates the project manager's task in collecting and analysing the data and reporting the results for the benefit of the project. Valuable lessons and indicators could be missed if there are many questionnaires to analyse manually. With the increased proliferation of networks and telecommunication systems for remote workers, it is possible for the 'Health Check' to be completed via a computer system and sent electronically. However, it is important that the team member who completed the 'Health Check' is not identified. Confidentiality is an important concern and must be emphasised to team members. Without this confidentiality and the ability to complete the 'Health Check' anonymously, it is unlikely that honest answers will be forthcoming. However, if there is a climate and culture of frank and open discussion, problems encountered on the project should be resolved quickly and effectively during discussion.

Although there is agreement from project managers in industry for the proposals set out here, there must be some formal and structured approach to confirming these results. A number of IS/IT projects need to be identified in order to test out the theories put forward in this thesis. Each project will need to carry out all the activities outlined in the life cycle (see Figure 5-4). It will be important that a start-up meeting is held to discuss and agree the criteria by which the project will be measured. The project manager can then focus on certain factors (see Table 4-8) to deliver that success. The project manager can then make use of the project Health Check to assess its effectiveness in understanding the problems on the project. Researchers will need to interview interested parties at regular intervals in order to get qualitative data about the project. In this way, the researchers will get regular opinions regarding the progress of the project and remove the selectivity of people's views. A review with all interested parties will need to take place after implementation to analyse the lessons learned from the project and measure the benefits.

Work in recent years by APM, ISEB and COSIT has identified competences (technical and business) that are required by project managers. There has been the incorporation of project management in a number of courses at British Universities. There has also been an increase in the number of postgraduate courses in project management, not solely for the IS/IT industry. Further links need to be established between APM and British colleges and universities to provide the foundation for future project managers. The Certificate in Project Management for Information Systems will need to take note of the results of this research and accommodate the issues in the syllabus.

Organisations must be encouraged to implement a programme of development for project managers. A research programme to examine this issue needs to be carried out. Organisations who have a great involvement in developing information systems need to be selected as pilot sites. The organisations will need, with the assistance of the researchers, to set up a portfolio of courses, each element having the objective to teach a skill. If any organisation has courses currently developed, then these will be matched with the skills portfolio (see Table 6-4) and an assessment of the gaps and/or duplication can be developed. A set portfolio of courses can be developed to deliver the skills required by project managers of the future. Some evidence of this process is given by Storeygard (1995) through experiences at 3M company. A centre will be set up to run courses, workshops, seminars and conferences. One of its major functions will be the collection of research and industry practices in order to further develop training material.

Computer-based project management information systems have to provide proper functionality for project managers. Only then will project managers be in some way happy with the products and use them to aid the project management process. The evidence is that organisations invest in software for project management but project managers either do not use it or find it wanting in a number of areas. Therefore, suppliers of such tools need to radically revise the functionality provided by the software.

However, it is not the additional functionality or the increased use of computer-based project management and system development tools that will enhance the prospects of IS/IT project success in the future. It is more fundamental than that. All parties in the project must define and agree the criteria for success in order that they are all moving in

the same direction. Greater emphasis must be placed on the start-up procedures and delivering the system at regular intervals. The project manager has to promote ownership of the project within the team and ensure their commitment to the project. Furthermore, the project needs to be assessed using the 'Health Check'. IS/IT projects are becoming ever more important for organisations in striving to achieve business objectives. Project managers are an integral part of this process. Businesses can no longer accept project failures on the scale witnessed in the past. Organisations must act now in implementing the key elements and the recommendations proposed here.

Appendix A - Questionnaire

This questionnaire is part of data collection for research into IT Project Management. The results will be analysed and provide details about industry's perception of success and failure of IT projects.

All the answers will be treated in the strictest confidence.

SECTION 1 - To be completed by ALL respondents please

1.1 Would you describe yourself as (please tick as many as is appropriate):

IT Sponsor (responsible for funding IT projects)	____	complete section 5
IT User (at an operational/tactical level)	____	complete section 5
Systems Analyst	____	complete section 3 and 5
IT Project Manager	____	complete section 2, 4 and 5
Other IT support staff	____	complete section 5

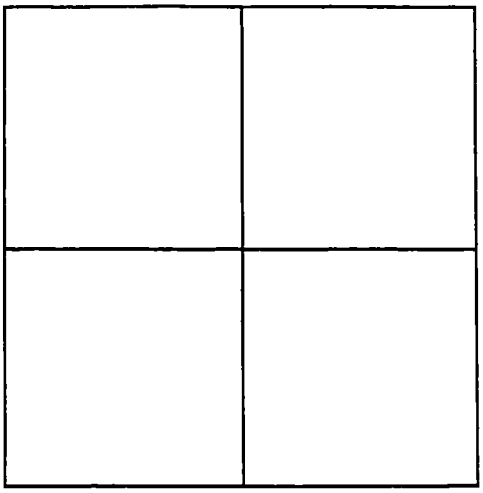
Please specify: _____

You should insert five ticks for questions 1.2 and 1.4. If you would like to add any brief comments (two or three words) in order to further explain your decision please do so.

1.2 For the two most significant projects with which you have been involved, please place a tick under A (project 1) and B (project 2), rating the FIVE most important criteria of how you judge the success of IT projects.

		A	B	Comments
a.	A commercial success?	___	___	_____
b.	Meets user requirements	___	___	_____
c.	Meets budget	___	___	_____
d.	Happy users	___	___	_____
e.	Achieves purpose	___	___	_____
f.	Meets timescales	___	___	_____
g.	Happy sponsor	___	___	_____
h.	Meets quality constraints	___	___	_____
i.	Happy project team	___	___	_____
j.	Other (please specify below)			
		___	___	_____
		___	___	_____

1.3 Place A and B in Pearson's matrix below. Consider how well defined were the criteria for success (horizontal axis) and the possible causes of failure (vertical axis) at the start of the project.



1.4 If you feel that both of the projects specified above in 1.2 were successful complete B below; if you feel that one of the projects specified above in 1.2 was a failure, complete A below for the failed project and B below for the successful project; otherwise complete A below

A. What do you feel are the FIVE main causes of failure in the IT project(s) which failed? Please place a tick under A (project 1) and B (project 2).

		A	B	Comments
a.	Weak leadership	___	___	_____
b.	Problems in motivation	___	___	_____
c.	Poor Planning	___	___	_____
d.	Wrong emphasis on success criteria	___	___	_____
e.	Wrong/poorly applied development method	___	___	_____
f.	Poor Monitoring	___	___	_____
g.	Wrong/poorly applied management method	___	___	_____
h.	Problems in delegation	___	___	_____
i.	Problems in communication	___	___	_____
j.	Poorly defined objectives	___	___	_____
k.	Lack of user involvement	___	___	_____
l.	Others (please specify and tick/comment below)	___	___	_____
		___	___	_____

B. What do you feel are the FIVE main issues of possible failure in IT projects specified? Please place a tick next to the appropriate issue.

