Business Development:

A Project Management Approach

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Acknowledgements

I wish to thank God for using me to bring this work into being and for sending me a wife equipped to help me finish it.

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Contents in brief

Synopsis

NAME: Van der Merwe AP

DEGREE: DPhil (Business Management)

TITLE: Business development: a project
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UNIVERSITY: Rand Afrikaans University

PROMOTER: Prof. N. Lessing

DATE: 2000

Project management from an industrial development perspective and as an engineering discipline has been researched and published throughout the past century. It could be said that the subject is mature, as recent publications on project management fail to bring new knowledge to light.

Research of published work in the form of books, journals, conference proceedings and magazines dedicated to project management, to find factors of success, expose, on analysis, that a "best practice" strategic level model can be derived for a project, revealing a high percentage of repeatability and re-use from project to project. Many of the worlds' leading practitioners concur that a base model for a project does exist; - that is to say, all projects follow a similar model leading to successful execution.

What has not been understood is how the emphasis on various aspects of such a model changes between industrial development, and business development. Many business development projects have failed as a direct result of implementing what is known of project management as an engineering discipline, and applying it directly to business development.

Research on how project management influences business development is both current and relevant. However, not much can be found in literature. What there is, concentrates on the information technology market segment. Available information on project

management from a business development perspective deals with the *project* rather than with the *management.*

This study analyses how business develops as an economic model to create wealth, and then further analyses how project management impacts on business development. The impact on strategy, structure and processes has been analysed to find how projects impact to improve efficiency and effectiveness within the business, thus further developing the business.

A project model was developed and applied to find how application of project management knowledge changes in theory between industrial development, and business development. The result of this research was used to create a project system that would assist in the application of theory to practice. *The system was used as a measurement tool to guide what was theoretically applied, and to show how practice changed theory, to a better understanding of how emphasis shifted in the model between engineering application, and management application.*

The project system was further refined during three consecutive business development case studies: ESKOM Transmission Group, ESKOM Distribution Group, and Gauteng Provincial Government. The lessons learned from these applications were finalised, and the project system evolved into a commercially viable product to aide and assist repeatable success in future applications of project management to business development.

Cognisance was taken of international developments to certify the competence of project managers and to evolve project management itself into a profession. Project management is seen to play an important role in the effective and efficient application of all resources to achieve development, not only in industry and business, but in society as well. This aspect impacts on the education of project managers, as society does not develop on the backs of people who *know* things but on the backs of people who can *do* things.

Sinopsis

NAAM:	Van der Merwe AP
GRAAD:	DPhil (Ondernemingsbestuur)
TITEL:	Ondernemingsontwikkeling:
	'n projekbestuur benadering
UNIVERSITEIT:	Randse Afrikaanse Universiteit
PROMOTOR:	Prof. N. Lessing
DATUM:	2000

Oor die afgelope eeu heen is daar omvattend oor projekbestuur as 'n ingenieursdissipline en vanuit 'n nywerheidsontwikkeling perspektief navorsing gedoen en gepubliseer. Daar kan met stelligheid gesê word dat dié onderwerp sigself oorontgin het, aangesien resente publikasies oor projekbestuur geen nuwe kennis openbaar nie en daar slegs verfyning van bestaande kennis aan bod kom.

Verkenning van gepubliseerde werk, in die vorm van boeke, vaktydskrifte, konferensieverrigtinge en tydskrifte wat aan projekbestuur gewy is, om suksesfaktore te bepaal, bring by nadere beskouing aan die lig dat daar vir 'n projek 'n "Beste Praktyk" strategiesevlakmodel met 'n hoë herhaalbaarheids- en hergebruikpeil van projek tot projek afgelei kan word. Die wêreld se toonaangewende praktisyns is dit eens dat daar 'n basiese model vir projekte bestaan, dit wil sê, dat alle projekte aan die hand van 'n vergelykbare model met welslae afgehandel kan word.

'n Aspek waaroor daar nie duidelikheid is nie, is hoe die klem op verskeie aspekte van sodanige model tussen nywerheidsontwikkeling en ondernemingsontwikkeling verskuif. Heelwat ondernemingsontwikkeling projekte wat misluk het, is reëlreg aan implementering van projekbestuur as ingenieursdissipline by, asook direkte toepassing daarvan op ondernemingsontwikkeling te wyte. Navorsing oor die invloed van projekbestuur op ondernemingsontwikkeling is 'n baie jong terrein en uiters fragmentaries. Tot op hede lewer die literatuur weinig data hieroor op. Dit wat wel

bestaan, konsentreer op inligtingstegnologie. Beskikbare inligting oor projekbestuur uit 'n ondernemingsontwikkeling perspektief handel oor die *projek*, eerder as oor die *bestuur*. Hierdié studie ontleed hoe ondernemings as 'n ekonomiese model vir die skep van welvaart ontwikkel, en ontleed vervolgens wat die impak van projekbestuur op ondernemingsontwikkeling behels. Die impak op strategie, struktuur en prosesse is ontleed om te bepaal watter impak projekte op verbetering van doeltreffendheid en doelmatigheid, en sodoende ontwikkeling van die onderneming het.

'n Projekmodel is ontwikkel en vervolgens toegepas om te bepaal hoe toepassing van projekbestuur kennis teoreties tussen nywerheidsontwikkeling en ondernemingsontwikkeling verander. Die resultate van dié gedeelte van die studie is ingespan om 'n projekstelsel te skep wat sou help met die toepassing van die teorie in die praktyk. Die stelsel is as 'n meetinstrument gebruik om aspekte te rig wat teoreties toegepas is, en om aan te toon hoe praktyk die teorie verander het, in 'n beter begrip van hoe die klem in die model van ingenieurstoepassing tot bestuurstoepassing verskuif het. Hierdie projekstelsel is verder tydens die volgende drie opeenvolgende onderneming gevallestudies verfyn: ESKOM Transmissie Groep, ESKOM Distribusie Groep en Gauteng Provinsiale Regering. Die kennis wat uit dié toepassings voortgevloei het, is afgerond en die projekstelsel het as 'n kommersieel lewensvatbare produk beslag gekry wat sal meehelp om herhaalbare welslae met die toepassing van projekbestuur op ondernemingsontwikkeling in die toekoms te bewerkstellig.

Daar is ook kennis geneem van internasionale ontwikkelings om projekbestuurders se bevoegdhede formeel te sertifiseer en projekbestuur as sodanig in 'n volwaardig erkende professie te omskep. Projekbestuur blyk 'n belangrike rol te speel in die aanwending van alle hulpbronne om ontwikkeling in nie slegs die nywerheid en sakesektor nie, maar ook in die gemeenskap te bewerkstellig. Dié aspek sny die opleiding van projekbestuurers aan, aangesien 'n gemeenskap nie gedy op die skouers van mense wat dinge weet nie, maar op die skouers van mense wat dinge kan doen.

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List of Acronyms

APCM	Association for project and change management
APM-BOK	Association for project management body of knowledge
APM UK	Association for project management United Kingdom
APM SA	Association for project management South Africa
BPR	Business process re-engineering
CAPEX	Capital account expenditure
CFPM	Commonwealth forum for project management
CPD	Certificated projects director
CPM	Critical path method
EAC	European Accreditation of Certification
ETQA	Education and training quality assurance body
GDP	Gross domestic product
GNP	Gross national product
ICB	IPMA competence baseline
IMF	International monetary fund
IPMA	International project management association
NQF	National qualifications framework
NVQ	National vocational qualification
PERT	Precedence evaluation and review technique
PMBOK	Project management body of knowledge
PMF	Project management Fachmann

PMI	Project management institute
PMP	Project management professional
RSA	Republic of South Africa
SAQA	South African qualifications authority
SBU	Strategic business unit
SUPEX	Supply account expenditure
WBS	Work breakdown structure
Y2K	Year 2000

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Chapter 1

Orientation

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1.3.1   Objective 1

To provide an overview of business development and project
management

1.3.2   Objective 2

To give insight to the management process, with reference
to strategy, structure, processes and projects

1.3.3   Objective 3

Development of a project management model

1.3.4   Objective 4

Application process of the project management model

1.3.5   Objective 5

Development of a project management vocational model

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Orientation

1.1 Background

Economic issues have occupied people's minds throughout the ages. Aristotle and Plato in ancient Greece wrote about problems of wealth, property, and trade. As time progressed the Romans later borrowed their economic ideas from the Greeks. During the Middle Ages economic ideas of the Roman Catholic Church were expressed in the canon law, which condemned usury (the taking of interest for money loaned) and regarded commerce as inferior to agriculture (Lekachman 1997: CD-ROM).

Economics as a subject of modern study, is distinguishable from moral philosophy and politics, and dates from the work "An inquiry into the nature and causes of the wealth of nations" first published in 1776 by the Scottish philosopher and economist Adam Smith. Since Adam Smith's publication, economic development and business development have been inextricably linked. Smith (1981a: 31-36) postulated that the economy grows when production increases in volume and or efficiency.

Macroeconomics as a subject deals with modern explanations of national income and employment, and dates from the book by the British economist John Maynard Keynes "The general theory of employment, interest, and money" first published in 1935. His explanation of prosperity and depression centers on total or aggregate demand for goods and services by consumers, business investors, and governments. According to Keynes, inadequate aggregate demand increases unemployment; for which the cure is thought to

be either more investment by businesses or more spending by government with the consequence of larger budget deficits by government (Lekachman 1997: CD-ROM).

Economic growth can be measured by the annual rate of increase in real gross domestic product (GDP) or real gross national product (GNP) at constant prices. GDP is defined as *the total value of all final goods and services produced within the economy in a given period of time* (Mohr *et al.* 1988: 38-39). Production in economic terms is the function of organisations participating in a country's economy for a given period of time, normally one year. GDP is the basis for the national "income statement" used in business to measure financial performance year on year. Economic growth is attained when a country's per capita GDP increases year on year. There are four factors in the growth process. These are: the size and quality of the labour force, the quantity and quality of capital, technology and the availability of natural resources (Van den Bogaerde & Fourie 1989: 239).

Organisation theory can be seen as social systems of co-operation that are designed to improve individual effort aimed at goal accomplishment. Organisation theory is how collaborative efforts form, function and survive (Hodge & Anthony 1991: 8). The industrial revolution marked the beginning of what is referred to today as the modern organisation to which Adam Smith brought a much-needed framework matching the theory of economics to knowledge about organisations in his work on the specialisation of labour (Smith 1981a: 23-30).

Max Weber built on this in 1900 when he analysed organisations and found bureaucracy to be an ideal form of organisation structure based on knowledge and ability rather than on favouritism, which he found prevalent (Weber 1947: 324-328). The theory of the firm is based on a combination of people, machines and money in order to maximise profit or to create wealth. Wealth, being the basic building block for economic growth where the firm functions as an economic model (Hirschey & Pappas 1992: 4), is created when more is paid for consumption than for production.

It was not until the 1920s that a concerted effort to study organisations formally began. The classical school of thought attempted to create a set of rational techniques that defined one best way of doing things. The theory was founded on **four pillars: division of labour, scalar and functional processes, structure and control** (Scott & Mitchell 1976: 31-35). Control gave way to the theory of management where planning, organising, leading and controlling is found which in turn, gave rise to the behavioural school of thought on how organisations formed, functioned and grew (Maslow 1943: 370).

Publications following the period just after the second World War, and containing management lessons learnt during the war on how to increase production, reveal a split in organisational theory into two specialist parts: systems theory, or business processes as referred to in more recent publications, and behavioural theory, which forms part of industrial psychology.

With their publication "Re-engineering the corporation", Hammer & Champy (1993: 32) caused a revolution in organisational studies when showing quantum leaps in efficiency and profitability when business processes were aligned to best serve customer requirements. Business process re-engineering was attacked with fervour to align strategy with customer delight.

Experiencing close to zero growth in many organisations during the 1980s, companies were upsized, downsized, and right sized, and organisational structures rapidly changed to match new strategies and processes. Organisations now seem to stand on **four new pillars: strategy, structure, processes and projects**, which influence and depend on one another in this era of rapid deployment - enabling an organisation to be the first in line to accept customers' money.

Until 1980, project management had been seen as the sole domain of engineers, finding a niche specifically in the civil engineering industry. Project management has now found acceptance in the rapidly developing information technology industry that was heavily relied on when mapping and analysing business processes. Early successes revealed, in

literature, a close tie with project management, and soon everyone was following suit. Michael Hammer (1994: 60), in an Information Week interview mentioned three reasons related to project management that contribute to business process re-engineering failure. These are: lack of executive commitment, lack of knowledge about what they are doing and a lack of knowledge on how to proceed. All three reasons can be eliminated by proper application of project management theory. (Project management theory as applied to business development that is, and not as applied to industrial development).

In this study a project model was developed and applied to analyse how application of project management knowledge changes in theory between industrial development and business development. This resulted in an understanding of how emphasis shifted between key elements in the model with relation to engineering and management application.

The model has been complemented with the development of project management procedure and a system of forms to show through practical application on several projects, how business development projects are managed. This study has considered the aspect of general management as it is customarily applied to business development, and project management as it is applied in engineering projects, to find what match can be made (if indeed any), in the principles applied to the management of people and work.

Research was undertaken to outline educational requirements in order to create formal tertiary education in project management as a management science to support the creation of management as a profession. The study concludes with a discussion on the impact that future developments may have on management and project management in continued business development.

1.2 Statement of problem

Organisational theory is rich in the research of strategic management with specific interest in strategic analysis, objective setting and the effect of organisational structure. But strategies do not fail when they are being analysed or when the objectives are being set. They fail during implementation. Equally, there is much published on business processes, without any regard to the natural scientific explanation of process theory. It was found during the literature survey that many authors create their own definitions when it comes to this subject, many contrary to generally accepted meaning of words.

Literature is empty of research of the effect that the implementation of strategy has on organisational structure, business processes and the role of project management. Particularly, on the integration and effect that strategy, structure, processes and projects have on one another. Of note is the fact that project management literature concentrates almost exclusively on the "PROJECT" and there is almost no research done on "MANAGEMENT" as it applies to the general management of an organisation. The problem confronted in this study, is to address the void that exists in literature, and to research the integration of strategy, structure, processes and projects as they apply to the development of a business.

To summarise: the problem is how to practically deal with Project Management when developing a business, being mindful of changes to, and integration of strategy, structure and processes.

1.3   Study objectives

The overall objective of this study is **to give insight into the significant role that project management plays in the development of a business**. The implementation of strategic objectives places the organisation into motion from its present strategic position towards its future strategic position. *The management of this progress is project management in its purest form,* not project management, as it is understood in industrial development, *but project management from a general management perspective.*

Factors have been taken into account, documented and analysed to provide a new understanding of how strategy, structure, processes and projects interrelate while the organisation moves to reach new objectives. In support of the overall objective, specific objectives for the study are:

1.3.1   Objective 1

This study will provide an overview of economic development, business development and project management. Further, it defines development in relation to economics, business and projects with an indication of their modern applications and relationship to one another. Additionally, this study will research project management theory and practise from different international and local perspectives to find elements of success that can be moulded into a best practise model.

1.3.2   Objective 2

This study will give insight into business development with relation to strategy, structure, processes and projects as applied to the modern organisation. It will define strategy, structure, processes and projects and to set the interrelationship of the elements as four new pillars in the modern organisation. Moreover, it specifically researches organisational structure and control to find how employees' available time is consumed in a functional bureaucracy and how this relates to time consumed on a project.

1.3.3 Objective 3

Objective three is to devise, develop and construct a base model for the management of business development projects utilising the four new pillars in objective 2 with particular emphasis on the MANAGEMENT of people so that these people can manage the work. In addition, a paper based system of forms that assist the user to practically apply best practise and to test this system on actual projects, will be constructed. This study will document a step-by-step guide in the use of the system leading to repeatable successful application.

1.3.4 Objective 4

Further, this research will apply the model and system to the management of business development projects, revealing the interdependence of and the effect that strategy, structure and processes have on the management of people and projects. It will practically apply the project management model to transform three organisations and to demonstrate the efficiency gained over functional bureaucracy to reach strategic objectives through the management of business development projects. The study will also document these consecutive case studies and record improvements made to the system through practical application.

1.3.5 Objective 5

One more objective is to examine project management competence and to develop a vocational model highlighting special circumstances, which need to be considered in order to establish formal education for project managers. This research will develop an apprenticeship programme for training future project managers by evaluating international and local efforts to institute project management as a profession and to create formal tertiary education in project management.

1.4 Research methodology

The research methods used in this study are unique in a number of ways, and comprise four aspects: literature survey, study of the management process, own research and interviews. As this study seeks to combine economics with business development from a project management perspective no one research method was deemed adequate. The different methods used in this research study, are justified as follows:

1.4.1 Literature survey

Strategic management of the modern organisation is theorised in many different ways in literature, as is the theory of the interrelation with organisational structure. The management of business processes in the modern organisation is a recent topic of research. Not much has been published to describe the natural scientific laws of processes on which to base formal findings of business process re-engineering. Project management as an industrial engineering concept is well published, however, *very little is published on the management of projects as an internal discipline to the management of the organisation.*

Sources utilised were international textbooks as well as management, project management and technological magazines, journals, published locally and internationally, as well as international conference proceedings published over the past five years.

1.4.2 Study of the management process

An academic study was made of the historical development of the organisation. Further, a study was made of theory pertinent to the strategic management process, organisational structure development, business processes and project management, by

concentrating on how each works in relation to the other. The information-gathering phase also took cognisance of common practise in order to develop knowledge of which factors led to success and which led to failure. Reference was sought to the practical use of business processes that can be explained and sustained in theory.

1.4.3 Own research

As Founder and past Chairman of the Association for Project Management in South Africa, full member of the Association for Project Management in the UK, Council member of the International Project Management Association in Zurich, Regional representative of the Commonwealth Forum for Project Management, member of the South African Qualifications Authority Standards Generating Body for Project Management as well as having had practical work experience of many aspects and in many areas of project management over the past 25 years, holding local and overseas postgraduate qualifications in project management and having obtained a masters degree in project management at Brunel University in London under the supervision of Professor Rodney Turner, president of the International Project Management Association and author of several definitive textbooks, has helped to further develop insight into the subject matter.

Work done internationally led to the research of business transformation through project management as well as effective and efficient management of multi-projects within an organisation, leading to the financial success of that organisation. The model, based on project life cycles, is the culmination of ten years' work, being an inquiry to discover fundamentals containing repeatability and re-use when applying project management to the development of an organisation. The model has been developed through practice and has been substantiated in theory, resulting in many successful implementations.

1.4.4 Interviews

Interviews were conducted internationally with members of top management, acclaimed researchers, authors and practitioners. Extended interviews were used to determine the factors of success and failure when applying project management to the organisation. The aim of these interviews where to determine fundamental understanding on how successful projects are similar so that those similarities could be entered into a model of a project. This model would then contain a consensus of "best practises" where most individuals would agree that projects following the model stood a better than average chance of success. That is - a general "best practice" model was sought.

No agenda was used in the interviews, as a "commonality of practice that works" was sought. Each person was interviewed three times, once before applying the model, once during first application of the model, and once after several applications of the model had been completed. The objective of the interviews was to cover all chapters of the study and to ascertain the degree to which the interviewees were familiar with the interaction of strategy, structure, processes and projects as applied to the development of the organisation.

Throughout this study the project management model was refined using a Delphi technique, modified to make use of group discussion rather than anonymous lists, to find a more suitable strategic level work breakdown structure with which to populate the model as a variable weighting could be applied to the parameters during discussion to influence the decision-making at the time of establishing the overall model (Van der Merwe 1995b: 44).

1.5   Scope and limitations

The study was specifically directed at South African organisations for the development, application and testing of a project management model based in four stages of the life cycle and containing a strategic level work breakdown structure. The focus was laid on the internal situation of the organisation. The study included public sector organisations as well as private sector organisations. The study dealt mainly with the practical application and use of the project management model.

1.5.1   Testing

ESKOM Transmission Group, ESKOM Distribution Groups and the National Government's Reconstruction and Development Programme were used in the initial testing of the project management model, with input from KPMG and Anderson Consulting. Gauteng Government Corporate Informatics Department and Spoornet Corporate Informatics Department were used in the second stage testing of the project management model. Eastern Districts Council, Business Against Crime, Spoornet Human Resources Department and also Time Systems International in Denmark and the Netherlands were used in the final testing of the model. Testing was limited to departments within organisations, as whole organisation conversions to manage by projects are currently still in progress.

The limitation of testing departments, and not whole companies, did not have a negative influence on the scientific nature of the study, as the conceptual base of the model proved to be sound and was verified by interviews.

1.5.2 Diversified nature of business

The complexity of various organisational activities, as well as the interrelationships and interdependence between differentiation and integration as described in organisational theory, are not always easily separated. The project management model was limited to accepted project management principles as they apply to the management of strategy, structure, processes and projects.

The limitation of the diversified nature of business, did not have a negative influence on the scientific nature of the study, nor did it negatively impact on the practical application of the study. As a matter of fact, in practise businesses are naturally of a diversified nature.

1.5.3 Non availability of literature in the management aspects of project management

A limited number of textbooks were available, particularly on the subject of project management in terms of general management principles and natural scientific principles of process as applied to the organisation. Use was made of engineering textbooks to define concepts used, and parallels were drawn to their application in general management. This enhanced the practical application of theory and the integration of the project management model into the management of the organisation.

The limitation of the restricted number of available publications, did not have a negative influence on the scientific nature of the study, nor did it negatively impact on the practical application of the study. The study aims at helping to bring management by projects into acceptance as a general management practise.

1.5.4   State and nature of project management in business development

Modern project management is thought to originate from Department of Defence programmes of the United States military during the 1960s. The reserved nature of the United States military places a limitation on cross-pollination of general management theory, and project management theory. Research done by Peter Morris shows that most authors still erroneously cite Department of Defence initiatives as the origin of modern project management. "The integration and, particularly, systems engineering origin of project management is still overlooked today". "While the subject of project management is now comparatively mature, and recognised by thousands if not millions of managers as vitally important, it is in many respects still stuck in a 1960's time warp. Project managers and particularly those who teach and consult them, generally take only a middle management, tools and techniques view of the subject. Few address the larger, more strategic issues that crucially affect the success of projects" (Morris 1997: 216).

To counter this limitation, research was undertaken in the theory of organisations to find its origin and to describe the fundamentals of project management in terms of general management theory. This resulted in clear identification of the different fundamentals that drive industrial development as opposed to those that drive business development.

This limitation did not have a negative influence on the scientific nature of the study, nor did it negatively impact on the practical application of the study.