		Tick	Comment
a.	Weak leadership	___	_____
b.	Problems in motivation	___	_____
c.	Poor Planning	___	_____
d.	Wrong emphasis on success criteria	___	_____
e.	Wrong/poorly applied development method	___	_____
f.	Poor Monitoring	___	_____
g.	Wrong/poorly applied management method	___	_____
h.	Problems in delegation	___	_____
i.	Problems in communication	___	_____
j.	Poorly defined objectives	___	_____
k.	Lack of user involvement	___	_____
l.	Others (please specify and tick/comment below)	___	_____
		___	_____
		___	_____

1.5 Briefly describe the nature of the projects used in questions 1.2 and 1.3

A.
B.

1.6 What was your role (use roles detailed in 1.1) on projects A and B

A.

B.

SECTION 2

ONLY TO BE COMPLETED BY RESPONDENTS WHO HAVE TICKED 'IT PROJECT MANAGER' AT QUESTION 1.1

2.1 Approximately how long have you been managing projects?

Years: Months:

2.2 What size have the IT-related projects been (please tick relevant number, one tick for each size of project, if appropriate):

Size of project	No. of projects			
	1	2	3	3+
small (up to 6 man months duration)	—	—	—	—
medium (6 man months to 1.5 man years duration)	—	—	—	—
large (1.5 man years and above)	—	—	—	—

2.3 What proportion of your time do you spend on project management? ____ %

2.4 Are the projects (please tick):

Developed by the organisation for product development? ____
Developed by the organisation for its internal use? ____
An bespoke contract for a client? ____
Government sponsored? ____
Others (please specify)

_____
_____
_____

2.5 Do you use project management software (please tick)? YES
NO

If you have answered NO to question 2.5 go to question 2.10

2.6 What is the name of the package?

2.7 In which year was it acquired by the organisation?

2.8 Do you feel that the software helped to manage the project better (please
YES NO

If YES, in what aspects (please tick)?

Planning ____
Controlling ____
Resourcing ____
Estimating ____
Other (specify) _____
_____

2.9. How far does the package provide the features you require?
Answer by a tick on a scale 1 to 5

Provides features required

None	Few	Some	Many	All
1	2	3	4	5

Now go to Section 3

Only to be completed if you have answered NO to question 2.5

2.10 Are you (or the organisation) considering using project management software?
YES NO

2.11 Have you ever used any project management *software*?

YES NO

If YES, which package(s) was it/were they?
If NO go to section 3

2.12 Did the package provide the features you required? YES NO

If not, what other features would have been useful?

2.13 Do you feel that the software helped to manage the project better?
YES NO

If YES, in what aspects (please tick)?

Planning ____
Controlling ____
Resourcing ____
Estimating ____
Other (specify)

_____
_____
_____

SECTION 3

ONLY TO BE COMPLETED BY RESPONDENTS WHO HAVE TICKED 'SYSTEMS ANALYST' AT QUESTION 1.1

3.1 Approximately how long have you been a systems analyst?

Years: Months:

3.2 What scale have the IT-related projects been (please tick the relevant number, one tick for each size of project, if appropriate):

Size of project	No. of projects			
	1	2	3	3+
small (up to 6 man months duration)	—	—	—	—
medium (6 man months to 1.5 man years duration)	—	—	—	—
large (1.5 man years and above)	—	—	—	—

3.3 Are the projects (please tick as appropriate):

Developed by the organisation for product development? ____
Developed by the organisation for its internal use? ____
An bespoke contract for a client? ____
Government sponsored? ____
Others (please specify)

_____
_____
_____

3.4 Do you use a system development methodology (please tick)?
YES NO

if you have answered NO to question 3.4 go to question 3.7

3.5 What is the name of the methodology?

3.6 Do you feel that the methodology helps to complete projects successfully (please tick)?

YES NO

If NO, please comment briefly

Now go to Section 4

Only to be completed if you have answered NO to question 3.4

3.7 Are you (or the organisation) considering using a system development methodology (please tick)? YES NO

3.8 Have you ever used a system development methodology (please tick)?

YES NO

If YES, what was it/were they?

If NO go to section 4

3.9 Did you feel that the methodology helped to complete projects successfully (please tick)?

YES NO

If NO, please comment briefly

SECTION 4

ONLY TO BE COMPLETED BY RESPONDENTS WHO HAVE TICKED 'IT PROJECT MANAGER' AT QUESTION 1.1

4.1 What do you think are the three most important competences for successful project managers?

1.

2.

3.

4.2 What would you say were the three most difficult problems you encounter in managing projects?

1.

2.

3.

4.3 What has been the most important contribution in your learning of your project management skills (please rate first, second and third by inserting a 1,2 and 3 in the appropriate area)?

Experience ____
Training Course ____
Seminars ____
Conferences ____
a Project Management Software Package ____
Other (please specify)

_____
_____
_____

4.4 List 3 most important areas where you feel you could improve managerially?

1.

2.

3.

SECTION 5

If you would like feedback on the results of the questionnaire, would you fill in the following details:

Name:

Job Title:

Company:

Address:

Tel:

THANK YOU VERY MUCH FOR COMPLETING AND RETURNING THIS QUESTIONNAIRE.

Appendix B - Synopsis of Initial Interviews

The main point from the interviews was the question of how is a project judged to be a success or a failure. Many of the interviewees, particularly users and sponsors, identified that different participants were focusing on different objectives to judge the success of the project. Users were measuring the success of the project on:

- 'did the project meet the requirements?';
- 'am I happy with the system as delivered?'.

Sponsors, on the other hand, measured success as:

- 'did it deliver the expected benefits?'.

Project managers were more concerned with the fact that the project should be delivered on time and within budget . Some projects were not budgetted or were fixed-price. In this case, time was the overriding criteria. To achieve this, very often detailed planning was carried out at the start of a project and a target date set. It was mentioned that project managers are judged by their superiors on achievement of time and cost. Therefore, it was no surprise that they tended to focus on these two criteria which are objective. Systems analysts were focusing on delivering the user requirements (or their perception of user requirements). The focus was so much on time and cost that system functionality was sacrificed in order to deliver the system on the specified target date. Then there would be a Phase 2 and, in some cases, a Phase 3 in order to deliver the functionality that was removed from the initial implementation. Users felt that this was an inappropriate course of action and they were often not consulted. The interviews pointed quite clearly to the fact that different people involved in an IS/IT project have different objectives and are, therefore, trying to deliver different, and incompatible, criteria.

Users also noted that the company used a structured analysis and design methodology (such as SSADM). They had been on courses in order to understand the advantages, rationale and fundamentals of using such a methodology. Despite the stated advantages of the methodology (such as user involvement), they felt that they were to a large extent excluded from the development process. They were not happy with the process and their involvement (or lack of involvement) in it. Conversely, the project managers and systems analysts suggested that users rarely knew what they wanted or needed. They had to 'read the minds' of the users. Because of the lack of user requirements' specification, projects were moving to prototyping very quickly and ignoring the early

stages of the life cycle - requirements analysis and specification. Many organisations used a structured analysis and design methodology as standard and it was felt by analysts and designers that most of their time was taken up by documentation rather than being involved in creating a new system.