1.5.5   Local influence

The study included local public sector organisations in South Africa. Although the model has been applied to private sector companies, these were in the guise of individual effort rather than in an official capacity. The only private companies studied, were in Denmark and the Netherlands where the model produced a good fit. The emphasis was primarily on the strategic level, and secondarily on the tactical

management level, with only reference to operational level tasks. Only key business activities and their integration with strategy, structure, processes and project were addressed.

This limitation did not have a negative influence on the scientific nature of the study, nor did it negatively impact on the practical application of the study.

1.6   Study plan

The study was divided into seven chapters to provide more impetus to strategic management in an organisation, and to ensure a logical flow of the study and its results. The chapters and their links to the research objectives, are as follows:

- **Chapter 2** satisfies objective 1 and provides an overview of business development and project management with an indication of their modern applications and relationship to one another.

- **Chapter 3** satisfies objective 2 and gives insight into business development with relation to strategy, structure, processes and projects as applied to the modern organisation.

- **Chapter 4** satisfies objective 3 and deals with the creation and development of a model for the project management of business development with particular emphasis on the MANAGEMENT of people.

- **Chapter 5** satisfies objective 4 and looks at the practical application of the life cycle model to the project management of business development, revealing the interdependence and effect of strategy, structure and processes on the management of projects.

- **Chapter 6** satisfies objective 5 and discusses the lessons learnt from the use the model to transform an organisation from functional bureaucracy to management

by projects. International and local developments in the proposed formal tertiary education of project managers is studied to reveal a possible vocational model and apprenticeship programme.

- **Chapter 7** contains the conclusion to the study and expands on further research opportunities.

1.6.1 Business development and the history of project management (Objective 1)

Chapter 2 gives an overview of the *history of business development theory* from Adam Smith, to the present. This sets the background to understanding the theory of the firm, how it has developed and how the different parts of management theory fit together. Next, an overview of the *history of project management theory* is researched to find divergence and convergence with the theory of the organisation. Modern applications, as well as the relationship of project management as change agent and business process engineer, is researched.

1.6.2 Management of strategy, structure, processes and projects (Objective 2)

Chapter 3 gives insight into business development with relation to the make-up of strategy, structure, processes and projects as applied to the modern organisation. Research is done on the theory of how these aspects exist, are managed and implemented individually within the organisation. Literature and own experience was used to research how strategy, structure, processes and projects influence and affect one another, to find the interrelations and integration these aspects have on one another. The need for the management of these four new pillars of the organisation forms the concluding part of the chapter.

1.6.3 Project life cycle, development of the project system and step by step guide (Objective 3)

Chapter 4 details how a four stage life cycle model is devised and developed, containing a strategic level work breakdown structure and the basis of alarm state navigation to control business processes. This forms the core of this study. This study worked towards a solution for the problems encountered in Chapter 2 and 3. Education in the use of the model is briefly touched on, as it is deemed necessary to deliver outcomes-based education to general managers in project management and the application of the model. A "Project/system" is developed to form a complete product including the model, training in the use of it and a personal diary concept for the application of the system. The system is used to demonstrate how project management needs to change from the management of engineering to the management of people who are doing the work of the project, to achieve the strategic objectives of the organisation.

1.6.3 Application of the project management model (Objective 4)

Chapter 5 focuses on the use of the model to change strategic direction and transform organisations from functional bureaucracy to effect management by projects. Three test cases for were used in the initial testing of the project management model with input from KPMG and Anderson Consulting.

Adjustments were made during a second group of test cases, while final adjustments were made to the theory through the practical application of the project management model to a commercial company - Time Systems International in Denmark.

1.6.4 Project management vocational model and apprenticeship programme (Objective 5)

Chapter 6 expands on the project management process by going from theory to practice to education. Competence is debated in the application of knowledge and skill. Education of project managers and team members is analysed in an outcomes based environment to deliver persons equipped to do things to achieve in reality the visions of social development.

The international debate on standards for education for project management is entered into whereby knowledge, skill and interest are utilised in an atmosphere of nurturing mentorship to evolve individuals into competent project managers. A syllabus is created for further development and creation of a possible future Faculty in Project Management.

1.6.6 Conclusion and further development

Chapter 7 looks at the conclusions drawn from this study, with some emphasis on the future education of individuals in general in the use of this project management model, to become an enabler for people to implement their visions.

Note is taken of ever-changing business development in the light of the current people's revolution, to link social responsibility and social development to the profit of organisations. The debate is initiated to argue that business development is the engine of social development where the link is formed through education, which is the only originator of improved efficiency, and where project management is a life skill in a project-driven society.

Business Development:

A Project Management Approach

Chapter 2

Business development and the history of project management

Chapter 2

Business development and the history of project management

Synopsis

The Bible gives an account of man from about 4000 BC (Reese 1977: 2). In the Old Testament of the Bible, the book of Deuteronomy historically records that there where numbers of poor people in Israel at every stage of the nation's history (Tucker & Craddock 1997: CD-ROM). Their poverty might have been caused through natural disasters leading to bad harvests, through enemy invasion, through oppression by powerful neighbours or through extortionate usury. In Deuteronomy 15: 1-11 there was an obligation on the wealthier members of the community to support their poorer brethren in the year 1423 BC according to Reese (1977: 312). Those who were most likely to suffer poverty were the fatherless, the widows and the landless aliens. They were often the victims of oppression (Jeremiah 7: 6; Amos 2: 6-7), but Yahweh was their vindicator (Deuteronomy 10: 17-19; Psalms 68: 5-6) and God's Law (Deuteronomy 24: 19-22) commanded that provision should be made for the poor (Wheaton 1962: CD-ROM).

Development has no formally accepted definition in literature as most authors only give an opinion and do not deliver any concrete understanding of what is meant by the development of society. The United Nations in its various programmes on social development use economic growth as well as a number of other different measures to test for social and economic development (United Nations 1996: 1). Theories of what causes economic growth abound, partly to analyse economic development of the wealthy versus the poor and partly to stimulate economic growth in poor countries (Ghatak 1995: 34).

The terms 'growth' and 'development' usually mean the same thing (Gillis *et al.* 1996: 7), a *growth of the per capita income contributes to a general rise in the standard of living*. But growth and development need not be the same. For instance, Kuwait's per capita . real income may be the highest in the world and yet the standard of living of an 'average'

Kuwaiti may not be the same as that of an 'average' American (World Bank 1998: 20). In other words, per capita real income figures are derived by dividing the total real national income by the total population to obtain an average figure and these averages could be misleading. Thus, the distribution of income must be taken into account before something can be said about the general level of development. A country's gross domestic product (GDP) may grow at a very fast rate and yet only a small proportion of its population could be the beneficiaries of such growth, while the masses of its population may not experience any improvement in their standard of living (Ghatak 1995: 34). There may be growth but no development which is a feature of 'dual' societies in lower developed countries. Such 'dual' societies are characterized by contrasts between the very rich and the very poor, between the towns and villages and between different social classes, therefore the quality of life should be regarded as an important index of development (Ghatak 1995: 35).

Economics teaches that the standard of living is improved for all when wealth is created (Fourie & Van den Bogaerde 1989: 89). Supply and demand determine price and when more is paid for consumption than for production, wealth is created. Population growth as well as accelerating consumption dictates the rate of economic growth to sustain continued wealth creation. The economy grows only when the total volume of production increases or when the efficiency of production improves. People and machines deliver production and increased volume is achieved by employing more people and more machines or by improving the efficiency of people and machines. Efficiencies can be improved through education, but improvement in technology directly competes with the employment of people. As people are replaced by machines they lose the ability to earn money, and to purchase goods and services, resulting in the shrinking of the economy. Education does not create employment, but it does improve ones chances to find a job. Increased unemployment results in increased rates of crime and violence, as the gap between rich and poor increases. Social development in conjunction with economic development must be balanced by education in project management. Project management that brings people together from diverse cultures, religions, social levels, and education levels to effectively and efficiently reach set objectives.

Business Development:

A Project Management Approach

Business development and the history of project management

2.1. Introduction

It was the year 712 BC (Reese 1977: 930) when the Profit Isaiah proclaimed "The Spirit of the Lord GOD is upon me; because the LORD hath anointed me to preach good tidings unto the meek; he hath sent me to bind up the broken hearted, to proclaim liberty to the captives, and the opening of the prison to them that are bound; To proclaim the acceptable year of the LORD, and the day of vengeance of our God; to comfort all that mourn; To appoint unto them that mourn in Zion, to give unto them beauty for ashes, the oil of joy for mourning, the garment of praise for the spirit of heaviness; that they might be called trees of righteousness, the planting of the LORD, that He might be glorified. And they shall build the old wastes, they shall raise up the former desolations, and they shall repair the waste cities, the desolations of many generations" (Isaiah 61: 1-4). It was this passage that Christ read from at the start of His ministry on earth with the words "this day this scripture is fulfilled in your ears" (Luke 4: 21). This was to be a direct intervention in changing the lot of the poor, spiritually at least if not economically. Social and economic development may have been debated by the Romans and the Greeks before this time, and the disparity of the wealthy versus the poor may have been noticed, but here one finds that something is to be done about it, which plagues mans' conscience to this day.

This study is to find how economic development can result from business development, and how social development is not seen as a contributor to economic growth. Lessons

are drawn from recent history and the developmental trends experienced in first, second and third world economies. Further, a study was made of business development past, present and future, to find driving factors for economic growth through the employment of people. Industrial development as a contributor to economic growth was investigated, and it was found that efficiency competes with the employment of people. The more machines are deployed to increase efficiency the less people have work. The result is that it would seem as if first world technology deployed in third world economies does not create employment but reduces it. To rectify the increasing debt of third world countries the International Monetary Fund and the World Bank view trade and not aide as the solution (World Bank 1998: 9). In this view, the perceived trade is based on efficient and effective businesses. This study shows how businesses could be organised on four new pillars: strategy, structure, processes and projects that are interlinked, and influence one another.

Management by projects plays a central role in organisations of the future where project management needs to be described in terms of the fundamentals applicable to business development. From the literature surveyed a trend developed where project management from the perspective of industrial development can be seen as the past, from the perspective of business development as the present and from social development as the future. Two schools of thought, the one with a distinct industrial approach, emanating from America, and the other, with a business approach, emanating from Europe, dominate the history of project management. The life cycle approach developed in Europe for use in business development can be seen as the driver or engine that leads social development. Connected through education in project management as a life skill in an outcomes based environment, the life cycle approach to project management is seen as essential for the development of third world economies.

Project management literature focuses on the "project" almost exclusively and lacks exposure to formal management theory and practice defined as: "getting things done" (Follett 1949: 30). Herein lies a dilemma in that the majority of project managers who are doing things do not belong to institutes, speak at seminars or publish their findings.

2.2. Business development

2.2.1. History of economic development

According to the classical view of macro economic theory (Grabowski & Shields 1996: 2), all people have work where they produce goods and services, in return for which they earn money, which they spend on goods and services to create demand. Price is used as a mechanism to control supply and demand or in the words of the French economist Jean Baptiste Say, "supply creates its own demand" (Hut 1996: CD-ROM) giving rise to the creation of wealth to satisfy people's wants and needs.

Economic growth considers the possibility of raising the standard of living not only for the rich but also for the poor (Fourie & Van den Bogaerde 1989: 236), which is usually defined as *the annual rate of increase in real gross domestic product (GDP) or real gross national product (GNP)* (United Nations 1996: 1). GDP is defined as *the total value of all final goods and services produced within the economy in a give period of time* (Fourie & Van den Bogaerde 1989: 25). GDP and GNP are equal when local interests abroad are the same as foreign interests in the local economy. To calculate GNP, subtract from GDP all profits, interest, wages and other income earned by non-residents and add profits, interest, wages and other income earned by ex-patriots (Mohr *et al.* 1988: 38-39). Dividing GDP by the number of nationals from a specific country results in per capita data. This is simply stated as an average currency earned per person per year for a particular country. Per capita is used to measure changes in efficiency and growth of an economy.

The Union Bank of Switzerland goes one step further when calculating purchasing power parity for their research into prices and earnings around the world, by taking the average working hours per year into consideration, in each city surveyed (Enz 1991: 5). Research done in the United States during the 1980's showed per capita variations in GDP from $12 000 for Sweden to $136 for Ethiopia (Fourie & Van den Bogaerde 1989:

240). These vast differences in the level of economic activity between established countries and less developed countries has led to a difference in terminology where **economic growth** describes the process of increased GDP, and **economic development** the process which results in an increase in real potential production. This implies a fundamental change in the community as a whole, as well as its economic system in the case of a developing country (Gillis et al. 1996: 15-16).

Of particular significance is the physical displacement between rural and urban areas, cultural patterns, training of workers and a very different approach to health services and transport between developed and less developed countries. To overcome this problem, the United Nations in it's various development programmes determines **economic development** in an economy through per capita GDP, Investment to GDP, exports to GDP and adult literacy (United Nations 1996: 1) then compares this data to other similar nations in four segments: Low Developed Countries, Developing Countries, Transitional Countries and Developed Countries. **Economic growth** is attained when a country's per capita GDP increases year on year. "There are four groups of factors which are generally held to be instrumental in determining the capacity level of GDP or GNP when deciding the opportunities for future growth" (Fourie & Van den Bogaerde 1989: 239). These are the size and quality of the labour force, the quantity and quality of capital, technology and the availability of natural resources.

In "An inquiry into the nature and causes of wealth of nations" first published in 1776 by Adam Smith it is postulated that the economy grows when production increases in volume and/or efficiency. Smith (1981a: 23-30) found that by separating production into several different operations and having people specialise, production could be made more efficient. The extent to which specialisation could be implemented depended on the size of the market. The more people the larger the market the greater specialisation and therefore higher productivity.

David Ricardo devised the law of diminishing returns in 1800, in terms of which production may increase but only at a decreasing rate until a maximum is reached (Fourie & Van den Bogaerde 1989: 243). Malthus added his law of population to show

that the standard of living of the masses cannot be improved because the power of population is greater than the power of the earth to produce subsistence for man. Population, he asserted, when unchecked by war, famine, or disease, would increase by a geometric ratio but subsistence only by an arithmetic one (Bonar 1996: CD-ROM). This meant that as production increased the average amount of food available would continue to decrease until only a subsistence level was reached (Ghatak 1995: 49-50).

Until 1930, Adam Smith's theory held true and economic growth was unprecedented in the history of man. The great depression and the Second World War saw the emergence of the Keynesian model. In his book "The general theory of employment, interest and money" published in 1936 JM Keynes postulated, that one could not rely solely on market forces to carry the economy back to full employment. Government's expenditure was to be applied to offset unfavourable deviations in private expenditure to create employment (Lekachman 1997: CD-ROM). Monetarists, led by Milton Friedman, became critical of Keynes after the Second World War with the emergence of inflation. Monetarists were extremely critical of exaggerated government expenditure to keep total expenditure at an acceptable level (Fourie & Van den Bogaerde 1989: 17).

With employment approaching 100% during the 1970's in America, economists had until then concentrated only on the demand side of the economy. Oil shortages awoke the concept of limited natural resources and brought a realisation that there could be problems with the supply side of the economic equation with the occurrence of simultaneous inflation and recession (Yergin 1991: 615). The enormous economic growth in the years following World War 2, resulted in a baby boom ensued by exponential growth in global population. For years, the human birth rate was slightly higher than the death rate resulting in very slow increases in population. However, during the 1960's, global population was increasing exponentially and trends clearly showed that demand would eventually outstrip supply.

In 1972 the Club of Rome presented a "Doomsday Model" (Fourie & Van den Bogaerde 1989: 250). The model was a computer simulation based on data available in 1972 postulating that the global economy would slow down to a zero growth rate due to

increases in population while at the same time experiencing an increase in consumption at a faster rate thus returning to the theories of Ricardo and Malthus. Since then the rise of the twin evils "inflation and recession" have been seen to play havoc with economies the world over; slowing down the annual growth rate of global economies (World Bank 1998: 171).

Industrialisation brought about an increasing rate in the economic process. Technological developments resulted in increased productivity, increased production led to increased employment which led to increased personal wealth and capital formation. This led to more funds being available for training labour, giving rise to both a market in which to sell goods and a labour force to produce increasing output (Hirschey & Pappas 1992: 12-15).

Technology has kept production in pace with consumption as it races ahead. The cost of economic growth in terms of environmental impact has in the last days of the 20th century revealed disparities. It is argued that high levels of pollution resulting from production in developed countries, damages the environment globally, leading to crop losses in less developed countries. It is further argued that if damage to the environment is deducted from global GDP the trend that emerges is one of global recession and not growth (Heap 1999: 4).

Economic development in less developed and transitional countries have shown slow progress in the years between 1987 and 1998 (World Bank 1998: 24), as they show deficiency in all four factors required to sustain economic development. Production is limited and they have become nations of consumers while the population growth has continued to increase in these countries, economic growth has not (Bhattacharya 1993: 4).

Developed countries' investment in the social development of the less developed countries has resulted in increased life expectancy and birth rate, without creating work. While in the developed countries work is replaced by technology, as the birth rate decreases keeping unemployment figures low. It would seem that in some less

developed countries once a measure of economic development is attained, social development takes on a higher priority. Increased expenditure on social development instead of on continued economic development leads to economic downfall as several less developed countries have experienced recently (Ro 1993: 30-36).

At this point it becomes necessary to state the condition of economic development in various countries. Originated by the Martinique-born Marxist writer Frantz Fanon, the designation "third world" was given to countries containing some two-thirds of the world's population and located in Latin America, Africa, and Asia. The term arose during the cold war, when two opposing blocs one led by the USA "first world" the other led by the USSR "second world" appeared to dominate world politics. The "third world" consisted of economically and technologically less developed countries belonging to neither bloc while economies considered intrinsically incapable of development, are at times lumped together as forming a "fourth world" (Allen & Thomas 1996: CD-ROM).

This compares with the current United Nations classification of low developed countries (4th), developing countries (3rd), transitional countries (2nd) and developed countries (1st) or low income, low middle income, upper middle income and high income used by the World Bank in the same order. In dealing with the political un-ease expressed by many of the foregoing classification system this research is to be based on a classification of only three levels as the author finds all countries' economies "transitional" whether up or down. History has taught that today's 1st world is tomorrow's 3rd world. In this classification system **1st world** countries are developed, e.g. England, France, Germany and the USA; **2nd world** countries are developing, e.g. Brazil, Hungary and Malaysia; and **3rd world** countries are undeveloped e.g. Angola, Ethiopia and Moldavia.

While travelling in India the author realised that development and project management where inextricably linked. Without project management development would suffer from ineffectual deployment of capital. This author also realised that projects to develop countries' economies, could be grouped into three sectors, namely: industrial, business

and social. Industrialisation or industrial development is the shift from manual labour to mechanisation, moving labour from agriculture to manufacturing goods for profit as is evident in modern production and engineering (Eichengreen 1997: CD-ROM). Commercialisation, or business development, is made up of complex operations in the lives of people concerning all those functions that govern the buying and selling of goods and services to make profit in a pattern of operation, strategy, marketing and distribution for consumption (Flynn 1997: CD-ROM).

Some scholars believe that the basic principles of socialism or social development were derived from the philosophy of Plato, the teachings of the Hebrew prophets, and some parts of the New Testament (the Sermon on the Mount (Matthew 5-7), for example). Modern socialist ideology, however, is essentially a joint product of the 1789 French Revolution and the Industrial Revolution in England. Socialism has assumed a number of distinct forms in the Third World but only in Israel has moderate social democracy proved successful for long periods. At least of equal significance, however, are the cooperative agricultural communes (kibbutzim), which have flourished since 1948. Commentators have argued that kibbutzim, more than anything else, shows the viability of socialist principles in practice. However, the peculiarities of Israeli conditions (for example, religious, tradition and constant war readiness, necessitated by the hostility of Israel's Arab neighbours) could not easily be duplicated (Berki 1996: CD-ROM).

In many other Third World countries, Marxism and various indigenous traditions have been predominant in socialist movements. In developing countries socialism as an ideology generally has been fused with various doctrines of nationalism, also a European cultural import but enriched by diverse motifs drawn from local traditions and cast in the idiom of indigenous cultures. In India, for example, the largest socialist movement has partially adapted the pacifist teaching of Mahatma Gandhi, and distinct native brands of socialism exist in Japan, Myanmar, and Indonesia. Similarly, in black Africa native traditions were used in the adaptation of socialist, mainly Marxist, doctrines and political systems based on them. Socialism in these theories is usually understood as a combination of Marxism, anti-colonialism, and the updated tradition of communal landownership and tribal customs of decision making. Most of sub-Saharan

Africa's socialist countries adopted free-market reforms in the late 1980s and early 1990s (Berki 1996: CD-ROM).

Overtly Marxist movements, aided by the USSR, China, or Cuba, nevertheless seized power in such African countries as Angola, Ethiopia, and Mozambique. South Africa's African National Congress (ANC) was strongly influenced by Marxist ideas. Socialist ideology remains a popular and widely held political belief, and it has deeply penetrated other ideologies, as can be seen, for example, in the acceptance by many conservatives of a "welfare state" and limited planning. The worldwide spread of socialist ideas has been accompanied by a process of dilution of original principles, as in Western social democracy, and by the degeneration and falsification of its values, as in Marxist states (Berki 1996: CD-ROM).

As no formal accepted definition for **social development** is prevalent, this research defines it *as those activities of society which are essentially non-profit areas, such as education, sanitation, healthcare, land reform and policing*. Economic development, as a producer of wealth, must therefore lead, and be synchronized with social development, a consumer of wealth. To better understand this aspect a matrix was constructed **(figure 2-1)** in which 1st, 2nd and 3rd world economies are related to industrial, business and social developments.

Figure 2-1.   Economic / Development Matrix

	Industrial Development	Business Development	Social Development
1st World economies	A	B	C
2nd World economies	D	E	F
3rd World economies	G	H	I

Source: Own compilation.

Examining **figure 2-1** by applying the "Pareto principle" or 80-20 rule to the World Bank's "world development indicators" where total **population** (1989: 45) of an economy includes all residents regardless of legal status or citizenship except for refugees. **Production** (1989: 15) or gross national product is the sum of value added by all resident producers plus taxes less subsidies. Private **consumption** (1989: 211) is the market value of all goods and services purchased or received as income and **aid** (1989: 345) is disbursements of loans and grants made to promote industrial development and welfare in recipient economies. The following deduction can be based on **figure 2-1**:

❑   Population: ABC=20%, DEFGHI=80%

❑   Production: ABDE=80%, GH=20% Real GNP per capita in 1997 $

❑   Consumption: ABCDEF=80%, GHI=20% in purchasing power parity terms.