Users laid the blame for failed projects on project managers. They felt that they were too narrow in their views, focusing on time and cost for their own ends. They needed to take more account of users' views. Project managers and systems analysts, on the other hand, viewed the users as a major cause of failure. They invariably cited a lack of knowledge of requirements and constantly changing requirements as the main reasons. Two systems analysts also identified that the use of contract staff, not committed to the project and unfamiliar with company standards, was a major problem which contributed to the failure of projects.

Appendix C - Questions for Second Interviews

1. What is you name?
2. What was your position on the project?
3. What is the project title?
4. Explain in your own words the nature of the project.
5. What do you consider were the main success criteria on the project?
6. Were they achieved? Explain.
7. Were the criteria for success agreed at the start of the project?
8. What do you think were the main reasons for failure?
9. How well defined were the criteria for success?
10. How well defined were the possible causes of failure?
11. Describe the project (e.g. size, duration, life cycle approach, tools used).
12. Were the tools, techniques and methodologies available used?
13. If no, why not?
14. Did you assess the risks of the project?
15. How did you staff the project?
16. Did you review the project? At the end? Throughout?
17. What was completed well?
18. What could have been done better?
19. Did anything go wrong?

Appendix D - Resumé of Second Interviews

D.1

Project:	**Payments link project**
Company Business:	**UK operation of a major US bank**
Interviewees:	**Project manager, Systems analyst, User, Quality Assurance Co-ordinator**

The project itself was not budgeted as an individual element of overall departmental costings. Plans for the project were drawn up at the outset of the project. However, although plans gave a target end date and cost, the emphasis was not placed in this area. Planning was important but the project team identified more important issues to deliver success. There were tools available to develop the system and manage the project but they were used selectively. The project team were concerned that the project met the user requirements, that the users and the project team (made up of technical members and also user representatives) were happy, that it achieved its purpose and that it was a commercial success.

The risks were assessed initially and documented in the 'Risk Assessment' Report. The assessment examined different areas relating to the project team, the project plan, the software/hardware environment, the business area and users and interfaces. Having identified the project risks, a member of the project team was tasked with the responsibility of managing the risk. The project had a start-up meeting (attended by systems, technical, support and user staff) where the business sponsor explained the business justification for the project. Other areas that the start-up meeting addressed were:

- defining deliverables;
- building the team (identifying roles and responsibilities);
- taking ownership of the vision;
- identifying the success criteria.

The start-up meeting and the assessment of risks were seen as vital in order to get the project started well.

The project was seen by all participants (sponsor, users, systems personnel) as a resounding success. The point that was constantly made is that the users were happy with the project and that the project achieved its purpose. The systems personnel placed

emphasis on getting the right people on the project at the outset, involving the user representatives in the project as part of the project team and concentrating on the communication aspects. Action points in meetings were always followed up. The project review involved all participants completing a questionnaire on the project performance and outcome.

An assessment of the project showed that some 90%+ of the transactions were 'clean' (that is, error-free) - a testimony to the extensive and high quality training that was undertaken. However, training was the area identified by the user representative as the only problem area. With it being an international project, the team decided to take a 'train the trainer' approach. However, it was felt, on hindsight, that the wrong person from one country was sent for training. This has caused problems during the operation of the project. The users felt that the project was very successful with the main reasons for that success being:

- user involvement (particularly in Prototyping);
- a strong project leader;
- right individuals at the right time;
- realistic project scope.

The project was reviewed as are all systems projects. Different participants were asked for their opinions on the project. This review highlighted the aspects which were considered as excellent:

- communication;
- effectiveness of reporting;
- assistance in testing and training.

and the aspects which were considered as good:

- estimating and scheduling;
- gathering and agreeing requirements.

A life cycle approach was taken involving:

- requirements specification;
- prototyping;
- build;
- test.

The use of prototyping was seen as extremely important in order to encourage the involvement and participation of users - good communication and strong user involvement were seen as crucial to achieve the success criteria. Prototyping was a major part of the development process.

The points can be summed up as:

- the use of a life cycle approach and prototyping;
- excellent user involvement and communication;
- staffing the project with the right people at the right time;
- comprehensive training.

D.2

Project:	**Manufacturing package implementation**
Company Business:	**UK Manufacturing company**
Interviewees:	**Sponsor, Project Manager, User Representative Manager**

The project itself was seen as not particularly successful. The success criteria was not defined and agreed at the outset of the project. The only success criteria mentioned is that:

'there should be a 30% reduction in costs for the company'

However, there was no Cost/benefit Analysis carried out for the project and, therefore, it would be difficult to assess the performance of the system in achieving the criteria. It was felt by some that the project would not achieve the savings stated; others felt that they would. There was no formal project review to assess whether the project achieved the success criteria set out at the start of the project. It was felt, however, that other projects will have better ability to achieve savings with the project implemented.

The project manager, in considering the possible reasons for failure, felt that the scope of the project was changed a number of times by senior management. Furthermore, the time scales set were too tight to achieve the savings. Additionally, the project manager felt that there was no clear definition of the project. The major lessons to be learned from the project are:

- define clearly the objectives of the project;
- ensure that the project scope is not changed;
- carry out a cost/benefit analysis if cost savings are required.

In line with the success criteria defined, the project manager was more concerned with achieving the cost savings rather than communicating with the operational users of the system. However, the project manager did feel that there were positive aspects of the project:

- the correct people formulated the project team with all team members being well trained;
- good team building (people have left but they have been effectively replaced);
- communication between the team and the other functional areas.

Once an implementation time was set, the project team set the project milestones. There was no structured approach to the management of the project and the project was not planned in any great detail. The project manager felt that it was a waste of time spending too much time on detailed planning when the scope of the project changed so frequently. Furthermore, there was no assessment of project risks.

The project involved the implementation of a Manufacturing package. The package satisfied about 80% of the requirements; the other 20% were developed in-house by the company systems and programming personnel.

The project followed a life cycle approach. The project started with a start-up meeting and training for the project team. The first task was to find all the suppliers of manufacturing software. Short demonstrations of the software packages were held with a full demonstration of the 3 packages that best suited the system requirements. The package was selected and purchased. At that point a test case was set up with a dummy business featuring all functional areas. The user manager felt that this was the best approach and that there was no alternative. Enhancements were forwarded to IT department for implementation. Finally, all the operational users were trained prior to implementation.

The positive points of the project were:

- the use of a test case;
- the staffing of the project - the right people at the right time;
- communication.

D.3

Project:	**Retail Banking project**
Company Business:	**International Section of UK bank**
Interviewees:	**Project manager, Systems analyst**

The project was a direct replacement of the existing Retail Banking system. The new system was to utilise new technology (new hardware, UNIX and INGRES) and would incorporate a few enhancements. The project manager remarked that a major success of the project was the ability to resist too many enhancements and changes to system functionality.

The success criteria was not defined at the outset of the project, although time was important as the project had a certain timescale to work to. The project was to be implemented internationally and therefore it needed to be flexible to provide the required functionality for different users in different countries.

Although not assessed, the project manager identified some possible causes of failure:

- the decision to change hardware/software mid-project;
- timescales were tight.

The project manager, in planning the project, gave a best and worst delivery date.

However, the project went well with, according to the project manager, many positive aspects:

- clearly defined objectives (the project was a replacement of a current system);
- top management support (all business areas extremely supportive);
- testing (users tested the system in England);
- user involvement (despite the geographical problems).

The project manager felt that the lessons to be learned from the project were:

- the necessity of a clear definition for the project;
- the importance of top management support.

Since implementation it was felt that the project has performed well.

The systems analyst agreed that the success criteria was not defined at the outset of the project. The systems analyst felt that the major success of the project was the successful move to UNIX/INGRES and the training that the move involved. This was the first project to implement a system utilising this software. Consequently, it was felt to be a success. The key success was the testing. However, the project team did not, it was felt, realise the full extent of the new technology, owing to the lack of expertise, both in-house and external. This expertise was difficult to acquire. Company employees were not familiar with the new technology. Therefore, a number of contract staff were employed by the project and this led to some communication problems. From the systems analyst's viewpoint, the major lesson to be learned was the need to have the right skills available for the project, particularly if the project is implementing new technology.

The project followed a broad life cycle approach:

- risk assessment;
- functional design;
- detailed design (on a modular basis);
- programming (in C);
- testing (program, system, user testing);
- pilot site implementation.

The systems analyst felt that this was the correct approach; the project manager felt that it was the only option for this type of project.

Oracle-CASE was used for project documentation. PMW was used for project planning. The project manager carried out risk assessment and managed the risks. Meetings were held throughout the project to assess the progress. However, no formal project review was carried out to assess the effectiveness of the project. The company very rarely carry out project reviews and it was not thought to be useful for this type of project.

The project benefited from the users having a 'sense of ownership' of the project. However, there were lessons:

- the use of contractors and acquiring 'right skills';
- the experience of programmers;
- although testing was a positive aspect, it could have been done better.

D.4

Project:	**Database system**
Company Business:	**Major International Electronics Corporation**
Interviewees:	**Project Manager, Sponsor, User, Systems analyst**

The project itself was relatively simple and straightforward. The system to be developed was one to hold data regarding clients, their products and promotional details. The system was required only for the input, modification and enquiry of the database. There was no requirement for ad-hoc reporting.

The system before the project was conceived was a manual process. It was particularly time-consuming to retrieve information. This was one of the benefits perceived by the users from the system. The success criteria were not agreed at the outset of the project by all parties. There was no formal start-up meeting for the project and the project team did not assess the risks and develop contingencies. The user identified three major success criteria for the project:

- meets user requirements;
- achieves its purpose;
- meets timescales.

The system was delivered to the users within the required timescales. The system met their requirements and the benefit of having the data readily available was achieved. The user was very happy with the system itself.

The project team placed great stress on meeting the time constraints of the project and on meeting the user requirements. The project team felt that they had produced a successful system which met those requirements in an acceptable timeframe. The users also felt that it was a successful system. However, the success criteria were not agreed at the outset by the project participants.

The system was developed for a standalone microcomputer within the Sales area who undertook the project in isolation. However, having had the system developed, the organisation identified the need to integrate the system with other aspects of the business and not to have one department acting independently. The data is available within the organisation and a decision was taken not to implement the system but rather to investigate the wider implications of the requirements with a view to implement a integrated system which deals with more aspects for the organisation as a whole.

The users noted two areas in which they thought the project team were particularly effective:

- the communication between the users and the project team;
- the team working.

There were no particular problems encountered during the project. However, the technical team spent a long time (it was felt later by the team that they perhaps spent too long) developing analysis and design products. Much of this work, it was felt, was inappropriate for the size and complexity of the project which was a fairly simple and non complex system.

Additionally, the technical team spent much of its time on planning the project in detail and using an automated tool to produce the plans. This again was too much for the type of project. It was felt that less time should have been spent on planning and producing neat documentation (although documentation was seen as important by the team).

There was no formal review of the project throughout or at the end. However, the project team learned some valuable lessons from the project, particularly in respect of the concentration on planning and documentation. The project required more effort (in terms of man hours) than was initially anticipated and consequently the team needed to work many more hours than was planned in the final month to achieve the timescale required. The end users within the Sales area felt that the system was successful. However, it was perceived as less successful by the organisation itself because it did not provide an integrated system using the data available.

D.5

Project: **Timesheet and Cost Tracking system**
Company Business: **International News Agency**
Interviewees: **Project Manager, User, Systems analyst**

There were a number of problems highlighted with the manual recording of time sheets and project costs:

- the completion, checking and entering of timesheet data is very time-consuming;
- duplication of effort in the validation of the time sheets with no guarantee that data is fully accurate;
- the retrieval of information from the system has proved to be complex;
- the reporting facilities are not readily available to project managers and are inflexible.

These problems were discussed and agreed by the users of the system and the project team undertook the development of a computer system using a Windows environment. A Terms of reference was drawn up. However, the users of the system agreed that they had not fully set down their requirements for the system. The success criteria were not discussed at any time during the project. Therefore, the project was not implemented when the software was delivered. Instead, the work carried out was considered the first phase - a prototype of the system. The project moved into a second phase - developing the working system. The system users accept that they did not fully specify their requirements and felt that this aspect was a major contributory factor to the outcome of the project.

The system was for internal use and the user representative felt that the major success criteria was that the system was used, having met user requirements. Because the requirements were not fully specified, the project was not implemented immediately. Therefore, the system was considered less than successful, although not a failure by any means.

Although it was felt that there was good communication generally between the users and the project team, the 'good feel' was compromised by the requirements specification (or lack of it). The users also commented on the dedication of the project team on the project. The users were not explicitly made part of the project team.

The project team highlighted the situation that the original specification was changed during the early stages of the project. Plans were subsequently altered and resources reallocated. The project manager felt that there was not sufficient deliberation and specification of requirements at the project outset.

The success criteria were not agreed at the outset of the project by all parties. In fact the user's major criteria - that the system should be used - was not met. The project team focused on the time elements of the project and on meeting the user requirements as they perceived them. The team felt that they had produced 'a fully functional system which satisfied the clients' specified criteria and operated satisfactorily in the users' environment'.

Initially the objectives and a set of requirements were drawn up. However, these were not complete. The team used a structured methodology (particularly during the analysis phase, developing Data Flow Diagrams and Entity Models). This was felt to be inappropriate for the size and complexity of the project. The project was planned but there was no formal approach to the management of the project. The project was not assessed for risks and was not reviewed at the end (phase 1).

Areas where the users felt that the project could have been completed better were:

- the team didn't sit down, specify the project and confirm all the user requirements;
- the lack of experience of the project team (all members were relatively inexperienced in system development);
- the documentation was lacking.