❑   Aid: CFGHI=80%, ABDE=20% in 1996 $

Figure 2-2 shows that 20% of the worlds' population is responsible for producing 80% of the worlds' wealth and consumes 80% of what is produced. Alternatively it means that 80% of the worlds, population produces 20% of the wealth and consumes 20% of all goods and services. "ABDE" is 80% of wealth's production and "I" is 80% of aid's consumption. "AB" produces most of the worlds' profit and "I" produces most of the worlds' debt. It can therefore be said that industrial development was mans' past, business development is mans' present, and social development is mans' future.

Figure 2-2.   Wealth & Consumption

	Industrial Development	Business Development	Social Development
1st World economies	**80% of Global Wealth, Production and Consumption**		
2nd World economies			
3rd World economies	**80% of Global Population and Debt**		

Source: Own compilation.

As global unemployment figures continue to grow, world markets reach maturity, a slacking off of demand is experienced. By definition, the 1st world is developed, prompting people to realise that in order for the global economy to grow, 2nd and 3rd world economies now need to be developed.

The basic premise of the production function is that people work (Gills *et al.* 1996: 41). This is simply no longer true. There are several examples where people are paid not to work, or paid not to produce, with the result that two of the four factors required for economic growth i.e. the size and quality of the labour force and the availability of natural resources, are no longer valid. This has proved technology to be a competitor to employment, as it replaces people in the production function with more efficient machines and can be seen where several of the most successful commodities ever presented on the stock exchange require no natural resources.

Until the start of industrialisation during the eighteenth century, an extended family of approximately 40 people farmed about one hectare manually. Mechanisation improved efficiency to the extent that 80 people could now farm four hectares resulting in farms getting bigger and employing more people specialising in the different activities. In the year 2000 technology has progressed to a point that one man can farm 400 hectares on a fully automated farm or milk 400 cows in a fully automated plant. Furthermore, most food production today is untouched by human hands from breaking the ground to the final product offered for sale at the point of consumption. First world technology deployed in third world countries does not create jobs but increases the number of beggars.

The World Bank and the International Monetary Fund have declared support of social development in lower developed countries to be a failure. At this point in time the world's financial authorities have been requested to scrap the debt of all lower developed countries as they simply cannot pay it back. It would seem that the key to continued global economic growth lies not in aid but in trade, together with continued

technological development which is achieved by more efficient labour - **not educated in knowledge, but skilled in methods of production.**

Expenditure on social development without synchronised economic development to create employment is a lost cause. Baroness Blackstone, Minister of State for Education and Employment in the UK, stated in a guest editorial in Project Magazine (June 1998): "In an increasingly global economy, Britain simply cannot afford to see its economic performance restricted by poor skills. The most successful businesses in the 21st century will be those that invest in the best-educated and trained workforce. As a consequence, the best way of getting and keeping a job will be to have the skill needed by employers. Furthermore, the concept of a job for life is no longer relevant." Baroness Blackstone pointed out that it was now estimated that people could change their career from 8 to 14 times in a lifetime. When all of the Y2K problems have been solved there is expected to be a worldwide glut of information technology skills. In Britain, an additional 500 000 people will be encouraged to further and higher education by the year 2002 (Blackstone 1998: 3-7).

It is generally accepted that "a business exists to make money" (Goldratt 1992: 40) so attention has to turn from macroeconomics to microeconomics to study how people function within the organisation that produces wealth.

2.2.2. History of business development

"I came to the study of people in organisations expecting certainty and absolute knowledge in the behavioural sciences. I anticipated that I would find laws governing the behaviour of people and of organisations as sure and as immutable as the laws of the physical sciences. I was disappointed" (Handy 1981: 9). From the earliest time, people combined talents and efforts into attaining larger goals when hunting and gathering. Labour specialisation made it possible for individuals to concentrate on tasks they did best without having to do every task necessary for survival and progress. Organisational

theory can be seen as social systems of co-operation that are designed to improve individual effort aimed at goal accomplishment. Organisation theory is how these collaborative efforts form, function and survive (Hodge & Anthony 1991: 8). The industrial revolution marked the beginning of what is referred to today as the modern organisation. Adam Smith brought a much-needed structure to the knowledge about organisations in his work on specialisation of labour (Smith 1981: 13-24).

Max Weber built on this in 1900 when he analysed organisations and found bureaucracy an ideal form of organisation based on knowledge and ability rather than on favouritism, which he found prevalent (Weber 1947: 324-328). His rules for the organisation are worth repeating here as they remind of the situation that organisations find themselves in today. They are:

❑ A division of labour existed in which authority and responsibilities were clearly identified for each member and were legitimised as official duties.

❑ The offices or positions were to be organised in a hierarchy of authority resulting in a chain of command.

❑ All organisational members were to be selected on the basis of technical qualifications through formal examinations or by virtue of training or education.

❑ Officials were appointed, not elected.

❑ Administrative officials worked for fixed salaries and were career officials.

❑ The administrative official was not an owner of the unit being administered.

❑ The administrator would be subject to strict rules, discipline and controls regarding his conduct while performing the official duties. These rules and controls would be impersonal and uniformly applied in all cases.

An organisation based on these tenets, argued Weber, would overcome the inefficiency and cumbersomeness found in the typical organisation of his time. It was not uncommon for positions to be filled by favouritism, rather than by demonstrated competency. Subjectivity and opinion took precedence over objectivity and order in the hiring and placement of employees. Charles Handy in his book "The hungry spirit" reminds that the competence of a manager is still to be determined (Handy 1998: 203).

The classical school attempted to create a set of rational techniques that would help in building both structure and process and so provide a coordinated set of relationships among the components of the organisation. The Classicists believed that rationality in structure and process could be attained by building a theory around what was defined as "one best way" of doing things. **The theory was founded on four pillars: division of labour, scalar and functional processes, structure, and span of control** (Scott & Mitchell 1976: 31-35). The school concentrated its attention on the proper allocation of work to people and machines. The divisions of work became the foundation for the selection, placement, and development of personnel. Both the structure and the process employed were built on these divisions of labour that were aimed at achieving the advantages of specialisation. The proper division of labour has been called the most important economic concept ever devised (Kimball 1925: 20).

Scalar and functional processes refer to vertical and horizontal growth, respectively. As the organisation experiences growth, additional personnel are required to perform the work that must be accomplished. In order to make room for them, the organisation must expand and add more supervisors. When the workload of any one manager becomes excessive, delegation of authority and responsibility requires that more levels of management be used. This process results in vertical growth (the scalar process). If no additional levels of structure are required the growth is horizontal (the functional process). These two processes account for all organisation growth, and are based on the first pillar, division of labour (Hodge & Anthony 1991: 21).

Structure refers to the vertical arrangement of jobs in the organisation. The essence of structure is a hierarchical pattern of authority and responsibility relationships aimed at

coordinating the work of the organisation. Classical theory centred its focus around the line and staff organisation structure. The line structure is concerned with accomplishing the basic work with which the organisation is primarily concerned. The staff structure, is concerned with those functions that facilitate or expedite the performance of work. The subordinates who immediately report to a given superior constitute the superior's span of control. Getting a group of subordinates who can be effectively supervised by a manager is of primary importance to Classical theory.

Structure can be considered to be made up of all spans of control taken collectively. Therefore, the shape of the structure is determined by the number and size of its spans of control. The shape can be basically tall with narrow spans of control (few subordinates reporting to a superior) or flat with wide spans of control (many subordinates reporting to a superior) (Haimann & Scott 1970: Ch 15). The span of control concept is key in Classical theory because it points out the limitations of managerial ability while at the same time it treats the matter of complexity of relationships and the need to provide coordination among them.

Among the many contributors to Classical theory, Frederick Taylor was convinced that there was a major need to develop the "one best way" to perform a task, to make that way standard practice, to find a first-class person to perform it, and to provide that person with the best tools and equipment available (Taylor 1911: 5). Both the person and the organisation would benefit as a result. At the time that Taylor was developing his theories and practices America, Henri Fayol was studying organisations in France. Unlike Taylor, Fayol concentrated his efforts on explaining the workings of the administrative levels of the organisation. He maintained that it was possible to devise a set of principles of administration that could be universally applied to improve the practice of management. As a result of his belief and study (conducted primarily in the coal mining industry), Fayol formulated fourteen principles of management that he believed would improve the state of the art of management practice. He held that these principles could be applied in any type of organisation (Hodge & Anthony 1991: 22).

The Classicists all concentrated in some fashion on how to build an organisation that was based on proper principles to manage work and the processing of information needed to carry out that work in an efficient manner. A group known as the Behavioural School developed and was concerned with how the human element should be accounted for in a theory of organisations.

The behavioural school is composed of investigators from psychology, social psychology, and sociology who have sought to improve the understanding of organisation behaviour by studying in a scientific manner why and how people behave in a certain way in organisations. Their contributions are ultimately aimed at enabling management to understand behaviour in order to be capable of modifying it in a manner deemed effective for the organisation. The Behavioural School largely accepted the theory put forth by the Classicists but modified it by stressing the importance of the social group to organisation efficiency. Where the Classicists, for the most part, held the human element relatively constant in the form of Taylor's "one best man" who would be a model for performance, the Behaviourists explored the role of group membership as a factor in organisation theory (Hodge & Anthony 1991: 22).

The Behaviourists examined both the micro, for example motivation and leadership, and the macro, for example social and technical systems analysis aspects of group membership (Wren 1972: 439). They attempted, in short, to study people as behaving individuals in an organisation. So attention was given not only to how individuals are motivated and behave but to how social groups interact with one another and with the technology of the organisation. Mary Parker Follett stressed the group principle in her works because she believed the group took precedence over the individual, and this emphasis would enable the individual to develop fully. Participation, cooperation, communication, coordination, and the sharing of authority, were themes that characterised her writings. She concentrated on how groups form and perform and how involvement of subordinates could improve organisation success were her signal contributions to organisation theory (Follett 1949: 40).

Chester Barnard's "The functions of the executive" (Barnard 1938), stressed cooperation as the main way to achieve both individual and organisation success. He tied the needs of the formal organisation to the needs of the individual and of informal groups within it and so provided new insight into how organisations work. Douglas McGregor's ideas (Gibson *et al.* 1985: 59) about human motivation, were based on the proposition that a person's assumptions about others have a significant impact on the way that person behaves toward them.

Assumptions regarding theory X held that workers are irresponsible and unwilling to work, and must be persuaded to perform their obligations to their employers. Thus, the Theory X-based management approach to organisation is to structure the job, closely supervise, and reward good performance and punish poor performance. This approach encourages a carrot-and-stick, hierarchically controlled approach to management. The emphasis is on short-term compliance and profitability. The role of the manager would be to create an atmosphere of dependency and fear if the workers were to produce at their maximum.

Assumptions regarding theory Y held that the manager is encouraged to assume that work is natural, that creativity is widely spread throughout the population, that people can be taught to accept responsibility, and that fear is only one way (and not a very good one) to inspire behaviour. McGregor termed these assumptions Theory Y. Thus, McGregor's Theory X and Theory Y symbolise what, at that time, was a new approach to motivation and interpersonal relationships.

Abraham Maslow formulated a hierarchy of human needs (Maslow 1943: 370). He maintained that humans have five levels of needs, and their behaviour is determined by the level of needs which are given attention at a particular time. The most basic need, according to Maslow, the need for food, clothing, and shelter, dominates attention until it is satisfied. Awareness then shifts to the need to be safe from injury and the concern for preservation of the means for satisfying physiological needs. Once satisfied, a third level needs appear as a need to be a member of a group. This is followed by the ego or self-esteem needs which deals with the necessity to develop and maintain a healthy self-

concept. The highest-order needs are self-actualisation needs to realise one's fullest potential. The recognition of this hierarchy and the effect that it has on behaviour is an important facet of understanding human behaviour and its part in the development of a theory of organisations (Hodge & Anthony 1991: 23).

Frederick Herzberg's two-factor theory of motivation is a key contribution to the Behavioural School. His research found that job enrichment is the core of motivation described by two sets of determinants of behaviour: job context (e.g. working conditions, pay, quality of supervision) and job content (e.g. recognition, promotion, professional growth). Management's role is to build tasks that bring about a sense of accomplishment and appreciation rather than to construct motivation efforts solely on the traditional tools of pay and fear (Herzberg, Mausner & Synderman 1950). George Homans (1950) increased understanding of the effects of group membership on behaviour and productivity with the publication of his book "The human group". Kurt Lewin (1958) made a similarly important contribution to understanding group behaviour with his field theory, the expression of social and psychological concepts and events in terms of physical science concepts.

The Behaviourists gave attention to group dynamics, role performance, motivation, leadership, and human relationships. Japanese style organisations and management have received a great deal of attention from theorists and practitioners alike. The essence of this approach is that people will work harder and with more of a sense of commitment if they have job security (most Japanese workers have a guarantee of lifetime employment) and feel they have a significant part to play in decision making and group activity (Hodge & Anthony 1991: 24).

General systems theory explains not only how the organisation functions but also how it interacts with its environment. General systems theorists, among them Kenneth Boulding (1956), and Ludwig von Bertalanffy (1968) have suggested that organisations be considered as systems of resources combined in a fashion aimed at accomplishing some purpose. These theorists argued that there were two views of systems: closed and open. A *closed system* is one that operates independently from its environment. In other

words, the system is considered an entity unto itself without regard to outside influences. In an *open system*, organisations must take into account the ecology of the organisation, that is how well it accommodates the general environment that surrounds it (Hodge & Anthony 1991: 25).

An essential component of systems theory, the application of cybernetics, improves the execution of control as a function of organisation equilibrium. Norbert Weiner (1954) and Stafford Beer (1959) are two notable contributors to the application of cybernetics, - a notion of controlling systems with feedback from the environment. Process control philosophy as found in engineering instrumentation and defined as: "a systematic sequence of operations to produce a specific result" in the American National Standard for Industrial Engineering Terminology, discusses feed forward, feed back and control loop systems that give insight as to how these concepts are applied to command and control functions in an organisation.

Jay Forrester has done research in an attempt to simulate the workings of an entire organisation based on process control philosophy, and Martin Starr has been instrumental in using mathematical techniques for solving organisational problems. These and other researchers have helped move organisation theory to its present state of development. The systems view is a means of appreciating how organisational parts fit together and how organisations interact with their environment and with other organisations. It is a broad perspective that makes room for the application of both behavioural and quantitative methods to the study of the components of organisations traceable to the work of the Classicists and modified by the Behaviourists (Hodge & Anthony 1991: 26).

The contingency school formulates the proposition that an organisation's relationship to other organisations, is dependant on the environmental situation. Such a view requires both theorists and managers to be more adaptable, flexible, and even more ingenious in their decision-making processes. Thus, the contingency theory rejects the all-purpose principles and constructs espoused by the Classicists and substitutes for them a prescriptive, adaptive view of the organisation. One pioneer who was instrumental in

moving organisation theory to the contingency approach was Joan Woodward, who studied the effect of technology on the organisation. Her empirical studies sought understanding as to why firms whose organisation structures based on classical foundations, were not always the most successful from a commercial point of view. Woodward found that many variations in organisation structure were associated with differences in manufacturing techniques.

As Woodward (1965: 6) pointed out: "Different technologies imposed different kinds of demands on individuals and organisations, and these demands had to meet through an appropriate structure. Commercially successful firms seemed to be those in which function and form were complementary". Woodward's research demonstrated that the rules of the classical school did not always work in practice (Woodward 1965: 242). Organisation structure appeared to be a product of many more variables than the early Classicists had thought. Her testing of well-established practices and ideas meant that Woodward's research approach had set an important precedent in the evolution of organisation theory. She argued that knowledge must replace beliefs and that such a replacement should be based on research (Woodward 1965: 25).

Woodward's ideas have left a lasting imprint on today's state of knowledge about how organisations work. The demonstration of a direct relationship between technology and the social structure of the organisation was the main finding of Woodward's research. Organisations making technical advances tended to develop direct relationships between these advances and the similarities in their structures, for example, the length of chains of command, the spans of control of the chief executive, and the ratios of managers to total personnel (Hodge & Anthony 1991: 27).

Jay Galbraith (1970: 113-139) conducted studies of how the organisation was established on the basis of the predictability of its tasks. The more certain the task, he found, the more the amount of activity that could be planned and the less was the need for continuous information flows through the organisation. Galbraith viewed the organisation as a processor that kept in tune with the demands of its basic task environment by properly processing decision information. Coordination among the

various components of the organisation was necessary if it was to deal effectively with its task environment. Change in this environment required the addition of more coordinating devices to process information for tying the organisation to its environment.

Several authors have further developed some of the ideas of contingency thinking. One of these contributors is James Thompson, who argued that organisations that experience similar technological and environmental problems would engage in similar behaviour (Thomson 1967: 39-65). This suggests that there should be similarities in organising patterns among such organisations. Thompson stressed the necessity for analysing the organisation as an open system as it is simply not prudent to build an organisation without considering how such forces as technology and the environment will affect the organisation.

Jay W. Lorsch and Paul R. Lawrence were among the first researchers to discover the contingent relationship between an organisation and its environment. Their research demonstrated that successful organisations appear to be structured in a pattern that was consistent with environmental demands. This pattern of relationships was evident in the amount and nature of differentiation occurring in the organisation. Lorsch & Lawrence measured differentiation in terms of four basic components: formality of structure (reliance on rules, procedures, and so on), goal orientation (concern with market targets contrasted with concern with scientific goals), time orientation (short-term versus long-term), interpersonal orientation (concern for task accomplishment versus concern for interpersonal relationships) (Lorsch & Lawrence 1970: 6).

Successful organisations, Lorsch & Lawrence (1970: 7) found, had orientations consistent with their environments. There was a contingent relationship between these organisations and how they were structured to deal with their environments. These contingent relations resulted in more differentiation of the various parts of the organisation. Environmental demands were thus formally recognised as an important factor in decisions about how to structure an organisation. Once the various components were differentiated, it was necessary to tie them together into an effective whole. This is

the role of integration. A highly differentiated organisation structure places a serious need on the organisation to develop a coordination network among the many subunits. Thus, the real challenge for management is how to achieve a balance and an integrated pattern of relationships among the differentiated parts (Hodge & Anthony 1991: 28).

Lorsch & Lawrence (1970: 8) stated a challenge to management: "organisations, to be economically successful, needed to meet environmental demands for both differentiation and integration, but they had to do this in spite of the fact that these two states were opposed to each other". In other words, the more differentiation required by the environment, the more necessary is the integration that, by the very nature of the differentiation, is difficult to achieve. The significance of Lorsch & Lawrence's work is that it puts forth in clear perspective the effect of the environment on organisations and how they must differentiate and integrate activities and orientations to cope with this effect in a contingent fashion.

"Plus ca change, plus c'est la meme chose" (the more things change the more they remain the same) (Karr 1849: 305). Organisations of the year 2000 seem to stand on **four new pillars: strategy, structure, processes and projects**, which influence and depend on one another when one reviews the most recent publications by, Gibson, Hammer, Peters, Scot and Toffler.

2.3. History of project management

Project management exists only as the implementation of solutions where the emphasis is on "things being done". But herein lies industry's greatest dilemma. Project managers who are doing things (estimated by APM-UK as being one million in Britain alone) do not belong to institutes, speak at seminars or produce written material.

Membership of the Association for Project Management in the UK has just passed the 8000 mark. Of these only 10% are active in perpetuating knowledge and then become less "doing" and more "talking". Project management theory is therefore based on only the partial experiences of 0.05% of the people active in the industry.

In America the Project Management Institute has about 75 000 members but the same ratio holds true. A scan of available literature, reveals that it is produced almost exclusively by faculty members. Experience of managing projects for 20 years before being introduced to the theory has raised a serious question about the process of project management and the over abundance of tools and techniques. This research is to consider three perspectives, American, European and African to see what can be made of project management.

2.3.1. The American approach

It is generally thought that modern project management had its origins in 1958 when a Program Evaluation and Review Technique (PERT) was first developed by Booz, Allen and Hamilton **(figure 2-3)**. It was first used to find the shortest possible time in which to develop and produce an operational Polaris missile for the Special Projects Office of the United States Navy (Kerzner 1994: 602).

PERT was actually an adaptation of an earlier precedence evaluation **technique** derived from cause and effect modelling which was used by the Manhattan Project to produce the first atomic bomb. Fundamental to PERT is the concept of an "event" **(task)** or the reaching of a certain stage of completion of a project. Also basic is the expected time required to complete activities leading up to that event (West 1977: 1).

At the same time chemical and explosives giant, Du Pont developed a **tool** called the Critical Path Method (CPM). CPM first examines the free time between activities caused by the relationship formed in the pert diagram. Activities which have no free time between the end of the predecessor and the start of the successor form the critical path, marked in red in **figure 2-3.** Secondly, CPM examines the criticality of **tasks** by the relationship caused in the duration and cost. As the duration is decreased, by adding more resources, a higher cost is incurred. When a point is reached where it is no longer financially viable to further reduce the duration, the activity is said to be critical. The reduced duration resulting from this analysis replaces the duration of activities forming the critical path in the first instance, thus reducing the overall duration of the project (West 1977: 2).

The general approach to project management in the American perspective, begins by drawing up a list of the tasks that need to be completed, in rough order. Next, the duration of the task is considered against the resources required, which impacts on the cost to complete the task. These tasks are now placed in sequence using a PERT diagram and relationships between the tasks are established, thus determining preceding and succeeding tasks. Working back from the target end date to the start activity one finds the latest date for each task to start and finish. Taking the earliest possible starting date for the project, one now adds the task duration to the start date to find the earliest possible start and finish date for each task.

The difference between the early date and the late date is called the **float** and where this is zero the task is said to be **critical.** All critical tasks make up the **critical path,** hence the Critical Path Method (CPM). The use of CPM concentrates management attention on those activities which make-up the critical path as these activities would be "critical"

to the overall duration of the project. Management attention is therefore focused on the task and the means of achieving that task within cost, time and quality constraints.