D.6

Project:	**Mailing system**
Company Business:	**UK computer distributor**
Interviewees:	**Project manager, User/sponsor, systems analyst**

The company place great emphasis on customer relations and satisfaction. A mail pack (either requested individually or sent as part of a targeted campaign) is a major part of the image of the company. Letters produced by the previous mailing system were of inferior quality. Therefore, a system for producing mailshots and other publicity material was required.

The aims and objectives were set out at the outset of the project in consultation with the project sponsor and a detailed Terms of Reference was drawn up. Additionally, at the outset of the project the project manager sought and agreed:

- the working relationship between team and sponsor/users;
- the user requirements for the project;
- the scope and boundaries of the system;
- the identification of the various stakeholders (MIS Operations, the project sponsor, mailing administrator, marketing executives) in the project.

The project itself was divided into two phases as a definitive timescale was set for the implementation of phase 1. The nature of the project deemed that a hybrid methodology (SSADM, conventional techniques and a life cycle approach) was appropriate. The team employed a standard and conventional life cycle approach. The project was initially planned and the team set great importance in the sharing of ideas to ensure that any unforeseen circumstances (such as illness) did not affect the project implementation. The project was planned around milestones that were set for every phase of the life cycle. Formal meetings were held regularly (every two weeks) to monitor progress although there were other methods employed:

- informal meetings;
- electronic mail.

A communications network was set up at the beginning of the project. The sponsor of the project highlighted that the communications aspects (both written and verbal) of the project was a considerable success factor in the project.

It was recognised early on that the right team needed to be established. Any gaps in knowledge and skills were rectified by training and cross-fertilisation of ideas.

There were a number of other areas that the project sponsor was extremely happy with the outcome:

- the project met expectations;
- the usability of the system;
- the attention to detail;
- no false assurances regarding planning;
- the project team took ownership of the project.

However, it was highlighted by members of the team that there were internal politics which impacted on the conduct of the project. These political issues did not affect the eventual outcome of the project although certain activities were held up.

The project was seen as extremely successful, meeting all the requirements of the sponsor, users and business areas within the organisation. There was no formal (or informal) analysis of the risks of the project. The technical user felt this was an extremely important aspect which was neglected. Some of the problems encountered in the project could have been alleviated or eradicated if a formal assessment of the risks was undertaken and managed throughout the duration of the project.

D.7

Project:	**Integrated Purchasing, Sales and Manufacturing system**
Company Business:	**International Communications company**
Interviewees:	**Project manager, Sponsor, User, Systems analyst**

The impetus behind the project was that the Production Manager was paying a large amount of money from his budget for a system which provided little benefit for him. The current system had a number of weaknesses (such as responses, access, reporting) and the Production Manager wanted to:

- pay less annually for a system;
- provide his department with the ability to function effectively and efficiently.

The new system needed to address these weaknesses.

The success criteria were not defined at the outset of the project. However, there was some measure of agreement. The project manager, user and sponsor all felt that the project must meet the budgetary constraints. The systems analyst felt rather that the users should be happy and the project manager felt that the users should be 'satisfied'.

There were also differences of opinion on whether the project risks had been assessed. The project manager said that the 'worst case scenario' was identified. Others were unaware of any risk assessment. If the risks were identified, the results of that process were not communicated to the project team.

The project was structured into two areas - business and IT. The business was sub-divided into module teams, one module manager for every module of the package to be implemented. The operational end-users were not involved in defining requirements. The module managers were the 'mouthpiece' of the operational users. This was not seen as a particular problem. However, the module manager interviewed felt that the end-users 'could have had more involvement'. Both the module manager and the sponsor felt that there was lack of commitment from middle management towards the project. There was a failure on the part of the middle management to accept ownership of the project.

The first three/four months of the project were dedicated to evaluating supplier packages. There was no formal start-up of the project with only a broad plan produced. Having decided on the package and gained approval for the expenditure, the team identified performance objectives (such as response time) and concentrated on the

analysis and design of the data take-on, converting the current system data to the new format. The decision was taken to amend company procedures to fit the package and not to alter and add to the package to fit the business procedures. This involved much less programming from IT except for the preparation of interfaces to other systems (such as Accounting, Costing).

The project was a fairly straightforward project with the emphasis on three areas:

- evaluating software packages;
- data take-on;
- training the users.

The training broadly went well. However, the project manager felt that the project team should have been taken away from their workplace for training. Additionally, the module manager felt that there should have been more briefing sessions.

There was no formal review of the project but it was judged to be reasonably successful. From the Production Manager's point of view, his annual IT expenditure has been reduced. However, the other business areas are still using the old system. There are modules for those business areas. The Production Manager felt that it was up to those areas to follow his lead.

D.8

Project:	**Manufacturing/Stock system**
Company Business:	**UK section of international pharmaceutical company**
Interviewees:	**Project manager, User, Systems analyst**

The company had a very old batch computer system for controlling stock. It was felt that the company was holding too high stock levels and that a modern on-line stock control system would reduce levels and make the company more competitive. A Cost/Benefit Analysis was carried out and, using standard Discounted Cash Flow (DCF), it was estimated that there would be a pay-back 2/3 years after implementation.

Although the success criteria were not debated and agreed at the outset of the project, the user and IS/IT staff agreed that the achievement of the purpose of the project, namely the reduction of stock levels, was the main success criteria. Additionally, the user felt that it must financially viable and making returns on the investment for company. However, there was no attempt after implementation to assess the financial return of the project and whether stock levels have been reduced. All parties interviewed suspected that it hadn't. It was considered very much a failed project.

In addition to the fact that criteria were not agreed, there was no assessment of the project risks, although the user said that there was contingency built in to the project plans to cater for unexpected events. The project manager used an automated tool for project planning. The project took a long time to implement (some 7 years from first inception to final implementation).

The project team (of 3/4 under a project manager from the business, not systems) initially carried out extensive interviews. The first time that a Cost/Benefit Analysis was carried out was when the estimated implementation plan was drawn up (some 3 years after the initial interviews were started). It was felt that much documentation was wasted in this phase. The package was purchased and it was decided to have a staged changeover, one product at a time. The first product implementation took place about 2 years after the package was purchased. The final product implementation took place some 2 years later.

There was some positive aspects of the project:

- a Steering Committee was set up;
- task forces were appointed to interview;

- team structure;
- support from senior management.

However, there was a different perception on other aspects:

- education;
- training;
- communication.

The systems personnel thought that these aspects were completed well. However, the user mentioned that they could have been done better. As regards training, they followed the procedure of 'Train the Trainers'. The systems personnel were pleased with that approach but the user felt that there was not enough time to do it properly. As regards communication, the user felt that the project manager was not good at conveying bad news. There were other areas of concern on the project

- middle management support;
- motivation (the lower in the company structure, the worse the motivation);
- personnel conflicts;
- greater expertise in the business;
- key issues not detailed;
- documentation and effort wasted;
- no post-implementation effort.