Figure 2-3 PERT Network
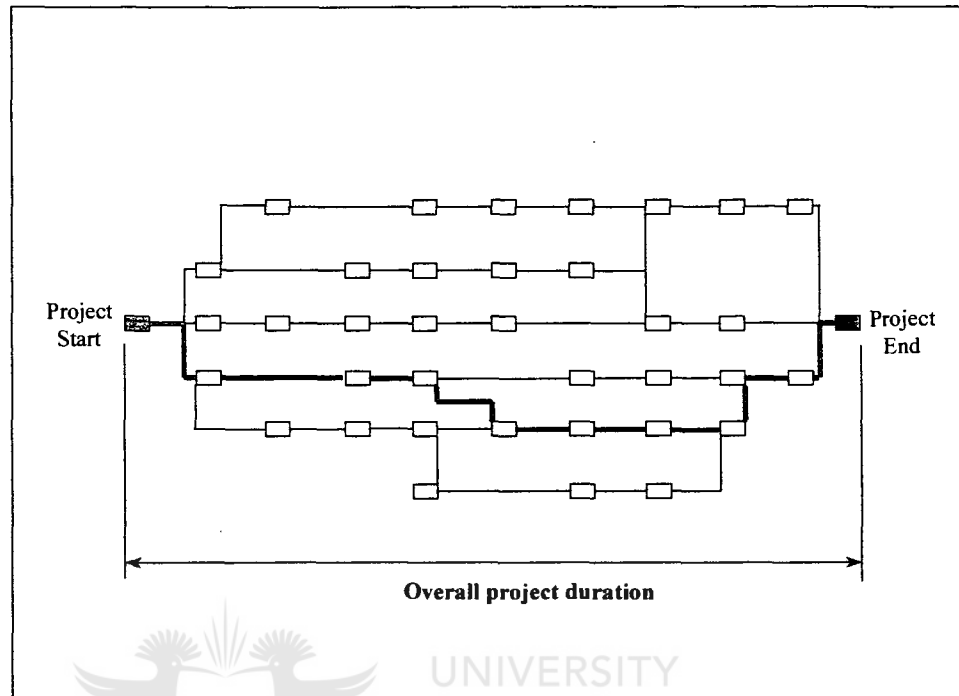
Source: Own compilation.

Both PERT and CPM had at their core **tools and techniques** to reduce the time required without impacting on cost and quality constraints to produce the product of the project, by creating a network of activities leading to an event. Use of PERT and CPM became popular when the Department of Defence and Du Pont requested contractors to use these techniques to comply with standard company control procedures. From this one can deduce that these techniques were used to control many contractors working on one project.

This aspect then forms the basis of the **American point of view** that *project management is the use of tools and techniques to control many tasks performed by many organisations working on one project.* This view is upheld by the Project Management Institute (PMI) in the USA who oversee everything concerning project management in

America and who exercise some influence over the various institutes in the rest of the world.

PMI have produced "A guide to the project management body of knowledge" which states that *"Project management is the application of knowledge, skills, tools, and techniques to project activities in order to meet or exceed stakeholders' expectations from a project"* (PMBOK 1996: 6). The PMBOK shows a lack of understanding in the use of business processes, project life cycles, work break down structures and the individuals who are to perform the activities. It dictates nine areas of knowledge which fall primarily in the "design stage" of the life cycle which is seen to be synonymous with the "implementation stage"

However, in its defence, PMI does state that all project management knowledge could never be contained in a single volume. PMI publishes a magazine "PM Network" and a journal "Project Management Journal" in which practitioners and professionals can publish their findings. Articles published in PM Network display a keen insight into the problems affecting project managers today and it is an invaluable source of information reflecting the actual situation within the project management industry at present.

The Project Management Journal is aimed more at the academic side of the industry and papers presented are often of a more theoretical orientation, rather than offering practical solutions. PMI also offers Project Management Professional (PMP) status to members who qualify according to a points scheme, but who lose PMP status if annual fees are not paid. PMI is one of the more active institutes internationally and influences theory and practice to a great extent. It offers many benefits to its members and plays a leading role in the project management industry all over the world.

To summarise, the *American perspective concentrates on the task, tools and techniques to deliver the product of the project, and co-ordination / control of many tasks performed by many organisations working on a single project.*

2.3.2. The European approach

In Europe it is commonly referred to as "management by projects" rather than "project management" to denote a multiple rather than singular approach to projects. A point to note is that almost no reference is made to tools and techniques. Project management as practised in Britain and by the European Union is explained as a "systems approach" (Turner 1993: 193), to problem solving and as such has its origin in nature where the first 'systems' are found, dating back to the origin of life.

Project management is not seen to be "construction or production" but is simply seen as "anything with a beginning and an end" according to Martin Barnes, originator of the New Engineering Contract. The European approach is based on three fundamental principles: the use of life cycles, work breakdown structures and responsibility charts. Life cycles can contain from three to seventeen stages but it is generally accepted that a basic four stage model is used to begin with. Research has revealed risk to be the major contributing factor to the use of more than four stages (Van der Merwe 1998c: 3).

A life cycle is constructed for a project when a technical expert referred to as a project "champion" in conjunction with a project process expert referred to as a project "manager" draw **figure 2-4** and try to determine the end condition of the project. Next, the beneficial change is discussed to find what improvement the project is to bring about. A working title is derived from the end condition and beneficial change. Next, a strategic level work breakdown structure of about 10 items per stage is entered.

The champion and project manager to determine whether the project is feasible performs the work of the feasibility stage. Project viability determines what expected resource constraints (number of people, expected labour man hours, total duration, equipment cost and cash needs) are required for the project. Perceived at a 50% accuracy level a proposal document is completed to communicate the intended project plan with potential sponsors and stakeholders for fundraising purposes.

Figure 2-4 Life Cycle

Feasibility Stage	Design Stage	Construction Stage	Close-out Stage
Beneficial change Preliminary technical investigation Search for sponsor Resource constraints agreed Approval to proceed to design stage	Establish project team Establish WBS Establish Responsibility chart Design Specification Contract award Approval to proceed to construction stage	Site establish Delivery to site Install Commission Hand over Commercial operation	Close contract Finalise paperwork Project close Project team disband

Source: Own compilation

Once sponsors and stakeholders have accepted the total resource cost, the project is allowed to proceed to the design stage. A project start-up meeting is called where the people who will now undertake to do the work ratify earlier decisions. The project team determines operational level work breakdown structures.

Responsibility charts **(figure 2-5)** reflect who has taken responsibility for which task, how much time is to be spent working on the task and when it will be finished. This is done in a group environment where all interested parties are present. People, groups and departments, who accept responsibility, are now part of the project team.

Figure 2-5 Responsibility Chart

Description	Responsible Person	Duration	Due date
Design new system	J Mathew	90 days	15 Dec
Specify performance requirements	P Cook	30 days	30 Jan
Issue specification for tender	C Aldridge	30 days	20 Feb
Evaluate tenders	J Dean	10 days	20 March
Appoint main contractor	K Coetzee	1 day	29 March
Provide contract document	J Potgieter	5 days	15 April
Confirm contract placed	P Smit	1 day	20 April

Source: Adapted from Turner 1993: 281

Work progresses to the end of design where total resource costs for the project are perceived at 75% accuracy, are presented to the sponsors and stakeholders for approval, in order to place contracts and proceed with implementation (or construction) of the project. Once the end condition has been met the project now proceeds to the end stage where the project team is finally disbanded. The project is managed jointly by the Champion (who is responsible for the technical content) and the Project Manager (who is responsible for the people).

In more recent years use has been made of project-based management in which Turner (1993: 37-38) describes each department of an organisation as seen as a project which is to achieve a certain goal. These goals make up the strategic objectives of the organisation as a whole. Successful projects cause the organisation to move from one objective to the next while unsuccessful projects cause the organisation to fail to reach their objectives.

Management's attention is placed on the management of the people who perform the tasks, and not on how the task is performed. This view is also portrayed by the

Association for Project Management (APM) in Britain, Body Of Knowledge, and by the International Project Management Institute (IPMA) in Zurich.

Technical Committee MS/2 of the British Standard 6079: 1996 "Guide to Project Management" produced by the British Standard Institute, define project management as *"The planning, monitoring and control of all aspects of a project **and the motivation of all those involved** in it to achieve the project objectives on time and to the specified cost, quality and performance"* (BS 6079 1996: 2). It also states "Project management could be said to be as old as humankind, since by definition, **any management activity** that introduces a new objective or causes change and has a definite start and finish time, is a project". Note the human / management of people slant given by these definitions. (BS 6079 1996: 4).

APM produce a Body of Knowledge (APM-BOK) advocating 40 areas of knowledge **TO MANAGE PEOPLE WHO ARE MANAGING THE WORK.** "Project", the magazine of APM, publishes articles produced by practitioners, and is filled with discussion on management processes, team work, motivation and management of people. Central to all is project management as a HUMAN endeavour and a UNIVERSAL process. This is in stark contrast to the management of the activity, task or event portrayed in American literature.

IPMA, the largest project management association (it affiliates all the institutes in Europe e.g. France, Germany, Switzerland and Britain, and also India and Russia), produces the International Journal of Project Management, widely regarded as THE authority on project management, and affiliates all APMs.

Europe is academically more accepting of project management as a profession as several universities have programmes and degrees dedicated to project management, while differentiation is made between degrees with project management content, and degrees in project management. APM has achieved chartered status and can now award qualifications at level National Vocational Qualifications 4 & 5 according to British

educational standards, and Certified Project Manager status is available (similar to Certified Engineer) to members who qualify.

This puts the formal tertiary education of project managers, as well as their professional status, at the highest internationally acceptable level. National Vocational Qualifications are incorporated, accomplishing the accreditation of training providers, presenters and training material. APM and IPMA offer a range of benefits to members and are at the forefront in establishing the Global Forum - an endeavour to bring about the global status of project management.

The European point of view on project management is that an organisation is made up of many small projects, and the cumulative success of these projects determines the success of the organisation. Key to this concept is the management of people who perform work on many simultaneously occurring projects. It is here that multi-project management as a business process is taught on a formal tertiary accredited basis.

2.3.3. African approach

Africa is gaining acceptance in anthropology as the origin of man. It is here that *Homo erectus* supposedly first swung down from the trees and walked upright across the mud flats of central Africa. Recent archaeological discoveries at an unfinished pyramid in Egypt (accepted as one of the oldest structures in the world) found that slaves were not used to build them as is popularly believed. A construction camp was unearthed containing architects' drawings and a nearby cemetery contained skeletons with injuries common to tradesmen (Bauval 1996: 29-32).

From these findings it is speculated that if architects' drawings and tradesmen existed, a plan for construction also existed. If so, then it can be concluded that some form of project management must have been employed. More recently, in the ancient kingdom of Kush, near to where the Ark of the Covenant is believed to be kept, Hancock finds pyramids older than those in Egypt, raising speculation that the building industry started

in central Africa and was emulated by the Egyptians, from where it spread to the rest of the world (Hancock 1996: 294). This may be the reason for project management in Africa being seen as the domain of engineers.

In South Africa it is generally accepted that project management is the manipulation of steel and concrete in the construction and production industries. The words "project management" conjure up images of a construction site where people are pushing wheelbarrows, carrying planks and mixing concrete. Imagination is void of management by projects, implementation of strategy, directing elements of business or the management of people.

Project management in South Africa follows that of the American perspective discussed earlier. While successful in various forms of engineering, production management and operational management, the American perspective is less successful in its application to general management. Where change is to be brought about within an organisation the European perspective points the way to success.

Keeping exclusively to the use of tools and techniques has led to the abject failure of projects and the attempted implementation of management by projects, in several unrelated industries, none more so than at the Saldanha Steel Project where the workers on the project burnt down the offices and the plant in 1998, out of frustration with management.

Lack of human understanding and poor management of people issues, it seems, will contribute to failure on any project. A common myth exists, that project management forms part of general management and is made up of tools and techniques. This suggests that exposure to the European perspective has been very limited in South Africa. Funding of projects in Africa by the World Bank, the European Union and the International Monetary Fund has made it necessary for project plans to reflect knowledge of the European perspective in project management.

Personal involvement with PMI South African Chapter has revealed that while the majority of members come from the information technology sector, the institute is firmly entrenched in civil engineering. The chapter decided to disband from PMI in America and exists as the Project Management Institute of South Africa. Independence meant self-accreditation which is largely seen to be the reason for the break.

Some private initiative has been displayed in the formation of the Association of Project and Change Management (APCM) which merged with APM (UK) to open a branch in South Africa as APM (SA). An independent magazine, "Project Pro", servicing several related industries, provides project management practitioners with a voice, and is the only publicly available magazine on project management in South Africa, at this time.

No formal tertiary education or accreditation exists as yet, in project management in South Africa, but several universities offer project management as a subject as part of other degrees, notably engineering as mentioned above. This does not detract from the fact that South African projects have won "International Project of the Year" awards from PMI in recent years as can be seen in **figure 2-6**. This serves to emphasise that the best project management practitioners are not active in perpetuating theory.

The African point of view on project management holds that it falls within the domain of engineering, and is largely influenced by the American perspective. Knowledge of the European perspective is lacking but demand by the European Union that project management training precedes donor funding of projects will undoubtedly change this point of view before long.

Figure 2-6 Project Awards

International Project of the Year Award Winner History 1990-1999	
1999 Project Title:	QATARGAS LNG PLANT
Submitted by:	Chiyoda Corporation
Project Contact:	Masayuki Ishikura
e-mail:	mishikura@ykh.chiyoda.co.jp
1998 Project Title:	MARS PATHFINDER
Submitted by:	Jet Propulsion Laboratory
Project Contact:	Craig Sholes
e-mail:	csholes@maill.jpl.nasa.gov
1997 Project Title:	*ADVANTIX*, ADVANCED PHOTO SYSTEM
Submitted by:	Eastman Kodak Company
Project Contact:	Chris S. Adams
Tel:	Tel: 716-722-6804
1996 Project Title:	1 B PROCESSOR STORY
Submitted by:	Lucent Technologies
Project Contact:	Paul Rutkowski
Tel:	630-224-7360
1995 Project Title:	BENFIELD COLUMN REPAIR PROJECT South Africa
Submitted by:	Sastech Engineering Services
Project Contact:	Ian Boggon
Tel:	27-0136-49-2381
1994 Project Title:	LOGAN EXPANSION PROJECT
Submitted by:	Fluor Daniel, Inc.
Project Contact:	Wayne Halli
Tel:	803-281-4891
1993 Project Title:	METRO RED LINE SEGMENT 1 PROJECT
Submitted by:	Rail Construction Corporation
Project Contact:	Elaine Stewart
Tel:	213-623-1194
1992 Project Title:	ATIGUN MAINLINE REROUTE PROJECT
Submitted by:	Alaska Pipeline Service Company
Project Contact:	William Howitt
Tel:	907-278-1611
1991 Project Title:	NEW PROPYLENE/POLYPROPYLENE FACTORY FOR SASOL
Submitted by:	SASTEC CHEMICAL INDUSTRIES (PTY) LTD
Project Contact:	Carol van Zyl
Tel:	27-16-708-2376
1990 Project Title:	LIMERICK GENERATING STATION UNIT 2
Submitted by:	Philadelphia Electric Company
Project Contact:	Thomas Gotzis
Tel:	215-841-4000

Source: Own compilation with data provided by the Project Management Institute.

2.3.4. Search for best practises

Research of available literature on project management published since 1981, as well as taking cognisance of the development of international institutes, and holding interviews with internationally prominent figures, personal observation concludes that only the surface is being scratched with regard to knowledge in project management.

When researching multi-project management, almost no information was found on the subject in available literature. Nevertheless, it was realised that practising project managers were being successful - they were merely not being public about it. This resulted in interviews being held informally with forty practitioners, fifteen research academics and five well-known authors on the subject as listed in the bibliography.

These interviews were held between 1995 and 1999. All the discussions were held informally and had the same intention: to find a commonality of things that work. A pattern emerged in that what was found in literature and what practitioners, researchers and authors maintained were what made projects successful were:

- project management software was not used to manage the project
- use was made of a spreadsheets and a databases
- incremental improvement of processes where managed
- life cycles where used knowingly or unknowingly
- work breakdown structures were broken down in the stages of the life cycle and not across the project as theory dictates
- responsibility charts where used to control the people and the work
- use was made of champions to control technical detail
- technical expertise was separated from procedural expertise
- project managers were ORGANISED and IN CONTROL
- **PEOPLE WERE MANAGED, WHO MANAGED THE WORK.**

Realising that textbooks published today contain information gained through experience by the author about 10 years ago, journal articles took two years to publish and that only magazine articles displayed current practice, a review was done of magazine articles published between 1995 and 1999 in APM's "Project" and in PMI's "PM Network". Also reviewed was IPMA's "International Journal of Project Management" and PMI's "Project Management Journal" for the same period. Finally all conference proceedings for IPMA and PMI where reviewed for the period 1990 to 2000.

In focusing on those articles that discussed solutions (things that work) and not problems (things that do not work), evidence was found that concurred with findings from the interviews.

2.4. Conclusion

Objective 1 sets out the foundation understanding of the three elements on which this research is based i.e. economic development, business development and project management. This sets the background to understanding how wealth is created and consumed, the theory of the firm; how it has developed and how management theory influences production. An overview of project management theory is researched to find divergence and convergence with the theory of the organisation.

It could be expected that projects are managed and therefore that management theory would apply to the management of projects but this research has revealed that the commercial nature of the origin of management and the industrial nature of the origin of projects has kept these two theories on separate paths. Of particular interest has been the discovery that neither management nor project management, despite their importance to society and longevity of application, have to date not been ascribed professional status. That is to say that no formal accredited body represents the "profession" in either case. If one is to consider that these two occupations are responsibly for practically all of wealth production and consumption, then greater is the surprise that no governing body exists.

The fact is that the one best way of performing a task as found in the classical view of management, the systems approach of management, and the contingency school of thought in management, have more to offer project management success than the tools and techniques of project management have to offer general management. On the other hand, a management question as to whether one manages the work or the person is answered in the European approach to project management by managing both through the use of responsibility charts and by splitting technical and procedural expertise.

The historical divergent nature of management and project management, is converged by the future needs of both to become recognised professions.

Business Development:

A Project Management Approach

Chapter 3

Management of strategy, structure, processes and projects

Chapter 3

Management of strategy, structure, processes and projects

Synopsis

The classical school of business development supposed that rationality in structure and process where attained by a theory that defined "one best way" of doing things. The theory was based on four pillars: division of labour, scalar and functional processes, structure, and span of control (Scott & Mitchell 1976: 31-35). Modern business development seem to stand on four new pillars: Strategy, structure, processes and projects, which influence and depend on one another, when one reviews literature as published by Gibson *et al.* (1985), Hammer (1994), Peters (1992) and Toffler (1971).

Organisational theory abounds in the research of strategic management with reference to examination, objective setting and the result of organisational structure. But strategies are not futile when they are being analysed or when the objectives are being set. They fall short during implementation and, more particularly, due to the lack of proper project management. Equally, there are many publications on business processes, without any regard to the natural scientific explanation of process theory. Even though business process re-engineering (BPR) is discussed in project management circles it remains a mystery as to how this interrelates with organisational theory. Literature is abundant on research of the effect that the implementation of strategy has on organisational structure, but void on the interrelation of business processes and the role of project management. Particularly, on the integration and effect that strategy, structure, processes and projects have on one another. Of note is the fact that project management literature concentrates exclusively on the "PROJECT" and there is little research done on "MANAGEMENT" as it applies to the general management of an organisation.

This research analysed "MANAGEMENT" and "PROJECT MANAGEMENT" in an attempt to find the application and integration of strategy, structure, processes and projects in order to facilitate the development of a business.

Business Development:

A Project Management Approach

Management of strategy, structure, processes and projects

3.1. Introduction

In a book entitled "The Goal", E.M. Goldrat states that the goal of an organisation is to make money (Goldrat 1992: 40), even though the social issues of "making money" have been debated in literature since at least 500 BC. "For just as poets love their own works, and fathers their own children, in the same way those who have created a fortune value their money, not merely for its uses, like other persons, but because it is their own production. This makes them moreover disagreeable companions, because they will praise nothing but riches" (Plato 1968: 330).

Environmental and ethical issues today would question whether the only reason for the existence of a business is "to make money". The fact is that if a business does not "make money" it rapidly ceases to do business. In **Understanding Organisations**, Charles Handy expresses how "disappointed" he was in trying to find an efficient organisation. Efficiency, one could explain in terms of "making money". Instead, he found "the weighty investigation of trivia" and "patchy efficiency" (Handy 1981: 9). Organisational theorists have long been searching for organisational efficiency but have never quite been able to grasp the fundamentals, until quite recently when Tom Peters implied in his book **Liberation Management** that project management was the holy grail of organisational efficiency (Peters 1992: 3). That it might well be, but it leaves more questions than answers as to organisational structure and control which project driven organisations seem to discard.

Many more such questions arise which seem to have no answers, as there are very few writers and practically no researchers on the subject of the organisation as a collective of projects. CJ Higson in his book **Business Finance** begins to provide answers when he explains that an organisation can be seen as a collective of projects where the success or failure of projects would influence shareholders to invest in or withdraw capital from the organisation (Higson 1991: 4). The relationship between an organisation, its capital account and projects as an engineering discipline is a well-studied and relatively well-understood area of commerce. The influence of project management on the supply account and as a business process, is another matter altogether. There is virtually no research being done presently, very little knowledge available and the subject is also poorly understood.

Analysis of any company's annual report will show that the expenditure on the capital account is at most 30% of total expenditure and reflects only large capital projects. Supply account expenditure on average makes up 70% of total company expenditure and includes many small and medium business projects. This means that potentially more money is being spent on small and medium projects than on large projects, yet little research is being done on the management of a large number of small projects, which incur only supply account expenditure. If projects are ascribed four stages to their life cycle, capital expenditure (if any) takes place only in the third (implementation) stage. The other three stages proposal, design and close-out are covered predominantly by supply account expenditure.

Business process engineering and re-engineering projects spend only supply account money, and are therefore potentially more numerous, and spend far more money than all capital projects combined. Investigation showed that only large capital projects have been managed along formal project management lines, and only the capital portion of the work has been controlled. The present knowledge base of project management relies on first world industrial development, which represent only 10% of the money spent on projects (unpublished research done by Prof. JR Turner). Business process projects, representing a larger number of projects, spending more money and consuming most of organisations resources, have almost no knowledge base available in project

management, nor in pure management disciplines. Project managers can therefore be equated to Alexander the Great who in 500 BC wept because there were no more worlds to conquer, while half the known world had not yet been discovered

Construction projects as an engineering discipline make use of project teams, and are organised, controlled and led by a project manager who is responsible for the time, cost and quality of each project. In this instance, projects are managed singularly and the organisation manages many single projects rather than multiple projects. Research in multi-project management as a management discipline (Van der Merwe 1997: 223-234) concentrates on the supply account portion of an organisation with a social science perspective. The reasons for this are: firstly, it is a largely un-researched area; secondly, there is almost no knowledge available in this area; and thirdly, management theory does not recognise project management as a source of solutions.

Management by projects requires people throughout the organisation to function in project teams to achieve the project's objectives, which are to reach strategic objectives to the benefit of a single organisation. These team members work on many projects simultaneously. Each project is internal to the organisation for transformation or renewal purposes. Multi-projects are managed using supply account funding, or incur labour costs only. Formal project management tools and techniques have difficulty in coping with the demands made when managing by projects, as is evident in the many business process re-engineering projects and organisational transformation projects that have failed.

Management by projects makes special demands on the time that project team members have available. A general lack of understanding exists on how the time an individual person spends performing the activities on a project, can influence other projects and the functional organisation as a whole. Following the debate on the philosophy of time engineering (applying scientific principles) as reflected in the work of people such as Albert Einstein (it depends on your perspective) and Stephen Hawking (it exists in parallel), reveals just how difficult it is to manage time. Project time management (to be in charge of or to control) is one of the knowledge areas contained in the various project

management bodies of knowledge and usually refers to some form of PERT analysis or GANT chart. Scheduling activities does allow time management of the task to take place, but there is an essential element missing from these tools which would allow the individual person performing the task to realise how his available time impacts on the projects and on the organisation's demanded time. Resource histograms are utilised to try to solve this problem and they do work in the manipulation of steel and concrete or management of the task environment. However, internally focused management by projects needs a different approach.

3.2. Management process

3.2.1. Strategy

Strategy means: "the art of the general" (from the Greek *strategos*), and originally signified the purely military planning of a campaign. Until the 17th and 18th centuries, strategy was concerned with the aspects of fortification, manoeuvre, and supply. In the 19th and 20th centuries, with the rise of mass ideologies, conscript armies, global alliances, and rapid technological change, military strategy became difficult to distinguish from "grand strategy," which is the proper planning and utilisation of the entire resources of a society, military, technological, economic, and political (Goodman 1996: CD-ROM).

Military commanders and theorists throughout history have formulated what they considered to be the most important strategic and tactical principles of war. Napoleon I, for example, had 115 such principles while the Confederate general Nathan Bedford Forrest had but one: "Get there first with the most men." The historical roots of strategy date back to the origins of human warfare and the development of large-scale government. The dense tactical infantry formation of overlapping shields called the phalanx, existed in an early form in ancient Sumar in 3000 BC. The development of strategy parallels the growth, spread, and clash of civilisations; technological discoveries and refinements and the evolution of modern state power, ideology, and nationalism (Goodman 1996: CD-ROM).

The Mediterranean basin saw the dawn of modern military strategy. It was under such leaders as Philip II (382-336 BC) and Alexander the Great (356-323 BC) of Macedonia and Hannibal (247-183 BC) of Carthage that the first great strides were made in military science. Philip combined infantry, cavalry, and primitive artillery into a trained, organised, and manoeuvrable fighting force backed up by engineers and a rudimentary signalling system. His son Alexander became an accomplished strategist and tactician

with his concern for planning, keeping open lines of communication and supply security, relentless pursuit of foes, and the use of surprise. Hannibal was a supreme tactician whose crushing victories taught the Romans that the flexible attack tactics of their legions needed to be supplemented by unity of command, and an improved cavalry. The Byzantine emperors studied Roman strategy and tactics, and wrote some of the first essays on the subject (Goodman 1996: CD-ROM).

The Middle Ages saw a decline in the study and application of strategy with the exception of the great Mongol conqueror Genghis Khan. Napoleonic strategy was closely studied by the first great theorists of war, the Prussian general, Carl von Clausewitz and the French general Antoine Jomini. Clausewitz's "On War" (1908: 34), emphasised the close relationship between war and national policy and the importance of the principles of mass, economy of force, and the destruction of enemy forces. Jomini, on the other hand, emphasised occupying enemy territory through carefully planned, rapid, and precise geometric manoeuvres. Whereas Jomini's theories had influence in France and North America, Clausewitz's teachings in particular were influential on the great Prussian military strategists of the 19th century (Goodman 1996: CD-ROM).

A visit to any academic library will reveal that books on strategy probably take up most of the space in the management section. From the earliest writings found, knowledge of strategy, has been held in high regard. Sun Tzu, wrote in "The art of war" during 500 BC "All men can see the tactics whereby I conquer, but what none can see is the strategy out of which victory is evolved" which now translated and reprinted is finding favour with the modern manager (Tzu 1981: 40). Formal study of strategy within the context of the modern organisation did not get under way until the 1950s when the Ford Foundation and the Carnegie Corporation sponsored investigations into business school curricula. The resulting Howell Report suggested that "Strategic Management" be taught as part of business studies (Wheelen & Hunger 1998: 7).

The strategy making and strategy implementing process in business development is thought to consist of five interrelated managerial tasks:

- Deciding what business the company will be in, and forming a strategic vision of where the organisation needs to be going, infusing the organisation with a sense of purpose, while providing a long-term direction and establishing a clear mission.

- Converting the strategic vision and mission into measurable objectives and performance targets.

- Crafting a strategy to achieve the desired end results.

- Implementing and executing the chosen strategy.

- Evaluating performance, while reviewing new developments that could lead to initiating corrective adjustments in the long-term direction, in light of actual experience, incorporating changing conditions, new ideas, and new opportunities (Thompson & Strickland 1995: 3).

Modern business strategy deals with the matching of the activities of an organisation to the environment in which it operates. Strategic management is that set of managerial decisions that determines the long-term performance of a company. It includes strategy formulation, strategy implementation, evaluation and control. The study of strategic management therefore emphasises the monitoring and evaluation of environmental opportunities and threats in light of a corporations strengths and weaknesses (Wheelen & Hunger 1998: 7). Peters et. al. book "In search of excellence" (1992) popularised the subject and brought to public attention the large number of Fortune 500 companies that failed as a result of not adapting to changing environments in which they operate, resulting in an explosion of publications on strategy during the 1970s and 1980s.

Strategy is considered as having three main elements within it. There is strategic analysis, in which the strategist seeks to understand the strategic position of the organisation. Strategic choice that has to do with the formulation of possible courses of action, their evaluation, and the choice between them and strategy implementation that is concerned with the planning of how the choice of strategy can be put into effect, and the management of the changes required (Johnson & Scholes 1993: 12).

Europe's best selling strategy text "Exploring corporate strategy" by Johnson & Scholes (1993: 10) defines business strategy as: *"the direction and scope of an organisation over the long term: ideally, which matches its resources to its changing environment, and in particular its markets, customers or clients so as to meet stakeholder expectation"*.

Wheelen & Hunger (1998: 11) state that the process of strategic management involves four basic elements:

- ❑ environmental scanning
- ❑ strategy formulation
- ❑ strategy implementation
- ❑ evaluation and control.

At the corporate level, the strategic management process includes activities that range from environmental scanning to the evaluation of performance. Top management scans both the external environment for opportunities and threats, and the internal environment for strengths and weaknesses. The factors that are most important to the corporation's future are referred to as strategic factors and are summarised with the acronym S.W.O.T. standing for Strengths, Weaknesses, Opportunities, and Threats. Once these are identified, top management then evaluates the strategic factors and determines corporate mission. The first step in the formulation of strategy, a statement of mission, leads to a determination of corporate objectives, strategies and policies. These strategies and policies are implemented through programmes, budgets and procedures. Finally, performance is evaluated, and information is fed back into the system so that adequate control of organisational activities is ensured.

An alternative view, supported by the top selling strategic text in Europe, show that when defining the strategic process, the following steps are used:

1. Strategic Analysis
    - ❑ External environment analysis

- ❏ Internal resource analysis
- ❏ SWOT analysis

2. Strategic objectives
   - ❏ Generate strategic options
   - ❏ Evaluation criteria
   - ❏ Screening options
   - ❏ Strategic evaluation
   - ❏ Select strategic objectives

3. Strategic Implementation
   - ❏ Planning and allocation of resources
   - ❏ Organisational structure and design
   - ❏ Managing the change
   - ❏ Project management (Johnson 1993: 23).

The strategic management process is about moving the organisation from its present position, to a future strategic position, in order to exploit new products and markets. The strategic analysis process investigates the current and future positions. The strategic objective setting process is about planning the trip, its duration and effort. The strategic implementation process is about getting the organisation to move.

3.2.2. Structure

Mintzberg's (1979: 66) definition of organisation structure states: "the sum total of the ways in which the organisation divides its labour into distinct tasks and then achieves co-ordination amongst them". This definition recognises two essential aspects of structure, integration and differentiation. Integration refers to coordinating tasks whereas differentiation involves breaking up the work to be done into tasks. The structure of an organisation is usually depicted by means of an organisational chart. This chart shows authority relationships in the chain of command, formal channels of communication,

formal work groups and formal lines of accountability (Lawrence & Lorsch 1967a: 1-47).

A formal organisational chart presents the official structure explicitly sanctioned by the organisation. Superimposed on these relationships are informal or *de facto* relationships that are not necessarily sanctioned by the organisation, although they might be perceived to actually exist, and are thus considered by some, to be the real structure. The informal structure evolves from people working in the organisation rather than from being officially established. This comes about because of faults and imperfections found in the **formal processes** resulting from the **formal structure**. The informal organisation can consist of informal work groupings, informal leaders, informal channels of communication, informal power and status differentials (Hodge & Anthony 1991: 290-291). Organisational analysis involves a critical examination of the elements that make up an organisation's structure and processes.

The concepts of organisation design and organisation development are often confused. Organisation development refers to changes an organisation makes so that it can better state and achieve its strategic goals. It is a way of achieving organisational effectiveness and efficiency. It may involve a change in structure, but it also usually involves training and development programs for managers and other personnel. It can also include a comprehensive review of organisation policy and processes. As a part of these organisation development programs, an organisation can, and often does undertake a comprehensive study of its design to determine if the organisation can be redesigned to find more effective and efficient processes to reach its strategic goals.

Organisational structures have two extremes: a) tall structures; many layers of management relative to the number of people in each layer, and b) flat structures; few horizontal layers of management in the organisation. Organisational structures can be differentiated into six parts; similarity of work or function, product, geography, market, processes and equipment.

Tall structures

Max Webber built on the work of Adam Smith to specialise labour, and described bureaucracy as a way to improve the organisation. The Burns & Stalker study labelled this as a mechanistic structure, in that organisations had defined decision – authority relationships and rules to the point of almost mechanising them. Bernard Reimann finds that one of the limitations of the bureaucratic mechanistic structure is that it tends to be slow to change and tends to encourage rigid adherence to policy and rules in the face of new requirements (Reimann 1973: 462-471).

Flat structures

The organic or adaptive context tends to have characteristics which are the opposite of the mechanistic or bureaucratic context. In overcoming the shortcomings of bureaucracy, it is a more appropriate means for integrating organisational tasks for those organisations facing a dynamic environment. Burns & Stalker (as quoted by Hodge & Anthony 1991: 328) found, for example, that "organic systems are adapted to unstable conditions, when problems and requirements for action arise which cannot be broken down and distributed among specialist roles within a clearly defined hierarchy. Individuals have to perform their special tasks in the light of their knowledge of the tasks and of the firm as a whole".

Even though the organic/adaptive structure overcomes many of the limitations of the mechanistic structure, it is not necessarily true that the organic/adaptive is the better structure. Organisations facing a shifting heterogeneous environment will find the organic/adaptive structure more effective, but organisations facing a stable, homogeneous environment will find the mechanistic structure suitable. Today's organisations face a shifting, heterogeneous environment causing executive officers throughout the world to succinctly state the case for organic/adaptive structures (Hodge & Anthony 1991: 329). Attitudes towards reorganisation are, that in a rapidly changing marketplace, the corporation should change and grow in response to market needs. This change and growth requires reorganisation. Any corporation in a dynamic environment must therefore be prepared to change.

The pace of strategic change has also accelerated. In the past, strategies were developed over 5, 10 or 15 years. Today short-term strategies are to be implemented within weeks and long-term strategies never have a window of opportunity of more than three years. "There is nothing permanent except change" Heraclitus (550 BC) quoted by Diogenes Laertius (1969: 37).

Organisational Forms

Organisational structure determines the speed of adaptability to changing environments. These structures take on many forms which all have different adaptations to assisting the speeds at which change can be brought about. Arranged in order from slowest to fastest these are:

Line structure: Organised around tasks that are involved in producing and distributing primary products the organisation creates.

Line and staff structure: As organisations grow, they add supportive staff to handle the secondary operative work involved in the production of a secondary product.

Functionalised structure: Originally developed by Taylor it is a line and staff structure that has been modified by the delegation of managerial authority to personnel outside their normal spans of control (Hodge & Anthony 1991: 332).

Matrix structure: First described by Jay Galbraith (1971: 29-40), as used in military weapons production, it superimposes a product or project structure onto existing function based structures. Resources from vertical units are assigned to horizontal units based on the need in each unit. There are three different kinds of matrix structures: product structure, project structure and programme structure.

Multidimensional matrix structures: developed by Dow Corning who views the matrix organisation as a four dimensional system composed of:

- Profit centres: the different businesses of the company along product lines.
- Cost centres: the functional entities such as marketing, manufacturing, and research, as well as supportive activities such as communication, legal and administrative services.
- Geographical areas: local or international areas considered for profit and cost.
- Space and time: fluidity through time, as the multidimensional organisation is constantly changing (Hodge & Anthony 1991: 333).

Disadvantages of the matrix structure

It is of significance to study the disadvantages of the matrix structure.

- The structure requires the project, product, or program managers to work co-operatively with the functional heads to handle conflict. It also requires the general manager of all these workers to be able to mediate conflict between program, project, or product managers and functional heads when they cannot work out problems among themselves. The appropriate delegation needed under the matrix may not be forthcoming in some organisations.
- Matrix structure, especially project matrix structure, may require a lot of relocation of personnel, which can cause behavioural traumas (e.g. breaking and forming new work and friendship groups, frequently moving families who need to form new superior-subordinate relationships based on mutual trust). Some individuals may have difficulty coping with these activities.

If explicit authority is not assigned to project, program, or product managers vis-à-vis functional heads, the unity-of-command principle can be violated. Explicit authority differentiation between the matrix managers and functional heads needs to occur so people under the matrix know to whom they are accountable for what and for what time period (Hodge & Anthony 1991: 337).

Linking-pin structures: developed by Likert, this structure holds that subordinate managers do not just link a superior with a subordinate's subordinate, they link a team of managers with a team of subordinates (Likert 1967: 85).

Strategic business units (SBU): described by Digman (1990: 157) as organisational units established primarily for strategic planning and decision making purposes. SBUs are comprised of a group of related products or services directed to a distinct group of customers or clients, they are used mainly in diversified multiproduct/multiservice organisations. SBUs are structured differently for strategic planning purposes than for operations.

Ad-hocracy: Discussed by Alvin Toffler (1971: 119) these are non-permanent organisations which are set up to examine a particular issue and disband once their report is made. These organisations function on a pure project basis.

Joint Venture: Structured like an ad-hocracy they also contain elements of the matrix structure. The difference is that two or more organisations pool resources to accomplish a particular project (Hodge & Anthony 1991: 342).

Laissez-faire: These are loose collections of people who are brought together for a period of time under a relatively loose style of management and control to satisfy the desires of the members rather than the needs of a client (Hodge & Anthony 1991: 342).

Industrial democracy: Known in Europe as co-determination, the structure is like laissez-faire, but more structured, as labour and management have a joint role in running the organisation (Hodge & Anthony 1991: 342).

Virtual structures: These are essentially formal structure-less organisations working in a distributed fashion through the use of information technology. Informally some structure does exist along the lines of protocol rather than on control as in this form of organisational structure there is no power by which the team is controlled the team exists only by mutual consent (Adams & Adams 1997:1).

From this it can be clearly seen that organisational structures have evolved from tall rigid arrangements to infinitely flat flexible affairs. The main reason for this is a

necessity to cope with ever increasing and more rapid changes to strategic direction of organisations as demanded by changing market conditions.

3.2.3. Processes

Systems or processes are another matter altogether. There seems to be no regard for the natural scientific definition of a process where organisational theory is concerned. Each book has its own definition, some contrary to the use of proper English.

Scientific process:

The Academic Press Dictionary of Science and Technology defines a process as follows: "Process- to perform a series of activities, or the series itself. Specific uses include: computer technology

- ❑ To perform operations on data in a computer.
- ❑ In multiprogramming, a program that is in a state of execution or would be executing if all of its required resources were available.
- ❑ A systematic procedure designed to perform some action, engineering a continuous or periodic series of actions organised and conducted to achieve an end result such as a chemical manufacturing process.
- ❑ Mathematics a sequence of random variables defined on a common probability space."

In the revised edition (1989) the American National Standard for Industrial Engineering Terminology a process is defined as: "A systematic sequence of operations to produce a specific result."

This research finds it important to not only understand what processes are, but to also understand how they are measured and controlled. No better explanation of good scientific principles can be found than that expressed in the Encyclopaedia of Chemical Technology by Kirk-Othmer, where it is stated that in order to operate a process in a

safe and efficient manner, it is essential to be able to control the process at a desired state or sequence of states. This goal is usually achieved by implementing control strategies on a broad array of hardware and software. **"The state of a process is characterised by specific values for a relevant set of variables, e.g. temperatures, flows, pressures"** (Kirk-Othmer 1996: 129). Both external and internal conditions, classified as uncontrollable or controllable, affect the state. Controllable conditions may be further classified as controlled, manipulated, or not controlled (Kirk-Othmer 1996: 129-174).

Process systems:

Because of the large number of variables required to characterise the state, a process is often conceptually broken down into a number of subsystems, which may or may not, be based on the physical boundaries of equipment. Generally, the definition of a system requires both definitions of the system's boundaries i.e. what is part of the system and what is part of the system's surroundings, as well as knowledge of the interactions between the system and its environment, including other systems and subsystems.

The system's state is governed by a set of applicable laws supplemented by empirical relationships. These laws and relationships characterise how the system's state is affected by external and internal conditions. Because conditions vary with time, the control of a process system involves the consideration of the system's transient behaviour. Process systems are broadly categorised as self-regulatory and non-self-regulatory. The former is one in which a change in an external condition can cause the system to move from an initial steady state to another steady state without additional external intervention. The latter, a non-self-regulatory process system, does not achieve another steady state without additional control action once the first external change occurs.

Controlled Conditions, Correcting Conditions, and Control Algorithm:

The basic elements of process control are the conceptual definition of the process system, the selection of the controlled conditions, the correcting conditions and the disturbance sources that need to be addressed, and the selection of the control algorithm.

Control Hierarchy:

The goal of process control is achieved by adjusting the values of an appropriate subset of process variables, i.e. the correcting conditions, or manipulated variables, so as to change the values of other process variables. That is, the controlled conditions or variables, to compensate for variations and disturbances in the process system. The controlled variables are selected so that their values characterise both the state of the process system as well as the process and operating objectives. The manipulated variables are selected so that these can easily be manipulated to affect the controlled variables. The control algorithm defines how the manipulated variables are to be adjusted to bring the controlled variables to their desired values, that is, to bring the process system to its desired state.

Generic Control Strategies:

The two generic strategies for process control are feedback and feed forward control. Most process control strategies are based on one or a combination of these strategies. In industry, plant optimisation control level applications determine the values of key variables that optimise the overall plant material and energy balance. The control applications at the local optimisation and supervisory control level, on the other hand, focus on subsystems within the overall plant. These subsystems usually consist of a single, or at most a few, highly interactive pieces of equipment. Most of the applications at this level are aimed at optimising the subsystem within an operating window defined by soft constraints. For example, values determined by the plant optimisation level applications, and hard constraints, e.g. equipment material limits.

Often the optimal operating point of the subsystems is against one of the constraints of the operating window. Hence, many of these control applications employ a constraint control strategy, i.e. a strategy that pushes the subsystem against the closest active constraint. Typically the closest currently active constraint changes with time and situations, e.g. between day and night, different weather conditions, different operating states of upstream equipment, etc. The constraint control strategies continually make minor adjustments to keep the substantials along the active constraint, or near optimum.

Process Measurement:

The most commonly measured process variables are pressure, flow, temperature and level. The selection of the proper instrumentation for a particular application is dependent on factors such as the type and nature of the product involved, relevant process conditions; range ability; accuracy and repeatability required; response time; maintainability and reliability.

Instrumentation:

Instruments are components of a control loop, which provides the direct interface between the process and the control hierarchy, which serves as the fundamental source of information about the process state and the ultimate means by which corrective actions are to be transmitted to the process. The function of the process measurement device is to sense the value, or changes in value, of process variables.

A natural law thus exists in that if processes are not continuously and incrementally adjusted and improved they naturally deteriorate to a point where they stop functioning.

i) Business Processes:

Not a company exists whose management does not "want an organisation flexible enough to adjust quickly to changing market conditions, lean enough to beat any competitor's price, innovative enough to keep its products and services technologically fresh, and dedicated enough to deliver maximum quality and customer service" (Hammer & Champy 1993: 7). It would seem that the results companies achieve are often very different from the results that their management desire.

Geary Rummler and Alan Brache, in their book entitled "Improving performance: how to manage the white space on the organisation chart" have found the process level to be the least understood and least managed level of business enterprise performance. "Processes roll along or more frequently stumble along in organisations" (Rummler &

Brache 1994: 44). They found that a tremendous amount of learning and improvement could result from the documentation and examination of the linkages depicted in a process map as between every input and every output a process exists (Rummler & Brache 1994: 45). Here business processes are defined as "a series of steps designed to produce a product or service." Most processes they state are "cross-functional, spanning the white space between the boxes on the organisational chart" (Rummler & Brache 1994: 45).

Some processes result in products or services that are received by the organisation's external customers, and are called customer processes. Other processes produce products or services that are invisible to the external customers but essential to the effective management of the business. These are referred to as administrative processes. Further categories of processes exist called management processes. These include actions managers should take to support the business processes, Management processes include goal setting, day-to-day planning, performance feedback, rewards, and resource allocation. "A process can be seen as a value chain by its contribution to the creation or delivery of a product or service; each step in a process should add value to the preceding step" (Hunt 1996: 3)

In their book "Re-engineering the corporation", Hammer & Champy (1993: 11) state that most companies today, no matter what business they are in, or how technologically sophisticated their products and services are, can trace their work styles and organisational roots back to the prototypical pin factory that Adam Smith described in "The Wealth of Nations", published in 1776. Smith recognised that the technology of the industrial revolution had created unprecedented opportunities for manufacturers to increase worker productivity and thus reduce the cost of goods, not by small percentages, which one might achieve by persuading an artisan to work a little faster, but by orders of magnitude. Hammer & Champy (1993: 35-36) also state that the word process gives most managers the greatest difficulty. "Most business people are not "process-oriented"; they are focused on tasks, on jobs, on people, on structures, but not on processes." They define a business process as "a collection of activities that takes one or more kinds of input and creates an output that is of value to the customer".