The user was more critical of the project than the systems personnel.

D.9

Project:	**Late Payments system**
Company Business:	**International Finance Company**
Interviewees:	**Project Manager, User, Systems analyst, Metrics analyst**

The current system was outdated and inaccurate, thereby leading to wrong statements being sent to customers. There was, therefore, a need to maintain accurate records in order that the statements to customers were accurate. A project was started to do exactly this. However, the project had an implementation date which was decided by a marketing need.

There were differing opinions on the success criteria. The project leader, dealing with the operational, day-to-day, issues on the project identified:

- meeting timescales
- meeting quality constraints (the data and information had to be accurate).

The project manager, taking a more strategic view of the project, identified:

- commercial success
- committed users

as the success criteria.

The analyst/programmer identified:

- commercial success;
- meeting quality;
- meeting user requirements (delivering what the users want).

The criteria were not defined at the outset and there was no attempt to assess the risks. However, after initially looking at the user requirements, it was clear the project could not implemented fully within the time set. Therefore, the project was rescoped. It was decided to implement the project in two phases and remove functionality from the first phase in order to meet the timescales. The user requirements were graded and the high-priority issues were implemented in phase 1, the others in phase 2.

Detailed estimates were initially drawn up. The project leader used PMW to plan, resource and control the project. Both phases were specified in terms of requirements, functionality and technical issues. A test and implementation plan were also drawn up. The major problem identified, on the technical side, was that of employing contract staff as analyst/programmers. There were problems of:

- inexperience in company design and programming standards - the company used its own design methodology;
- inexperience in operating system/database management systems;
- continuity;
- co-ordination.

Other problems identified were:

- lost time in testing phase, thereby involving weekend work;
- implementation;
- lack of post-implementation support.

Despite all these problems, the project was seen as successful as it was a commercial success and it generated a great deal of income from late payments. This was due to the quality of the information provided by the system. The user was particularly positive about the project and the system's ability to achieve the purpose which it set out to achieve - namely, generate increased income.

What went well on the project? It was felt that:

- the team worked well on the project;
- the requirements, in phase 1 and 2, were agreed and understood by the project team;
- the documentation was clear;
- the testing was very thorough, although the testing took some 33% of the project time and there were problems in the testing phase.

D.10

Project:	**Sales Analysis Project**
Company Business:	**UK Paper and Printing company**
Interviewees:	**Project manager, sponsor, systems analyst**

The project objective was to analyse current methods of sales analysis and offer recommendations for improvement. The end product was a number of options which would solve the major system problems and identify specific areas for improvement.

The project did not have a full time project manager assigned to it. However, a member of the project team did act as the focal point of the project. The project was small and the team acted democratically, discussing each issue and deciding on a course of action. Project meetings were held on a regular basis among the team. They felt that this approach suited them. However, it was far from clear that it was an approach which suited the project. To reinforce the view that a project manager should have been assigned to the project, it was felt that the project should have had more clearly defined control points. The members of the project team were relatively inexperienced. In hindsight, it was recognised that the project should have had a relatively experienced manager (not full-time) to oversee the project.

It was felt by the sponsor that the project was only partially successful, in terms of a percentage of success - about 60%. The documentation generated was too much for the size and complexity of the project (although it was good quality and useful for subsequent development) and the team should have placed greater emphasis on the involvement of the users.

The project was developed using a structured systems analysis and design methodology. The technical team (systems analysts) felt that too long was spent on the techniques of the methodology. The users were not interested in those areas; they simply wanted to be presented with the Business Systems Options and to be able to make their decision based on the recommendation.

The use of the methodology did not, it was felt, hinder the project substantially. However, the project took longer than was expected. From a technical viewpoint the use of the methodology helped to produce good and thorough documentation - a major success of the project. The documentation could then be used for subsequent development of a working system to meet the new requirements for sales analysis.

The project team also used a computer-based project management tool to plan and control the project. The team found that the tool was difficult and time-consuming to learn. For a project such as this, a relatively small in terms of time and complexity, the planning and monitoring could been adequately achieved by manual methods.

Although the data gathering and fact finding (such as interviews) were conducted and documented well, the systems analyst could have been more assertive. There were slight communication problems because of this. However, the system analyst involved was relatively inexperienced.

As regards the views of the systems analyst, it was felt that there was a non-specific definition of requirements on the part of users. Consequently, the options produced were unlikely to address the issue of meeting requirements. *It was thought, however, that the* project was a good foundation for subsequent development.

D.11

Project: **Call Logging System**
Company Business: **Major UK Energy company**
Interviewees: **Project manager, User, Systems analyst**

The existing call logging process was totally manual and consequently rather unsatisfactory. The system involved the analysis, design and development of a prototype model for a call logging system.

The user required that the technical personnel deliver a system that was immediately implementable. The system needed to be delivered within a specific time frame. The major success criteria, as defined by the users, were that:

- the project achieved its purpose;
- the project met user requirements;
- the project was implemented on time.

The user felt that their requirements were achieved. This was seen as a major positive aspect of the project. The technical team identified the major success criteria and concentrated on achieving that criteria. There was a particular effort on the planning and re-planning of the project, knowing the importance of the constraints on time.

The technical team, the users felt, thought out the project and remained focused. However, it was felt by the users that the technical team did not receive formally a Terms of Reference for the project. Additionally, it was also felt that the end users of the system were not involved enough. The technical team spent their time on developing the prototype without consultation with the users.

However, the major user changed during the project but a new user was appointed promptly. This involved renegotiating the project objectives based on new ideas and new requirements. It also involved the team in spending a large amount of time in producing new plans for the project. Much of the earlier work was thought to have been wasted. However, the importance of the time constraints was reiterated. It was important to keep to this schedule and timescale.

For the team members this was one of the first development projects which they had undertaken. The technical team was, therefore, fairly inexperienced. A more experienced team would have probably used the users more effectively, it was felt. There was not a

full-time project manager appointed to the project. The team were responsible for planning and monitoring the project. Estimating and initial planning was questionable in the early stages but it improved as the project progressed. The planning was not helped by the change of user during the project. No project management methodology was employed. The team used bar charts to define the tasks and resources.

Although the technical team thought that the project was a success, they felt that the project should have run more smoothly. However, the problem of a change of user part way through the project was, it was felt, out of their control. There was no formal review of the project after implementation. There were lessons to be learned but they were not documented for future reference.

D.12

Project:	**Customer Database System**
Company Business:	**Independent regulatory and environment company**
Interviewees:	**Project manager, User, Sponsor, Systems analyst**

The project was not budgeted. The initial activity was to produce a Terms of Reference with the sponsor and then produce plans for the project. The success criteria were not identified but there was a definition of the target end date and a statement of the requirements of the system. Additionally, there was no assessment of the project risks. The company use SSADM Version 4 as standard and the project team had to produce documentation which conformed to this standard.