Under the influence of Adam Smith's notion of breaking work into its simplest tasks and assigning each of these to a specialist, modern companies and their managers focus on the individual tasks that make up a process and tend to lose sight of the larger objective. "The individual tasks within a process are important, but none of them matters one whit to the customer if the overall process doesn't work, that is, if the process doesn't deliver the goods" (Hammer & Champy 1993: 35). In combining what is know of scientific processes and business processes one can see that both are made up of an input, process, out-put relationship.

If it is considered that the state of a process is characterised by specific values for a relevant set of variables, temperatures, flows, pressures and levels. And that the condition of the process can be measured by instruments and the reading thus obtained, and this can be used to take corrective action or to exercise control (Kirk-Othmer 1996: 129) then one realises just how much engineering processes and businesses have in common.

For comparison purposes, a simple engineering process of water, flowing through a pipe, is used. If the pressure is increased, flow increases to a point. Instruments will tell us that that once a certain rate of flow has been achieved no further increase in flow is experienced, irrespective of how much additional pressure is applied. Instead, temperature increases and as temperature increases it further increases pressure. If control is not exercised to reduce this pressure, the process will destroy itself.

Using a business process: if the pressure on employees increases, workflow increases to a point. Behavioural instruments show that that once a certain rate of workflow has been achieved no further increase in flow is experienced, irrespective of how much additional management pressure is brought to bear. Instead, behavioural temperature increases and as temperature increases it further increases pressure. If control is not exercised to reduce the pressure, the workers will destroy the process.

This follows what content and process theories illustrate when describing the behaviour of individuals within the organisation (Gibson *et al.* 1985: 147). It is exactly at this point where business processes fail: no measurement, no control, no maintenance and no incremental improvement. Gibson is of the opinion that the natural scientific description of a process illustrates everything man needs to know about how to manage a business process. The difference is that in a business, one is dealing with people. Processes exist in the organisation in three different forms. There are the formal processes, then there are best practices and then there are the real processes. The first is used by management, the second by consultants and the third by workers –apparently with no connection between the three forms.

This research has found that *formal processes* come about when management reserves for themselves the sole right to good ideas. *Real processes* come about when workers who are doing the work experientially come up with the ideas. *Best practices* arise when consultants, through questioning workers, see the shadow of a real process and then sell it to management as the existence or substance of a best practice process.

Studies done by Professor Edgar Schein of MIT and published in his twin volumes "Process Consultation", clearly illustrate the need to study processes in organisations by actual observation, rather than by questionnaires. Studies of organisational differentiation and integration have shown that four levels of involvement are present in performing the work of the organisation. These are: decisionary, steering, anchoring and operational. One could explain these levels of involvement as: those who create the **VISION**, those who set the **OBJECTIVES**, those who **IMPLEMENT** ideas and, those who perform the **WORK** (Lawrence 1967: 157). The two middle levels are normally referred to as management, with the key difference being in the level of preoccupation in the visionary process of the organisation. Studies of Group Dynamics done by Bales (1950, 1979), Carter *et al.* (1951), Chapple (1940), Lewin (1947), White & Lippitt (1953) who studied groups from anthropological, sociological and psychological perspectives, showed the effects of different kinds of leadership on group morale and productivity (Schein 1988a: 17).

This means that those who are doing the work have their efficiency affected by management i.e. management can either help the workers to get the work done or they hinder the workers in the performing of their duties. These studies of group dynamics clearly showed that effective and efficient workers have two kinds of leader, a task leader (technical leader) who helps the group to do its job and a "socio-emotional" leader (process leader) who helps to build and maintain good relations among group members (Schein 1988a: 18). Only rarely were these two kinds of leader the same person.

Studies done by Arensberg, Dalton, Dickson, Homans, Mayo, Roethlisberger, Schein and Whiteand into Group Interpersonal Relations, showed that how people actually relate to each other bears only limited similarity to how formal organisation structures says they should behave. These studies illustrate the need to study human processes in organisations by actual observation rather than what people say in interviews or on survey questionnaires (Schein 1988a: 18).

Process consultation developed by Schein sets out to define how the roles of the "technical leader" differs from the "process leader" and how they influence the performance of the workers. The formal definition of process consultation is "a set of activities on the part of the consultant that help the client to perceive, understand, and act upon the process events that occur in the clients environment in order to improve the situation as defined by the client" (Schein 1988a: 11).

A process consultant (i.e. process leader, socio-emotional leader) helps the "technical leader" (i.e. task leader or functional manager) to assess the consequences of different alternatives or suggest alternatives that have not been considered. Process leaders do not have "pat" answers or expert solutions. They assist in adding perspective. Detailed analysis of small group problem solving showed that groups best develop solutions with the aide of a process leader in conjunction with the technical leader and the team of workers (Schein 1988a: 11).

Functional management has the advantage that task leaders (general managers) are usually thought of as having formal responsibility for defined organisational outcomes; they have line bosses, and they have specific resources at their disposal with which to exercise the authority they have been given. They are accountable, and this accountability cannot be delegated. Project managers (process leader) have delegated resources from across the functions that still have functional demands placed on them. The project team members must balance loyalty to the cost centre that pays their salary with the demands of the project. They are deemed to be responsible for the outcome of the project but rarely are they seen to be accountable.

This brings one to the realisation that the management of business processes and the management of projects are interrelated.

In fact the process team can be directly equated with the project team. Both teams work across functions. From the natural scientific definition of a process, a natural law exists in that if processes are not continuously and incrementally adjusted and improved they naturally deteriorate to a point where they stop functioning. In business, it is found that in order for a process to exist, one must identify why the process is required and why one needs to be involved. Conversely, if the need for a process cannot be identified, no continual incremental improvement is required, and there is no need for people to be involved, as the process has no reason to exist.

This research found that business processes are governed by the following rules:

1. There must be a clear purpose to the process, which is the goal (non-specific) that it is trying to achieve.
2. Incremental improvement has to take place during the process of reaching the goal.
3. Each incremental improvement must be a project which involves people.

From these rules it is clear that processes are governed by a group of projects that bring about incremental improvement.

3.2.4. Projects

At the 28th annual seminar of the American Project Management Institute held in Chicago on 29 September to 1 October 1997, Zeitoun & Heimy (1996: 593) presented a paper entitled "the pyramids and implementing project management processes". The intent of the paper was to show that it is possible that the building of the pyramids could have followed the process of project management outlined in the American Project Management Institute's 1996 publication "A guide to the project management body of knowledge." Here, a project is defined as "a temporary endeavour to create a unique product or service" and project management is defined as "the application of knowledge, skills, tools and techniques to project activities in order to meet or exceed stakeholder needs and expectations from a project" (PMBOK 1996: 4)

As was pointed out in Chapter 2, most authors state that project management had its origin in 1958 with the development of the PERT methodology (Kerzner 1994: 602). Project management as an engineering discipline in architecture and production can be seen as a mature issue as it is well used and understood in these areas. Industrial development projects such as chemical plants, power stations, bridges, dams, and production plants, to name only some, use human resources in a dedicated centralised team working full-time on one project at a time to manage the project. Implementation is performed by using contractor's staff, and never one's own staff. Project duration is in years and all project costs are of a capital nature as an investment, which are calculated to have a payback period, or return on investment.

Management effort is spent in the implementation stage where management of change to the original plan is a key activity. Project risk is quantified prior to gaining financial commitment to the project by the sponsor, and once gained, this risk does not feature. Product risk is quantified in the planning stage as it is originated by the design, and impacts on quality, time and cost in the implementation stage through conventional processes.

Design is completed formally by an in-house design team or by a contractually appointed external team. Contract management always follows a specification preparation, a tender evaluation and a contract negotiation process on these projects. Implementation is always completed by a contractor, with the client administering the contract on site. Many formal tools and techniques exist, and are frequently used to complete the task. Project close out is not normally seen as part of the project, neither is commercial operation.

On the other hand, British Standard 6079 of 1996 (BS6079) defines a project as "a unique set of co-ordinated activities, with definite starting and finishing points, undertaken by an individual or organisation to meet specific objectives within defined schedule, cost and performance parameters" (BS6079 1996: 2). Project management is defined as the "planning, monitoring and control of all aspects of a project and the motivation of all those involved in it to achieve the project objectives on time and to the specified cost, quality and performance" (BS6079 1996: 2).

Here clear distinguishing factors are the "individual" and "motivation" laying emphasis on managing people who manage the work of the project instead of on "tools and techniques". Business development projects involve bringing business processes, strategy, any change, and restructuring into being or modifying existing aspects internal to the organisation. Human resources used to manage these projects involve people from distributed cross-functional teams, lateral teams and virtual teams working on many projects concurrently. Predominately in-house staff is used with some input by consultants. Project duration is in weeks or days and most often, there is no money spent on capital equipment. Costs incurred are in terms of labour man hours spent.

Most management effort is spent in the planning stage due to very short implementation periods, and changes to the original plans result in almost automatic failure. Managing people is the key activity as the people manage the tasks. Project risk requires alignment with strategic direction, and changes to marketing windows of opportunity remain a constant threat throughout the project. Product risk is quantified in the planning stage as

part of design, and if featured during implementation, negatively influences time, cost and quality.

A team compiled from management and contractually appointed consultants complete the design. During the planning of the project, contracts are entered into between departments for the supply of labour and are a feature of these projects. Contracts for supply, delivery and installation, as seen in industrial development, are an extremely rare occurrence on successful business development projects. The same team, which did the design, completes implementation. Use of tools, techniques, processes, procedures, methodology and models do not exist to a large extent, and are not often used. Here effort is specifically directed at the motivation of those involved with communication, and time management is the key to success. The commercial operation stage of the project is characterised by ongoing modification and changes to project deliverables, often leading to obscuring the end of the project.

As shown in 3.2.3 above, business processes are continuously incrementally improved in order to remain in use. Employees using real processes all day long, realise improvements to these processes, and request improvements as projects. The result is that if all requests for improvements from management, staff, customers and suppliers are seen as requests to improve working processes, then by logical deduction these requests contain the evidence of the processes being used or at least those that are used.

To identify these processes each request should be turned into a project where the project title needs to correctly, and unambiguously define the measurable end goal and beneficial change of the project, as stated at the end of the implementation stage of the life cycle. "Begin with the end in mind" (Covey 1990: 95). When this has been done the collective project titles contain processes that are used and in need of repair.

As part of this research, processes where identified following this convention at an engineering company identifying 137 projects concerned with accommodation. Closer investigation revealed 23 people in the organisation dealing with accommodation, revealing a high percentage of temporary staff used. A switch to more permanent staff,

and purchasing a building in which to house short term staff, not only resulted in improving effectiveness of production, but also negated the need for the 23 staff members to be involved in these projects.

Appling once-off corrections may change the process or identify a new process that will be the true process requiring incremental improvement. Once these projects have been achieved, new projects may once again change the process. This relationship between the process and the projects needs to be understood and accepted, as the end goal of the process is not directly accessible. The projects therefore seem to meander towards the goal of the process by applying continuous incremental improvements, of which water logic by Edward De Bono, is a good example (De Bono 1991: 33-45). Scientific processes are continuously incrementally improved through controlled adjustments to flow, pressure, temperature and levels of equipment. Business, processes are continuously incrementally improved through controlled adjustments to flow, pressure, temperature and levels of people.

This aspect of the relationship, is revealing project management as the point of departure for all management theory, where management manages the behavioural processes of people, who manage the continuous incremental improvement of business processes in the organisation through projects that guide the business process to address the change in the strategic direction of the organisation.

The contribution that knowledge of managing projects can make to management at large is greatly underrated, and generally poorly known. For years, project management was ridiculed in business development as a low-tech, low-value and questionable activity. Only recently has it been recognised as a central management discipline. Major companies now use project management as their principal management style. Management by projects has become a powerful way to integrate organisational functions and motivate groups to achieve higher levels of performance and productivity (Peters 1992: 5). Literature on modern organisational theory refers to United States of America - Military Department of Defence programmes during the 1960s, developing

new forms of organisational structure referred to as **Matrix structures** described by Galbraith (1971: 29-40), as used in military weapons production, it superimposes a product or project structure onto existing function based structures (Morris 1997: 213). Resources from vertical units are assigned to horizontal units, based on the need in each unit. Three different kinds of matrix structures are referred to as product structure, project structure and program structure.

These structures are derived from the role of differentiation and integration in organisational theory. As discussed in 3.2.2, differentiation splits up authority into horizontal levels in the organisation so that each level has more authority than the level below it. At the same time as an organisation differentiates itself, it must also integrate activities into sets of tasks performed as a co-ordinated whole. The span of control in management theory refers to the number of immediate subordinate positions that a superior position controls. The matrix structure can be seen as the cross over point between tall versus flat structures. Differentiation in the matrix is split, not only horizontally, but vertically as well, while work is integrated across functions in the organisation.

During this research, the author discovered while scanning literature, that most management books separate the work or task being performed, from the management of the person performing the work. Using Schiens research as pointed out on page 32 above, managers can be seen as task technical leaders and the human resources practitioners can be seen as socio-emotional leaders.

> **If business development is to prove anything, it is that the successful outcome of any change in the organisation can only be achieved when business processes and human behavioural processes converge in the person of the project manager.**

3.3. Project management of business development

3.3.1. Organisational structure

If an organisation manages many individual projects, each with its own dedicated project manager, there will inevitably be little or no overall control of the projects. Further, project management will overrun the organisation and take-over every function in the organisation. This is a poor situation, although some would disagree. The organisation still has its functional needs. The question now becomes: "How is the functional organisation married to the multi-project organisation?" This problem is not easily considering that at the 12th. INTERNET International Expert Seminar, Eric Gabriel (President) said in his closing address: "Multi-project control has been a topic in our Congresses and Seminars for many years. I don't think we have ever really solved the severe problem of integration of multi-projects into traditional functional hierarchical organisations" (Gabriel 1988: 1).

Figure 3-1: Functional organisation position of individual

```
                          ┌──────────┐
                          │ Director │
                          └──────────┘
      ┌───────────┬───────────┼───────────┬──────────────────┐
┌────────────┐ ┌──────────┐ ┌───────────┐ ┌───────┐ ┌────────────────┐
│ Production │ │Operations│ │ Marketing │ │ Sales │ │ Administration │
└────────────┘ └──────────┘ └───────────┘ └───────┘ └────────────────┘
  ┌ J Crick     ┌ A Bundy    ┌ L Dean      ┌ K Gold   ┌ A Stone
  ┌ L Candy     ┌ J Rock     ┌ R Grey      ┌ S Blue   ┌ V Body
  └ P Wizard    └ C Clark    └ B Rose      └ F White  └ I Shad
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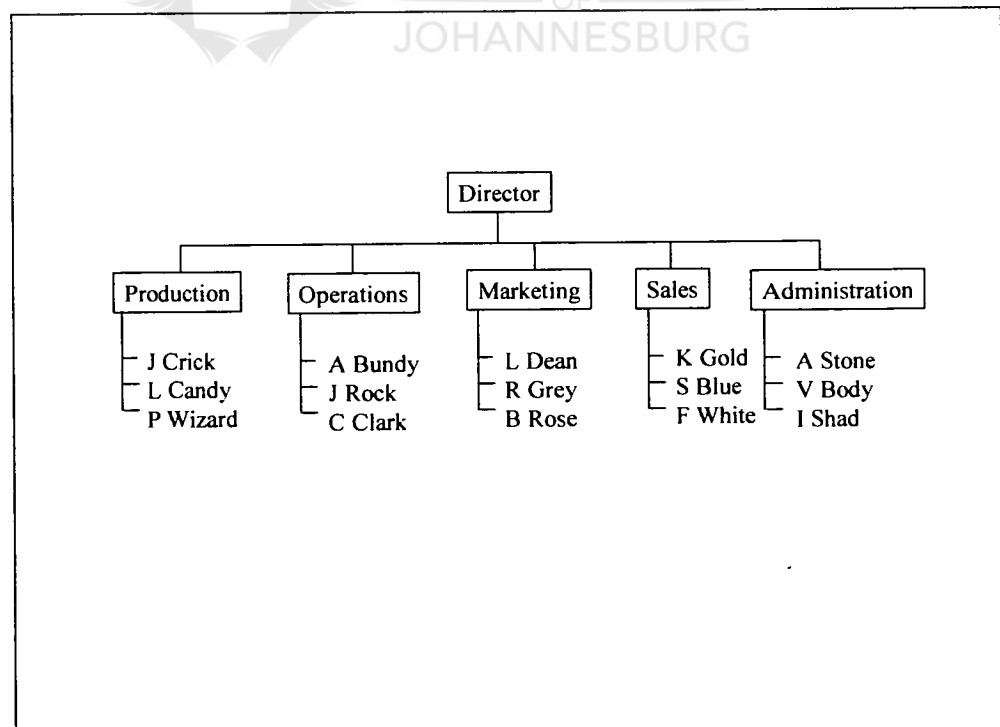
Source: Van der Merwe 1997: 224

In order to develop a solution to this problem one must first investigate the relationship that exists between the organisation, the individual and the projects. Consider the functional organisation **(Figure 3-1)** and the position each individual occupies within the organisation.

To find the relationship each individual has within each project, it becomes necessary to re-draw the organisational diagram on its side so that each individual employed can have his name in the heading of a column as in **figure 3-2,** adding the individual projects and showing the involvement of the individual people with the projects, while retaining the functional hierarchy. The picture now displays the relationship between the organisation, the project and the individual. The make-up of the project team can be seen in the rows, and the extent of project involvement can be seen in the columns.

Figure 3-2: Position of the individual and project

	Production			Operations			Marketing			Sales			Administration		
	J Crick	L Candy	P Wizard	A Bundy	J Rock	C Clark	L Dean	R Grey	B Rose	K Gold	S Blue	F White	A Stone	V Body	I Shad
Project One	☆			☆							☆			☆	
Project Two		☆		☆									☆		
Project Three	☆			☆						☆					☆
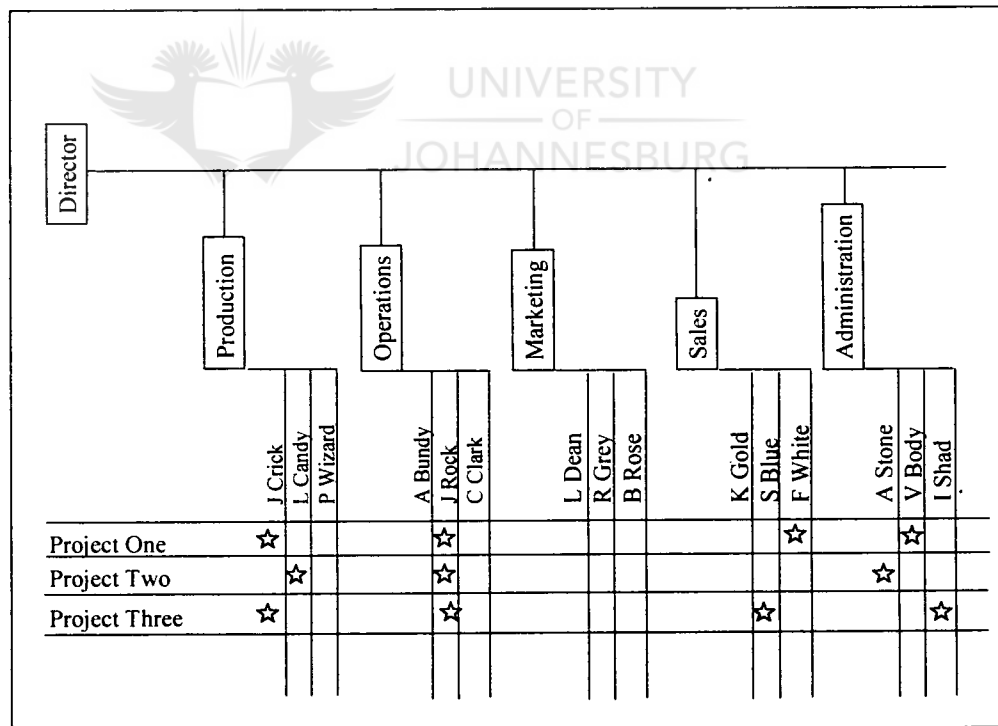
Source: Van der Merwe 1997: 225

The organisation can be expanded on the horizontal plane while projects can be added on the vertical plane. To manage the projects in such a way as to gain overall control of the projects, use is made of the sponsor, champion and manager (Turner 1996: 53). The sponsor is the owner of the product which the project is to produce. As such he is also the person whose budget is utilised to finance the project.

The champion fulfils the duties of both *technical expert* and *project leader* for the project. He represents the sponsor on the project team and defends the sponsors cause, hence the name "champion". The champion is selected from the department which will best serve the sponsor's interest, or is the person who originates the project.

The manager brings to the project team project management procedural expertise. Further, he guides the team by fulfilling the role of **facilitator, educator** and **consultant**. The position of the manager on the project team **is not full time,** as the team is capable of managing the work while the manager assists other teams. **It is in this concept that true multi-project management is realised.**

No other method of project management would allow the manager to have the personal time available to move freely amongst numerous simultaneously occurring projects giving praise where it is needed, assistance where things are going wrong **and staying out of the way of the people who are doing their work**. This is achieved by using the model presented in **figure 3-2** to show the project organisation by indicating the position of the sponsor, champion, team members and project manager as in **figure 3-3.**

Figure 3-3: Make up of the project team

	J Crick	L Candy	P Wizard	A Bundy	J Rock	C Clark	L Dean	R Grey	B Rose	K Gold	S Blue	F White	A Stone	V Body	L Shad	Manager
Project One		C											S	T		★
Project Two	T						C			S		T		T		★
Project Three				T	S		T			C				T		★
Project Four	S									T			C			★
Project Five				T			C			T					S	★
Project Six	T			C			S									★

S - Sponsor

C - Champion

★ - Project Manager
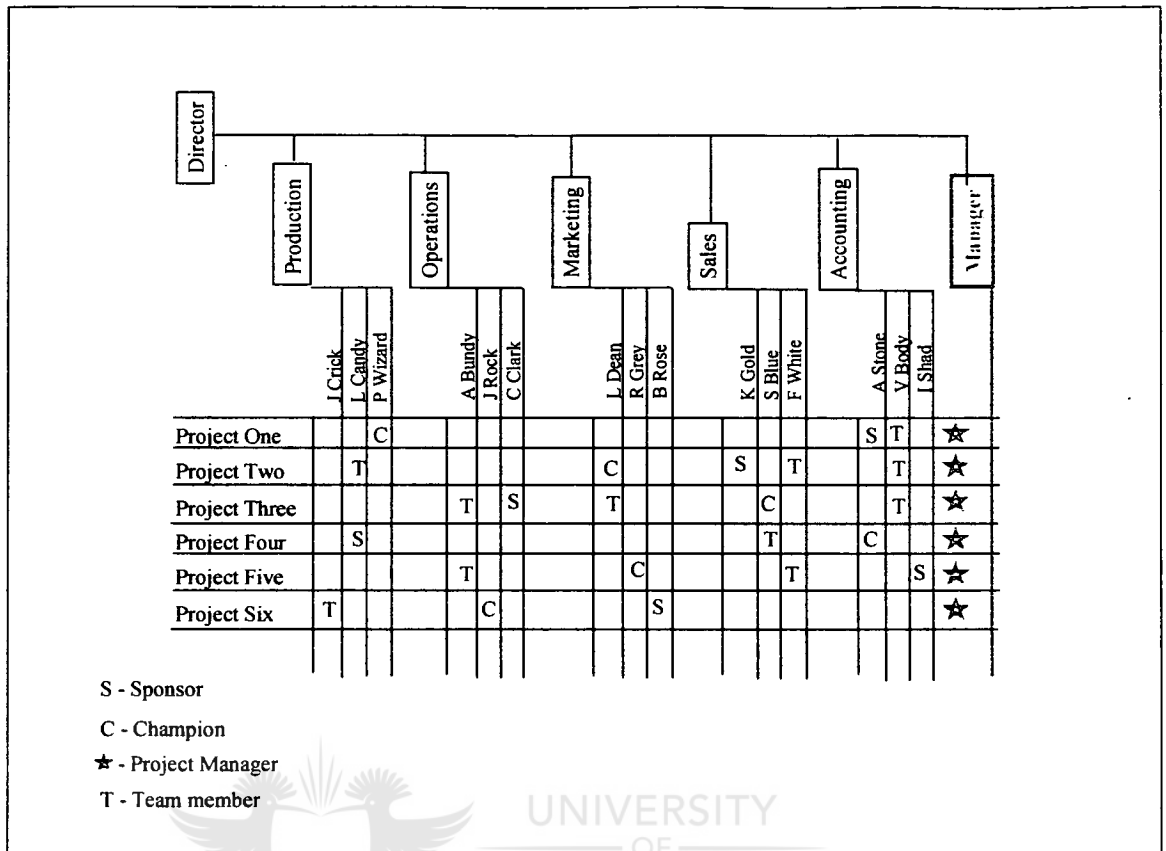
T - Team member

Source: Van der Merwe 1997: 225

This graphic shows that the sponsor, champion and team members can come from anywhere in the organisation. The multi-project manager on the other hand comes from only one position.

From **figure 3-3** an stimulating discovery is made:

❑ **Individual projects are managed in the rows by the champion.**

❑ **Multiple projects are managed in the columns by the manager.**

❑ **The functional organisation can exist on the horizontal plane while the project organisation exists on the vertical plane.**

Projects can now be managed in procedural groups, using champions to manage individual projects through project teams who agree to perform the work of a stage of the life cycle as reflected by a responsibility chart. Project managers are now procedural experts who facilitate, educate and consult the project team towards achieving the goal of the stage in an effective and efficient manner. Use is made of a "people time control matrix" **(figure 3-8)** to identify those projects and team members who are achieving better than expected results.

As projects are organised in a novel way to undertake a unique scope of work, the team members find themselves in an ideal position to generate solutions to problems encountered in their "unique" work. The project manager learns from these in order to find solutions that can be applied to those projects and team members not progressing as expected. This was practically applied when acting as Main Transmission Systems projects advisor. The authour was tasked to manage 2000 projects per year for three years on a 4 billion Rand annual budget. The projects were scattered across $50\ 000^2$ km in 12 decentralised geographical regions throughout Southern Africa. Project budgets ranged from about R 20 million to about R 200 000 each. While compiling a list of the projects it was noticed that the project titles fell into procedural groups such as security, fire protection and facilities. On reviewing these procedural groups, it was found that security and fire protection constituted 80% of the expenditure. The capital value of security projects was double the total maintenance expenditure.

A matrix, **figure 3-4** was constructed showing the procedural groups in the rows and the geographical regions with their staff in the columns, using one project manager and twelve champions (one for each region). The champion was facilitated by the project manager to find a sponsor and a local team to produce the product of the project. If no sponsor was found, centralised sponsorship was found. Conversely, if an internal team was not compiled, hired contractors were used.

Figure 3-4: Make up of the project team

MTS Groups	Engineering	Region 1 — Champion 1: U Dex	M Gorny	J Crick	P Candy	P Wizard	Region 2 — Champion 2: I Fish	K Gold	P Black	A Bundy	J Rock	Region 3 — Champion 3: I Hood	J Fourie	C Clark	L Dean	R Grey	Region 4 — Champion 4: Y Conn	D Smith	C Gum	Region 5 — Champion 5: A Shad	V Sweet	Contractor
Security																						
ES95001		S	C	T	T																	
ES95002							S	C	T													
ES96001												S	C	T		T						
Fire Protection																						
EC95001		S					C		T	T												
EC95003		S										C	T	T								
Facilities																						
EU95004		S															C	T				
EU96002		S																		C	T	
EU96005		S		C	T		T															
Extensions																						
ER95002		S		C		T	T															
ER95005		S						C	T	T												
ER95006																						
Modifications																						
ESQ95009												S	C		T	T						
ESQ95010		S															C	T				
ESQ96099		S																		C	T	

Source: Van der Merwe 1997: 227

Monthly reports based on weekly team reports were sent to the project manager and sponsor reports were compiled quarterly, based on the project reports. Control was executed by means of the multi-project control matrix **(See figure 3-8)**. In closing, some observations were made from the use of procedural groups. Firstly, when all the projects were viewed as a collective, the titles of the projects revealed the underlying processes that existed in the organisation. Processes only exist if there is continual incremental improvement. (If this were not true, processes would self-destruct). The projects that are identified by the employees of an organisation are these very incremental improvements to existing processes. Often it was found that the projects revealed processes which management did not even know existed.

Secondly, the functional organisation, project procedural organisation, project team organisation, work breakdown structure, time and cost make up the six sides of a cube. Relationships between individual people, projects and time, make up the three dimensions of the cube. If cuts are made in all three dimensions along the lines formed by each individual person, project and unit of time measurement, thousands of smaller cubes are formed with the six sides revealing the extent to which the individual person or project influences the organisation around him. The assembled cube can be related to a filter into which resources are poured, and out of which flow the products produced by that organisation. Management, external to this cube, analyses it to locate ineffective and inefficient passages of flow, and then go in to repair them.

3.3.2. Control

Modern commercial project management is thought to have developed around a planning tool called the Critical Path Method (CPM) (Kerzner 1994: 601). Early modern definitions saw a project as having a starting point in time and a pre-planned completion point and so did each activity within it (International Journal of Project Management 1988: 173). CPM uses the duration of the activities and their relationships with one another to calculate the shortest duration between the start and end of the project; hence the critical path. It is believed that the activities making up this path should consume the largest slice of management attention in order for the project to reach its end state at the pre-planned end date. Project management is therefore seen to manage the work that made up the project, and the project manager is in charge of the project.

Today it is accepted that projects generally have four stages to a life cycle. Although these stages are known by different names, they comprise a proposal stage, a design stage, a construction stage and a closing stage. Own research has revealed that three of these stages are fixed and only the design stage is expanded to comprise several stages in order to contain risk. Overlaying the life cycle concept on to CPM project network **Figure 3-5** reveals that the absence of a clear transition from one stage to the next, is a primary problem as the relationship between activities will allow design to start before

feasibility is completed, or construction to start before design is completed. This is the main reason why projects overspend their resources.

Figure 3-5: Comparison of PERT and life cycle

No clear transition from one stage to the next

Project Start · · Project End

Feasibility Stage · Design Stage · Construction Stage · Close Stage
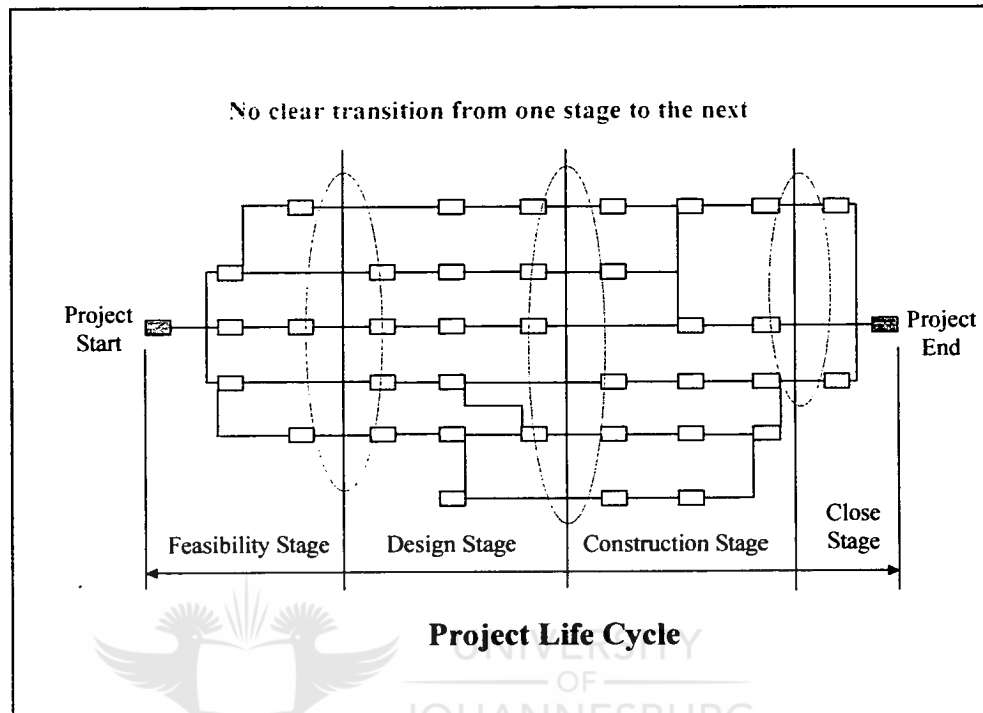
Project Life Cycle

Source: Van der Merwe 1997: 229

Life cycles break projects down into logical blocks or into smaller projects, each with its own distinct start and end. This allows design to be fully completed before construction can start (Turner 1993: 22). Other advantages are that specialist project teams can be used to manage specific stages, each with its own budget, keeping internal costs separate from external costs. This allows for smaller teams to be used while increasing accountability. The project manager is now in the ideal position to manage multiple projects as he manages a team which manages the work. He is therefore able to move among more projects than he would have been able to under traditional CPM conditions.

Project networks are still used for each stage but the major method of control now becomes the Work Breakdown Structure (WBS) (Turner 1993: 25).

Figure 3-6: Converting PERT to a life cycle
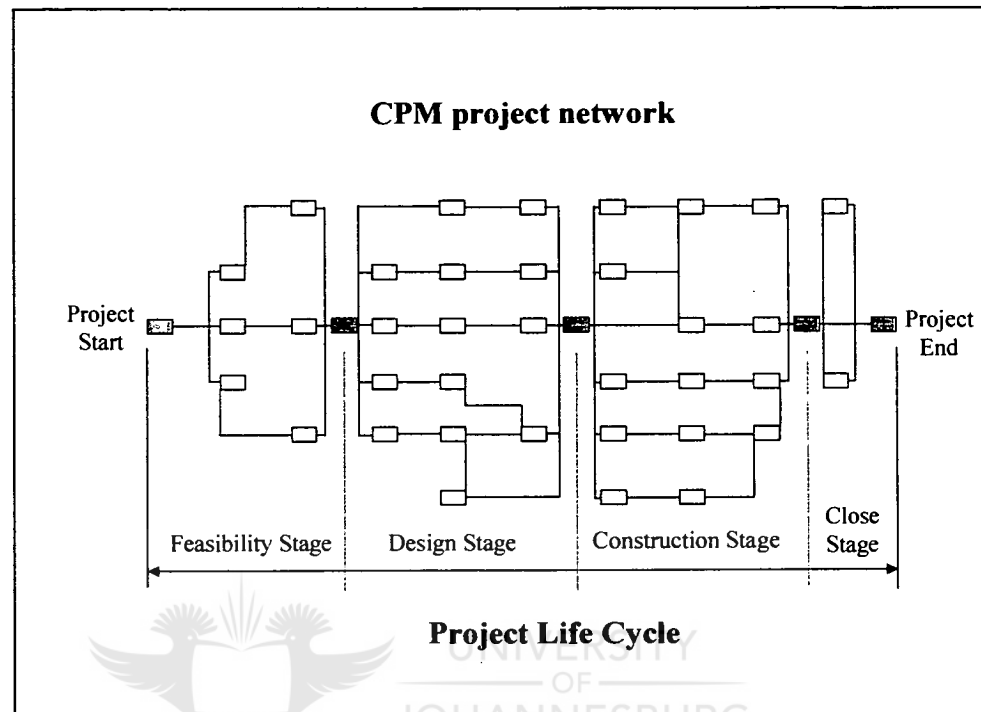
Source: Van der Merwe 1997: 229

Each stage of the life cycle now contains a work breakdown **(Figure 3-7)** describing the procedure to be followed by the project team in order to progress from one stage to the next. Review and approval by the project sponsor can now take place at the end of each stage, which represents a precise logical break in the work being done on the project. A project manager is therefore not responsible for the entire project but rather for the stage he manages. (If he manages all the stages then he would be responsible for the whole project.) This is achieved by allowing the champion (who best knows what is required of the project) to lead the team who is doing the work of the project across all the stages. **The manager manages the people who manage the work.** This arrangement reveals further advantages of WBS over CPM.

- Only the details of the present stage are managed
- Only the end date of the present stage is fixed
- Projects can be dormant between stages
- No long range detailed networks are used, thus reducing misleading information

Figure 3-7: Work break down structure (WBS)

Feasibility Stage	Design Stage	Construction Stage	Close-out Stage
Beneficial change Preliminary technical investigation Search for sponsor Resource constraints agreed Approval to proceed to design stage	Establish project team Establish WBS Establish Responsibility chart Design Specification Contract award Approval to proceed to construction stage	Site establish Delivery to site Instal Commission Hand over Commercial operation	Close contract Finalize paperwork Project close Project team disband

Source: Van der Merwe 1997: 231

The project team is assembled by the champion (who is assisted by the manager) from people who have the required skills and enthusiasm to bring the current stage to a successful conclusion. These team members may also serve on other project teams and have their normal day's work to contend with, which brings project control into the mix. The problem is partially solved by the use of responsibility charts according to which team members individually commit themselves by agreeing to perform certain tasks by pre-arranged dates. Project control can be equated with people control and this is the only point where CPM with a dedicated project leader and team has an advantage over WBS.

On the other hand, facing the problem forces one to find a solution for "people time" as a resource constraint. It is a little considered fact that 8 hours in a working day and 40 hours in a full working week results on only 124 800 working minutes over 52 weeks or one year. Individual "people time" is a finite resource constraint that cuts across all boundaries of the organisation whether it manages projects or not. It is proposed that the solution comes about by finding a method to help the individual manage his own time within the context of the organisation and the project teams on which he serves. In order to find this solution it must first be understand how the organisation, projects and individuals co-exist. **Figure 3-8** displays the relationship between the organisation, the project and the individual. The make-up of time consumed can be seen for project teams in the rows, and the extent of project involvement can be seen in the columns. Even at this elementary stage management analysis will reveal that marketing is not part of projects while J Rock is the only person in operations working on projects.

If the time each person spends achieving the activity he has agreed to, is entered in the corresponding position, some progress will have been made towards finding a solution for "people time". Management analysis of the "People time" matrix **(Figure 3-8)** at this simplified level makes interesting reading. For example: 60% of personnel are involved in projects, 48 man hours are spent working on them, J Rock is over-committed, K Gold is not achieving his objectives, Project Three is consuming excessive resources, and Project One may not be achieving its completion date.

If time consumed by individuals working on the project is properly managed, then cost, quality and the duration of the project will be managed by inference. This is a bold statement, and one that few experienced project managers would be willing to try in practice, but it is none the less true. The amount of time an individual spends in performing a task, is directly related to the quality of the work being done, and to the cost of performing the task.

Figure 3-8: People time matrix

	J Crick	L Candy	P Wizard		A Bundy	J Rock	C Clark		L Dean	R Grey	B Rose		K Gold	S Blue	I Shad	
Project One	2					5							0			7
Project Two			9			7										16
Project Three		7				9								9		25
Total	2	7	9			21							0	9		48

Source: Van der Merwe 1997: 232

Use of responsibility charts therefore has the advantage that the "people cost" can be managed along with the "people time" by entering the cost for completing a task in the same matrix used to manage time. By adding the responsibility chart for the current stage to the matrix, a direct relation can be made to the task, the person, the time, and the cost. The multi-project manager enters a new dimension within the organisation in order to cope with the volume of work. The champion manages the team on an individual project basis while the manager manages procedurally. That is, he manages only the procedure used in the execution of the work of the project.

To practically demonstrate this aspect, research was concluded during 1995 to develop processes, procedures and systems for the Electrification Project as part of the Reconstruction and Development Program (RDP) of the Government of National Unity under the leadership of President Nelson Mandela. The project objective was to connect 3 million houses to the electricity grid within 5 years. It had been in progress for three

years and had only connected 600 000 houses to the grid. The object was to lift the current effort to 300 000 a year and then to 500 000 a year while bringing the connection cost down from R 5 000 to R 1 500 per house.

The project was using ESKOM to build the distribution lines to squatter settlements, to design the reticulation and order the equipment. Private contractors were being developed out of the local community to install the equipment according to the reticulation design. There was no centralised project team or control and each Distribution Group (there were five) was given capital and a connection target and were instructed to work on it, over and above their existing workload.

Using work breakdown structures, responsibility charts and people time matrices, a production line effect was developed for the projects where the stages of the life cycle were used as the stages in the production line. Each Distribution Group assembled teams to perform the work from the beginning to the end of the stage within the designated procedural groups of schools, clinic, rural and urban squatter settlements.

A procedure manual for project management was developed by this author, and implemented to incorporate these findings. This implementation immediately delivered benefits. It was identified that the Network design office was continually redesigning the reticulation (up to four times) as the duration from first request to final (first) design was 18 months. Meanwhile some squatter settlements had doubled in size and population, and others had disappeared.

Secondly, projects were only fixed in terms of cost at the start of the construction stage. The proposal and design stages were off the record. Thirdly, as the construction stage was performed by contractors, discrepancies existed between the reported connections, the target number of connections and the actual connections. With only partial implementation of the measures described in this research, 1995 ended with the target of 300 000 connections being exceeded, and furthermore the cost per connection being reduced to R 2 900 per connection.

3.3.3. Time control

The use of time as a control measure in multi-project management reveals that time, being a finite resource constraint, has two separate users of it. The individual person who has time available spends it on activities which makeup a project and on individual tasks within the organisation. Money being a relatively finite resource is owned by the organisation that spends it on people and projects within the organisation. This concept led to the development of a test for the use of time by using the "people time" matrix. The test is to balance the time demanded composed of the sum of all project duration with the total man hours available. Some thought provoking results have been gained from this test; for example, how does an organisation with 28 000 employees plan to manage 500 000 projects per year? That constitutes 116.48 man-hours per project or 2.9 weeks for one employee to work on one project.

The test has led to a formula being developed to find the number of project managers required for a multi-project environment based on available time. To begin with, the sum of all projects' duration in hours is calculated, then divide by the number of projects to find an average duration of a project. The available time in a year is then divided by the average duration, to find the number of times a project can be repeated in a year. The number of projects is divided by the repeat time, to find the number of simultaneously occurring projects. Next, a sample is taken of the simultaneously occurring projects, say 40%, to find the required time to be spent on the projects. A sample of available time is taken, say 70%, to represent the available time that a project manager has to spend on the projects. The required time is then divided by the available time resulting in the number of project managers required. A formula can now be extrapolated:

$$Pmn = \frac{sD \cdot Px \cdot aD}{aT^2 \cdot Py}$$

where:

sD = Sum of all project duration's in hours.

Px = Sample size of total number of projects (0.1 to 0.5)

aD = Average duration of total project in hours

aT = Number of working hours in a year (40 X 52)

Py = Time projects managers are to spend working on projects as

a sample of total time (0.7 to 1.0)

PMn = Number of project managers required.

Px and Py are sample sizes based on the amount of time demanded for required exposure to each project. If Px and Py are equal to 1 that is 100% of available time exposure is required for each project, then the number of project managers will be equal to the number of projects. Further, aD is equal to sD divided by the total number of projects.

Recently, the geographical dispersion of projects has been included in to the formula. If 0.01 is added to Px for every 10 000^2 km which the projects cover, a good correlation is found. Project value can be treated in the same way but it is usually reflected in the project's duration of similar projects (Project Program) and is therefore not essential to obtain good correlation.

The second concept of money being a relatively finite resource is owned by the organisation, with the individual person vying for money as do the projects which comprise the organisation, raises the question of company valuation. A new method must be found to value a multi-project driven organisation, as its value will be largely dependent on its success at managing projects.

3.4. The philosophy of time engineering

The study of time requires that two opposing perspectives, that of time available and that of time demanded, be clearly understood as it is when discrepancies in these two views arise that time fails.

3.4.1. Organisation, project, and individual

Consider that there are three tasks to perform: to drive to the airport, update a presentation and call a client. Each of these tasks take approximately 60 minutes. Done consecutively they will take three hours, or concurrently, one hour. There is only one hour available and all three tasks cannot be performed concurrently by the same person. Money can be used to employ two people for an hour, one could update the presentation while the other sorts out the client.

If the client on the phone is paying R500 per hour for advice and each of the employees is paid R100 per hour, there would still be a profit. As can be seen, the organisation as a corporate individual finds that it has work to do, but it does not own time - it consumes time. The individual person on the other hand has time to offer in exchange for currency. The project in the same sense is a time consumer and competes with the organisation for people to spend time on it.

3.4.2. Paralleling time

The more concurrent tasks the organisation has to complete the more employees it needs. In theory every 8-hour bundle of work requires one person for one day. This is the mythical "Labour man hour" that is much discussed. It means that if one needs to complete 24 hours of work in 8 hours, three people are to be given money in exchange for their effort (time).

This is what is proposed as "paralleling time". In a perfectly efficient environment the parallel time demanded, divided by 8 hours should be equal to the number of employees required per day. However, it is common knowledge that the workplace has never been a perfectly efficient environment.

3.4.3. Available time versus demanded time

If 100 people are employed, then 800 labour man hours are available per 8 hour working day. If there were in reality 800 labour man hours of work per day, then available time would equal demanded time.

The sum total of all the tasks in hours performed in an organisation (demanded time) divided by the sum total of working hours (not labour man hours) available for the period (available time) should equal the number of employees. That is, there would be 800 hours of work to do in 8 hours = 100 people at 100% efficiency. Research done by Time Systems International in Denmark (Svensson 1994: 109) suggests that a person runs out of time because no contingency plan is made for unexpected or emergency work. Their research found a 60-20-20 rule to regulate the use of time and kept 20% of available time in reserve for unexpected work and 20% of time in reserve for emergencies. Using this concept requires that total available time be multiplied with 0.6.

There is another way to calculate the use of time: a working year consists of 52 five day weeks containing 40 hours each which equals 2080 working hours a year per employee at 100% efficiency. Turnover divided by (2080 X number of employees) finds the income generated per employee per hour. When base lined, this is how the big consulting houses find the quartile of efficiency for organisations. The budget for a department divided by (2080 X number of employees) finds the expenditure rate that needs to be generated per employee per hour if the budget is to be spent within the year. As a baseline and compared to other departments efficiency in expenditure can be found for a department.

Why this is interesting is that for similar departments if expenditure per labour man hours is below the baseline then there are too many personnel for the amount of work, or if expenditure per labour man hours is well above the baseline then there is too much work for the available personnel.

In order to demonstrate this, use a department budget of R 5 million, personnel of ten people and a duration of one year. That is: 5 000 000 / (2080 X 10) = R 240 per man-hour needs to be spent. Consider this the baseline. If the personnel is reduced to 5 then R 480 per man-hour needs to be spent i.e. more work per person is required. If the budget is reduced to R 2.500 000 then R 120 per man-hour needs to be spent, which shows that there are too many people in the department. If the baseline represents the average labour man-hour cost for the department, then the situation becomes clear.