The project ran into a number of problems (particularly in estimating the coding phase of the project and the response of users to requests for information) throughout which meant that the initial project plan had to revised. The initial end date was not met. However, the user and sponsor accepted the situation. They were more concerned about the project meeting the requirements and that the project achieved its purpose. A number of the problems could not have been foreseen at the start of the project and perhaps, according to the sponsor, the plan should not have been so detailed at the outset of the project. The team should have waited until more information was available. The team had allowed for contingency but the amount was clearly not sufficient for the number of problems encountered.

Meetings were held at regular intervals within the project team and between the project team, users and sponsor. The sponsor felt that these were very valuable in addressing particular issues and avoiding them becoming problems. The meetings were seen as a very effective part of the project, particularly in communicating matters to the sponsor. The project team appeared to be well prepared for the meetings and minutes were produced quickly. Because SSADM was the standard analysis and design methodology the project had to comply with strict quality assurance and control. This was seen as an important part of the project and was very effective.

Communication with users, it was felt by the technical team, was difficult. The users worked flexible hours and were not enthusiastic over the project initially. One user in particular felt that the computerisation of the database may entail user redundancy. Additionally, they detected some conflict between the users and their manager which again caused problems because different information was given by the different people. There was a certain lack of involvement of the end-users on the project. Communication was through correspondence rather than face-to-face contact which was felt to be

unsatisfactory. The project team tended to discuss the project status with the sponsor Furthermore, the sponsor felt that there was a problem of communication among the project team on occasions. This could have been prompted by the problems which the project encountered.

The project was reviewed at the end and the team acknowledged some areas that they had learned lessons - user communication and involvement and estimating. The sponsor also learned much from sponsoring the project and felt that all the team members would be more aware on future projects of:

- project organisation;
- estimating;
- the importance of planning;
- maintaining user commitment.

Appendix E - Second Interviews' Results

	Start-up Meeting	Agree Criteria	Good Leadership	Good Monitoring	Proper Planning	Appropriate Dev. Method	Appropriate Mgmt. Method	
D1	*	*	*	*	*	*	*	
D2	*	x				*		
D3		x			*	*		
D4	x	x			x	x		
D5		x			*	x		
D6		x		*	*	*		
D7	x	x			*		*	
D8		x	x		*	x	*	
D9		x			*	*		
D10			x	x	*	x	x	
D11		*	x		*			
D12		x		*	x	*		
	Top Mgmt Support	User Involvement	Clear Objectives	Project Review	Assess Risks	Training/ Testing	Good Communication	Good Staffing
D1		*	*	*	*	x	*	*
D2	x	x		x	x	*	*	*
D3	*	*	*	x	*		x	x
D4		*			x		*	
D5		x	x				*	x
D6			*		x		*	*
D7	x	x			x	*		*
D8	*			x	x	x	x	
D9			*		x	x	*	x
D10		x	x				x	x
D11		x	x					x
D12		x	*	*			x	
	* = factor completed well							
	x = factor completed badly or omitted							

Appendix F - Configuration Management

Many authors (for example Cleland and King (1983), Cooper (1989), NCC (1990) and Turner (1993a)), in discussing project management, have described the concept and the disciplines which make up Configuration Management. A synopsis of the disciplines are given here. There are four areas that need to be addressed in configuration management:

1. Configuration identification.

The identification of configuration items is the start point for configuration management. By examining the PBS all products (be they hardware, software or documentation) are identified. The items can then be used to identify a 'base line' for control purposes. Any changes to individual configuration items can then be made with recognition of all the implications on the system.

2. Configuration control

In order to prevent changes (for example, a new user requirement, an error detected during testing, an inconsistency between two or more products) being made to a configuration on an ad-hoc basis, with the resultant chaos which will ensue, all configuration are subject to control. Any change can have a major impact on a number of issues (such as quality, time, cost and the resultant success of the project). The use of Change Requests (CR) ensures that this chaos will not happen. The impact of the change must be assessed and prioritized. Changes are made to items against a base line and, after a specified length of time or a specified number of changes, a new release is issued. Control can then be maintained on the new release.

3. Status accounting

This is very much the administrative function of Configuration Management, concerned with recording and documenting changes to a base line. It provides management information on all items that are part of a particular configuration and report on the position (for example, CR received, CR approved, changed item received) of any item within a configuration. It ensures that the various parties (for example, contractors, users) are using up-to-date versions. It also records the changes planned for future base lines.

4. Configuration review

The importance of a review is to ensure that all procedures were carried out properly. It is needed to ensure the integrity of the base lines. It is a periodic review, often carried out at key checkpoints within the project, tracing the development of base lines and the changed items which make up that base line from the previous one.

Authors have demonstrated that there are many benefits from implementing configuration management as opposed to simply carrying out change control. There may be several versions of a software system used by different customers. A customer, for example, detects an error in the software and, in order to trace this error, it may be necessary to reconstruct the entire system. Consequently, it is necessary to have available the exact constituent parts of that version - the configuration needs to be identified. Therefore, it is important to develop the PBS to identify which components make up the configuration.

Having identified the configuration, the project manager needs to manage the versions and the inter-relationships between the constituent parts. The Configuration Librarian plays a pivotal role in this process. Formal standards will be instituted to manage the configuration by the use of Change Request forms. Changes need to be reviewed on a regular basis, particularly at the end of every stage.

Further benefits of configuration management are particularly seen where there is use of prototyping, where several versions or prototypes are available at the same time. Configuration management can control the configuration of each prototype. Users are involved in the change process and feel that systems people are taking account of their views and concerns.

Appendix G - Project Health Check

Part 1 - criteria

1. The success criteria for the project are defined.	1	2	3	4	5	6
2. The success criteria for the project are agreed.	1	2	3	4	5	6
3. I believe that the success criteria are appropriate.	1	2	3	4	5	6

Tick the main, important and not important success criteria for the project.

	Main	Important	Not important
4. The project should achieve quality constraints.			
5. The project should be a commercial success			
6. The users should be happy.			
7. The sponsors should be happy.			
8. The project team should be happy.			
9. The project should meet its stated objectives.			
10. The system should achieve its purpose.			
11. The project should be delivered on time			
12. The project should be delivered within budget			
13. The project should contribute to the organisation's overall business strategy.			

14. There is a clear relationship between the project and the overall business plans and strategies	1	2	3	4	5	6
15. The project team do not appreciate the important success criteria.	1	2	3	4	5	6
16. I am confident that the project will be a success.	1	2	3	4	5	6
17. The project goals are clear to me.	1	2	3	4	5	6
18. The project goals have been explained to the team.	1	2	3	4	5	6
19. I can explain the benefits of the project to the organisation.	1	2	3	4	5	6
20. The project has an unrealistic completion date.	1	2	3	4	5	6

Part 2 - factors

1. The estimates for the project are realistic.	1	2	3	4	5	6
2. Project estimates are generally over-optimistic.	1	2	3	4	5	6
3. Estimates were developed in consultation with the person allocated to the task.	1	2	3	4	5	6
4. The project has been planned strategically.	1	2	3	4	5	6
5. The project plans are understandable to all parties.	1	2	3	4	5	6
6. The project plans are often changed.	1	2	3	4	5	6
7. Our plans focus too much on the completion date and not on intermediate results/dates	1	2	3	4	5	6
8. The project plan effectively utilises resources	1	2	3	4	5	6
9. I am happy with the plans and estimates for the project	1	2	3	4	5	6
10. The project participants are motivated well to achieve the project objectives.	1	2	3	4	5	6
11. Responsibilities are not well delegated.	1	2	3	4	5	6
12. The clients and users know their roles and responsibilities.	1	2	3	4	5	6
13. I am not happy with the leadership shown by senior management.	1	2	3	4	5	6
14. I am not happy with the leadership shown by project management.	1	2	3	4	5	6
15. Communication and consultation channels have not been effectively set up.	1	2	3	4	5	6
16. There is poor communication in the project team.	1	2	3	4	5	6
17. The users are involved effectively in the project.	1	2	3	4	5	6
18. Communication channels are poor	1	2	3	4	5	6
19. The project managers do not fully report project status to sponsors/users/project team.	1	2	3	4	5	6
20. Corrective measures are always taken in time when the project encounters problems	1	2	3	4	5	6
21. All the roles and responsibilities are clearly defined.	1	2	3	4	5	6
22. All parties are fully committed to the project plan.	1	2	3	4	5	6
23. The right resources are available at the right time.	1	2	3	4	5	6
24. There are adequate procedures for handling priorities	1	2	3	4	5	6
25. Quality assurance is not a major aspect of the project.	1	2	3	4	5	6

Part 3 - tools, techniques and methodologies

1. The tools, techniques and methods available for planning the project are adequate.	1	2	3	4	5	6
2. The tools, techniques and methods available for controlling the project are adequate.	1	2	3	4	5	6
3. The tools, techniques and methods available for organising the project are adequate.	1	2	3	4	5	6
4. I agree that the tools, techniques and methods used are appropriate.	1	2	3	4	5	6
5. The development tools and methods are sufficient for the project.	1	2	3	4	5	6
6. The management tools and methods are sufficient for the project.	1	2	3	4	5	6
7. The development tools and methods are poorly applied on the project.	1	2	3	4	5	6
8. The management tools and methods are poorly applied on the project.	1	2	3	4	5	6
9. The chosen methodologies stifle creativity during the project.	1	2	3	4	5	6
10. There are established methods which are to be used.	1	2	3	4	5	6
11. These established methods are being used on this project.	1	2	3	4	5	6
12. I believe that they are appropriate for the project.	1	2	3	4	5	6
13. There are computer-based tools available for this project.	1	2	3	4	5	6
14. Computer-based tools are not being used effectively.	1	2	3	4	5	6
15. The project does not use methods for assessing and managing risks	1	2	3	4	5	6

Part 4 - skills

1. There are the necessary skills available to plan the project.	1	2	3	4	5	6
2. There are the necessary skills available to organise the project	1	2	3	4	5	6
3. There are the necessary skills available to control the project	1	2	3	4	5	6
4. There are the necessary skills available to develop the system.	1	2	3	4	5	6
5. Project management are unable to handle fully the human relations aspects	1	2	3	4	5	6
6. Conflicts are resolved easily and satisfactorily	1	2	3	4	5	6
7. The project plan overestimates the skills and competences of the team	1	2	3	4	5	6
8. Project management is astute in dealing with the politics of the project	1	2	3	4	5	6
9. Project management is unable to inspire others.	1	2	3	4	5	6
10. Project management is good at getting the project team working together	1	2	3	4	5	6

Part 5 - Project execution

1. A life cycle approach is being applied.	1	2	3	4	5	6
2. I do not agree with the approach used.	1	2	3	4	5	6
3. An effective start-up meeting was held for this project.	1	2	3	4	5	6
4. The right people are allocated to the project.	1	2	3	4	5	6
5. Project team members are not carrying out appropriate activities.	1	2	3	4	5	6
6. Resources for the project are selected badly.	1	2	3	4	5	6
7. There are problems with the project.	1	2	3	4	5	6
8. I foresee further problems on the project.	1	2	3	4	5	6
9. The management of the project is excellent.	1	2	3	4	5	6
10. The project team has appropriate members at appropriate times.	1	2	3	4	5	6
11. The project risks were assessed at the outset of the project.	1	2	3	4	5	6
12. I belive that the assessment of risks are appropriate.	1	2	3	4	5	6
13. The project risks are not being managed well.	1	2	3	4	5	6
14. The deliverables are fully identified.	1	2	3	4	5	6
15. The deliverables are Quality assured constantly.	1	2	3	4	5	6

Appendix H - Project Health Check Instructions

This project 'Health Check' should help you, as a project manager, to assess the anticipated success or failure of a particular project. It will help you to identify the particular problems which are being encountered on the project and to take steps to alleviate and eliminate these problem areas. If these areas are not addressed, the project could be perceived by many team members as a failure.

The questions are grouped into five major areas:

- the success criteria;
- the success factors;
- tools, techniques and methodologies;
- project skills;
- project execution.

You will need to get people who work on the project or who are directly affected by the project to complete the Health Check. Respondents are asked to rate 85 questions on a scale 1 to 6. The scale is as follows:

1 if you strongly disagree with the statement
2 if you generally disagree with the statement
3 if you marginally disagree with the statement
4 if you marginally agree with the statement
5 if you generally agree with the statement
6 if you strongly agree with the statement

As many of the personnel as possible need to complete the Health Check. In that way you will get a full picture of the project and not just a selected appraisal. The Health Check must be completed anonymously (otherwise honest answers may not be forthcoming). However, you must follow-up the responses with discussions about the problem areas as they arise.

It is appropriate to have the Health Check completed at regular intervals on the project (for example, at the beginning and then a quarter/third of the way through the project).

You need to assess the answers in three ways:

i) investigate when an answer should be a high mark (5 or 6) but the team mark it low (1 or 2) or vice versa. This would indicate that something is seriously wrong with the project. There is a potential problem if statements are marked moderately (3 or 4). Why are some of the team not agreeing strongly with the statement? The statements are worded such that either a high or low mark is expected.

ii) investigate when an answer between respondents shows significant variation - one respondent marks a statement as 1 but another marks the same statement as 6 (this includes where in Part 1 the major success criteria are mentioned). This might indicate that the communication within the project is poor.

iii) check the success criteria highlighted in Part 1 with the factors given in table attached. Where there is a difference of opinion on success criteria, this needs to be addressed first before any assessment of the appropriate factors is made.

You should show the spread in addition to the average. The average will indicate how well the problem area is being addressed. The spread will indicate how the team understand the project performance. Note that for some statements a high score is good; for others a high score is poor.

The Health Check is a set of statements which you can use as a diagnostic tool to assess the success of a project at times during its execution. It will help you to highlight and to focus on the problem areas. However, you will need to discuss the results with your colleagues and project team in order to overcome particular problem areas. The answers should be dealt with qualitatively rather than quantitatively.

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