3.4.4. Project efficiency

The same analysis can be done for a project where the project budget per annum is used over the total labour man-hours available (number of people working on the project, X 2080). The baseline created here can be used in the same way to determine if there are too many personnel for the amount of work, or too much work for the available personnel.

An observation made while advising in the public sector was that a project driven department with 100 personnel who were successful in spending R15 million on projects in one year decided to schedule projects worth R85 million the following year **with the same number of personnel**. This would have necessitated a fivefold increase in labour man-hour efficiency. It proved to be an impossible task -the department eventually spent less than R15 million in the second year. In reality the individual employee has only 8 hours a day and finds himself in a position where he must divide his time between the organisation and the project. The project resource histogram does not cater for the individual's decision.

The perspective on time has changed. The task may take three hours to complete but the team member has a parallel universe called the functional organisation. Both make demands on his available time. So it may take 40 hours to complete 3 hours of work. This fact is not catered for in traditional project management, which uses dedicated resources.

In management by projects where life cycles, work breakdown structures and responsibility charts are used, only the due date of an activity is required from the person who has taken responsibility for performing the task. The individual person fits the duration of the activity into his available time to deliver the outcome by its due date.

3.4.5. Time control

There are three elements required to control time: The project, the organisation and the individual. Work breakdown structures set within the stage of a life cycle having time on the one axis and effort on the other, form the cornerstone of time control as they clearly spell out the time demand of the project.

Organisation breakdown structures are not as clear in setting out the time demanded by the organisation but do determine the individual's position and hence his cost per hour. Here is a clear indication of the difficulty in marrying the functional bureaucracy to the project driven organisation in that **the functional bureaucracy is an imperfect consumer of time.**

The available time that the employee has to offer is now known. Deducting the time demanded by the project will reflect the time available to the organisation. So it is a problem that can be solved. A perfect solution would be if all the work requested from the employee could be set out in hourly demand.

3.5. Conclusion

Objective 2 provides comprehension of business development with relation to the make-up of strategy, structure, processes and projects as applied to the modern organisation. Research was done on the theory of how these aspects exist, are managed and implemented individually within the organisation. The project management of business development requires new insight into how strategy, structure, processes and projects interact with one another.

The natural scientific definition of processes brought the required light to these subjects and was used to explain their interactions. Project management was shown as that aspect of business dynamics that turns vision into results. Project management brings together a team of people from diverse levels of education, social backgrounds, religions and experience to form a coercive group that can reach the objectives put to it in an efficient and effective manner.

This aspect revealed project management as a point of departure to management theory, where management manages the behavioural processes of people who manage the continuous incremental improvement of business processes in the organisation, through projects that guide the business process to address the change in the strategic direction of the organisation. If business is to develop then the successful outcome of any change in the organisation can only be achieved when business processes and human behavioural processes converge in the person of the project manager.

Business Development:

A Project Management Approach.

Chapter 4

The project life cycle, development of the project system and step by step guide

Chapter 4

The project life cycle, development of the project system and step by step guide

Synopsis

Project management from the perspective of industrial development was found to have been well described in literature as were the control and command structures applicable to the management of the task. On the other hand, managing human behavioural processes is a recent advent, as is the management of people with a social emotional emphasis to ensure the effective performance of tasks. Distributed teams, cross functional teams and virtual organisations of late, have had to find ways of keeping team members loyal to the project, as accountability and responsibility enter into a new dimension where the command and control structures of old are proven useless in virtual organisations.

This research creates new knowledge as it attempts to describe and define project management in terms of business development as a radical departure from industrial project management with the use of project life cycles, work breakdown structures and responsibility charts. Life cycles have been a cornerstone in the understanding of many aspects of science. One need only think of botany, astronomy, or an investigation concerning the life and death of anything, to realise that life cycles are in evidence. In business development the germination, growth, maturity and death of the product life cycle has been studied throughout the last fifty years. Cleland, Kerzner and Turner refer to the application of the life cycle concept to project management as one of the most important aspects to have come to light in modern times, yet not much is known about it in practice, and rarely does one see it applied. Project life cycles are seen as the first natural law of projects. All projects have, and go through a life cycle. While concurrent engineering is common practice amongst industrial projects, it leads to disastrous results in business development projects.

Business Development:

A Project Management Approach

The project life cycle, development of the project system and step by step guide

4.1. Introduction

In October 1997 at the Commonwealth heads of government meeting in Edinburgh, an overview of project management in the context of Commonwealth projects was presented. Research by the commonwealth forum on project management (CFPM) established that a lack of proper project management skill was the most important factor contributing to slow development of commonwealth countries (Blackstone 1998: 3).

CFPM is an enabling organisation, designed to assist commonwealth countries to achieve efficiency in bringing projects from conception to reality. Its objective is to develop and maintain the highest standards of expertise in people, tools and techniques, across all project-oriented organisations, in all commonwealth regions. It works internationally to boost development cycles across commonwealth nations, acting as a forum for information and innovation transfer, and good and best practice. During 1998, the South African Auditor General, reported to Parliament that a lack of project management skills in government departments was responsible for the slow progress being made in developing the country.

While it is true that a first world component exists in emerging market economies, it is not true that a third word component exists in developed economies. Personal experience in working in different economies indicated that there is very little understanding in the first world, of how things get to be done in the third world. It is

also true that most of the knowledge and theory around project management comes from the first world and that there is limited success in its application in the third world. Mostly it has been found that the training has been too theoretical, promotes methodology, controls the task and not the person, and uses systems that fail and have no repeatability or reuse.

The first world is by definition, developed. The second world is developing, and the third world undeveloped. It follows logically that in order for the global economy to expand, the first world should invest in the development of the third world. It is at this point exactly that projects are failing to deliver results. At the Global Forum on Project Management held at the 14[th] World Congress in Slovenia, an appeal was made for "low-tech" solutions to be found in the emerging market economies, to solve the problems being experienced there.

This research presents such a solution, compiled in such a way, that together with the forms which make up the system, a practical procedure is created for the uninitiated to apply to the project of their choice. Resulting in achieving the implementation of the solution required to resolve the problems, whatever they may be. It has been deliberated for some time as to how knowledge becomes skill. The author has debated this topic with academics and practitioners locally, in India, the Soviet Union and Yugoslavia and found that *knowledge is the skill of the mind, and skill is the knowledge of the hands*. The problem lies in bringing the two together. Competence can be taught through simulation and procedure, which imparts knowledge and skill to a learner, but only personal interest in the subject determines whether the student will rise from mediocrity to excellence. A further complication to the competence debate is the fact that a project by definition is "novel" and "unique", which means that there are no set solutions.

4.2. Project life cycle

4.2.1. Four stage model

There are three complementary views of the management process: the classical view, the problem solving view and the life cycle. The classical view proposed by Henri Fayol (1949) addresses the integration of novel organisations through five basic management functions: planning, organising, implementing, controlling and leading. The problem solving cycle used by the World Bank and others, is as follows: perceive the problem, gather data and define the problem, generate solutions, evaluate solutions, select solutions, communicate and plan implementation, implement and monitor.

The life cycle **(Figure 4-1)** addresses the transcendent nature of projects and the changing way in which management processes are applied in the various stages of an ageing life cycle. Following the development of a seed, one is confronted with four stages: germination, growth, maturity and death (Turner 1993: 20). Placing management objectives into four stages the following is found:

The three views of the management process complement one another, as the classical view could be seen in three stages: planning the work, organising the people, and implementing by assigning work to people. The problem solving cycle is a life cycle with 10 stages and the. It is also possible to see each stage as a problem to be solved or as a small project on its own. Management processes are repeated for each stage with implementation of one stage leading to the next.

Figure 4-1: Concept four stage lifecycle

Proposal and initiation	Design and appraisal	Execution and control	Finalise and close
project definition	system design for sanction	education and communication	completion of work
scope and business objectives	planning and resourcing	detail planning and design	use of product
functional design	sanction estimates to 10%	control estimates to 5%	achievement of benefits
feasibility	baseline	work allocation	disbanding / rewarding team
initiation estimates to 30%	sanction	progress monitoring	audit and review
go/no go decision		forecasting completion	historical records
		control and recovery	

Source: Turner 1993: 23

The use of life cycles lends itself to developing a repeatable, reusable process model for project management, enabling continuous incremental improvement each time it is reused. Too often people change suddenly from perceiving a problem to choosing a solution, or worse, to implementing a solution. If a solution is chosen without going through the decision making process, it may cure the symptoms, but does not get to the cause of the problem. Similarly, moving straight to the execution stage of a project without first determining whether the proposal is worthwhile, or how it is to be achieved, does not lead to success. However, if a plan is first developed for the project, determining what is achievable and what is feasible, the management process will provide a structured approach to the project to achieve the best result.

4.2.1.1. Proposal stage

The proposal stage seen in **Figure 4-2** starts with an idea, generally accepted to bring about a solution to a problem, which means that any project is preceded by a need for change to take place. The change adds value only if it costs less to eliminate the problem than to live with it. A proposal is used to define the problem, and to suggest solutions based on preliminary investigations. It is also used to establish a preliminary monetary value for implementing the proposed solution and to examining alternatives. Feasibility

and viability are compared to the clients expectations and the available window of opportunity in order to make decisions on the continued need for the solution offered. The process applied to this stage presumes that a need for change has arisen, for which the procedure at a strategic level follows:

Figure 4-2: Process model for a proposal stage

Inputs	Process	Outputs
1. Initiation	1. Basis of change identified	1. Planning proposal document completed
2. Establishing the project champion	2. Feasibility: Scope planning and project risk investigation	2. Project technically feasible and cost justified
3. Introduction of the project manager to the project	3. Preliminary technical investigation launched (Design One)	3. Project sponsor formally agrees to expenditure of resources
4. Joint development of the proposal	4. Resource constraints determined	4. Project resource constraints agreed
5. Project manager prepares formal proposal and presentation	5. Search for sponsor	5. Strategic level plan
	6. Formal project proposal to sponsor	
	7. Formal presentation of project justification	
	8. On approval scheduling of responsibilities and resources	

Source: Van der Merwe 1996: 23

4.2.1.2. Planning stage

Approval of the resource constraints by a sponsor, signals the formal approval of the project, the end of the first stage in the project life cycle, and the start of the second stage. The second (planning) stage seen in **Figure 4-3** of the project is the most important in business development projects. The brief nature of the implementation of the product to be produced by the project requires careful planning, as change introduced later results in almost automatic increases in time and cost, which could contribute to project failure. Decisions made here, impact on the financial break-even point of the product of the project. A leverage effect is caused by the design on the payback period of the product, which determines whether the project was applied in a

cost beneficial way. Therefore, care needs to be taken to apply a "fit for purpose" quality perspective to the design. The processes applicable to the planning stage of the project are as follows:

Figure 4-3: Process model for a planning stage

Inputs	Process	Outputs
1. Project leader (champion) appointed	1. Call project start-up meeting	1. Technical / performance specification document
2. Project team appointed for life cycle	2. Establish project organisation	2. Responsibility charts / role clarity for team members
3. Project Sponsor approval	3. Establish work breakdown structure and level	3. Project network / bar chart
4. Resource constraints 50% accurate	4. Scope definition (Design One)	4. Contract document
5. Historical data	5. Establish responsibilities	5. Main contractor appointed
6. Lessons learnt from similar projects	6. Write specification and tender document	6. Operational plan
	7. Specify performance requirements (Design Two)	7. Resource constraints 75% accurate
	8. Issue tender	
	9. Evaluate tenders	
	10. Place contract	

Source: Van der Merwe 1996: 24

4.2.1.3. Implementation Stage

Contractual agreement between the project management team and the project implementation team signals the end of the second (planning) stage of the project life cycle and the start of the third (implementation) stage seen in **Figure 4-4.** The project management team takes on a lesser role during implementation, as its main function becomes one of monitoring the contractor or project implementation team. Careful attention needs to be paid to the progression of work done in relation to the money spent. Earned value analysis as a performance measurement seeks to find the variance between budgeted cost of work performed and actual cost of work performed where budgeted cost of work performed is the earned value (BS6079 1996: 35).

The cost impact of schedule slippage can be found by subtracting the budgeted cost of work scheduled from the budgeted cost of work performed. An index can also be used

by means of a ratio expressing the percentage of work done to the percentage of money spent. Ideally this ratio should be as close to 1:1 as possible. The processes that apply to the implementation stage are as follows:

Figure 4-4: Process model for an implementation stage

Inputs	Process	Outputs
1. Technical / performance specification document	1. Final Design (Three)	1. Detail level plan
2. Responsibility charts / role clarity for team members	2. Inspect manufacturing of equipment	2. Operational activities completed
3. Project network / bar chart	3. Factory test	3. Installation completed within constraints
4. Contract document	4. Delivery to site	4. Commissioning completed
5. Main contractor appointed	5. Installation	
6. Operational plan	6. Commissioning	
7. Resource constraints 75% accurate	7. Hand-over of system	

Source: Van der Merwe 1996: 25

4.2.1.4.   Close-out stage

This is the fourth and final stage of the project. As its name suggests, the stage is used to close the project and disband the project team seen in **Figure 4-5**. Care should be taken during this stage to keep up the quality of the work and not allow activities to be closed merely to get them off the books. The project now enters the commercial life cycle where operational staff utilise the solution provided by the project to gain the benefit envisioned. This stage is used to hand over what was installed to the maintenance staff, with appropriate training, drawings and manuals to ensure efficient operation. Disbanding the team was found by Cleland (1988: 223) to have a major impact on the success of following projects. When the project was not properly closed the team would continue to look for performance information on the past project, causing a lapse of

attention on the current project, resulting in more errors than one would normally expect. The processes applicable to closing the project are as follows:

Figure 4-5: Process model for a close out stage

Inputs	Process	Outputs
1. Project definition report	1. Close contract	1. Project report
2. Responsibility charts of all stages	2. Finalise paperwork	2. Financial closure
3. Operational plan	3. Finalise drawings, manuals	3. Project team closure
4. Commissioning report	4. Finance close	4. Asset register
5. Operational activities completed	5. Administrative close	5. Commercial life cycle
6. Commissioning completed	6. Maintenance training	
	7. User training of new system	
	8. Lessons learnt	
	9. Final meeting	
	10. Performance appraisal	

Source: Van der Merwe 1996: 26

4.2.1.5. Life cycle model

Research of available literature on project management published since 1981, as well as information available from international institutes and interviews held informally with forty practitioners, fifteen research academics and five well-known authors on the subject of project life cycles resulted in the compilation of a model project seen in **Figure 4-6.** These interviews were held between 1995 and 1999. All the discussions were held informally to find a commonality of things that work. A pattern emerged in that which was found in literature, and that which practitioners, researchers and authors maintained was what made projects successful, and these were included in the model. A review was done of magazine articles published between 1995 and 1999 in APM's "Project" and in PMI's "PM Network" as was IPMA's "International Journal of Project Management" and PMI's "Project Management Journal for the same period. Finally all

conference proceedings for IPMA and PMI where reviewed for the period 1990 to 2000. In focusing on those articles that discussed solutions (things that work) and not problems (things that do not work), evidence was found that concurred with findings from the interviews that a base model could be constructed as follows:

Figure 4-6: Project life cycle model

PROPOSAL			PLANNING	IMPLEMENT	CLOSE
Beneficial Change:			Start-up meeting • Time Management • Human Resources	Site establish	Administrative close
Manager: Champion:			Investigate Availability	Procure equipment	Finance close
Feasibility: Scope Planning and **Project Risk**			Do design Quality Planning and **Product Risk**	Monitor equipment delivery	Contract close
Constraints: Project Product			Compile specification	Quality Assurance and Control	Project review
People:			Scope Define	Administer Contract	Scope Verify
Time:					
Equip:					
Cash:	SUPEX	CAPEX			
Proposal Document Prepare			Cost estimates Cost budgeting	Monitor contractor performance and Progress reports	Quality review
Communication Management Stakeholders			Enquiry Document	Install	Creation of template
Lobby / Pitch			Tender	Commission	Performance appraisal
Presentation: Search for sponsor			Evaluate	Hand Over	Project Report
50%			Negotiate 75%	95%	Final Meeting 100%
Sponsor: **Approval of constraints**			**Award Contract**	**End Condition: Quantity and Quality**	**Disband Team**

Source: Van der Merwe 1996: 36

4.2.2. Work breakdown structure

Research found that work breakdown structures where often confused with product breakdown structures in practise, as well as in theory. In Turner's (1993: 102) Handbook of project-based management, work breakdown is seen as a technique whereby the work of a project is divided and then again subdivided for management and control purposes. Using the scientific definition of work, it is defined in joules when one Newton is measured through a distance of one metre. Power is defined as the rate of doing work and is measured in watt. The watt is equal to one joule per second (Morley 1975: 7). Therefore, work is done when effort (force) is applied over time. What project management theory most lacks in the definition of a work breakdown structure is the time element; hence it makes the error of only sub-dividing the work.

This research found that if the project life cycle contains the work breakdown structure, the error is avoided. That is, the work **within** a stage of the life cycle can be broken down to different levels. Further, if the work is broken down only within a stage of the life cycle and not across the stages, management and control are increased. This complements rolling wave planning in that only the detail of the current stage of the life cycle is managed.

Three levels of work breakdown are normally sufficient to assign enough detail to any project: the strategic level, the operational level and the tactical level. These levels are used to link the project objectives with the management processes by determining the work breakdown structure, indicating the activities required to complete the project within stages of the lifecycle.

During the construction of Koeberg Nuclear Power Station, there were approximately 57 000 activities on the project plan. If it takes 3 minutes on average to update an activity for the month end report, it would require 2850 man-hours, or 18 people working full time, to keep the project plan current. However, each activity has to have progress verified on site and by invoice. This takes 2.5 hours on average, which means the requirement would be for 890 people to work full time just on keeping the project

plan current. It is now clear why the project plan was always unworkable. **There is a logical limit to the number of activities that can be managed effectively on any project.** The control algorithm of the Roman Army, proven over two millennia, requires that 10 people report to 1. With this method applied to the work breakdown structure, one can code a matrix of 4000 activities, which should be enough to control most projects as follows:

4.2.2.1. The strategic level

The work breakdown structure at the strategic level is to be made up of a single A4 sheet of paper, containing the context of the work to be done and a list of no more than 10 work packages per stage of the life cycle. Each work package is coded A 1 to 10, B 1 to 10, C 1 to 10 and D 1 to 10 for the 4 stages resulting in 40 strategic level work packages.

4.2.2.2. The operational / milestone level

At this level the work breakdown structure is reduced to a maximum of 10 operational activities for each of the strategic level activities. 10 A4 sheets of paper containing 10 operational activities each is prepared for every stage of the lifecycle. These 40 sheets are marked A1 to A10 for the proposal stage, B1 to B10 for the planning stage, C1 to C10 for the implementation stage and D1 to D10 for the closeout stage. Each of these sheets contains 10 operational level activities numbered a-i so that an individual activity may be coded as B4f, for example. The project plan can now contain a maximum of 400 activities.

4.2.2.3. The tactical / detail level

The work breakdown structure is now further broken down to contain 10 tactical level tasks for each work packages. Ten A4 sheets of paper containing 10 tasks for each operational activity is prepared for every strategic work package in each stage of the lifecycle. These 400 sheets are market A1a to A10j for the proposal stage, B1a to B10j for the planning stage, C1a to C10j for the implementation stage and D1a to D10j for the closeout stage. Each of these sheets contains 10 tactical level tasks numbered i to x

in roman numerals so that an individual activity may be coded as B4fiii, for example. The project plan can now contain a maximum of 4000 activities.

Use of this coding convention allows all concerned with the project to instantly recognise the current stage of the project lifecycle being worked on, the work package, activity and task affected, and at what level of detail work is being performed. This assists in solutions being developed for the appropriate measure, that is, to the task, the person performing the task, or the time allocated to the task.

The most relevant result of using this method of placing the work breakdown structure into these specific levels and numbering convention is that it allows the principles of alarm state navigation to be applied. That is, only 10 strategic level work packages are monitored and controlled by management. Any tactical level task in difficulty automatically reports to the operational level team leader. Any operational activity, which has a tactical task in difficulty, automatically reports to a strategic level work package supervisor. At progress meetings, appropriate solutions are discussed and selected for implementation.
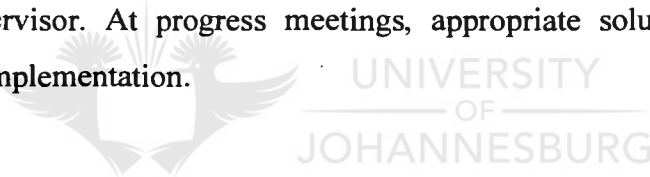
4.2.3. Responsibility chart

Responsibility charts takes on the role of a natural law in project management as all projects have work to be performed and the person performing the work is responsible for it. This responsibility cannot be delegated. It forms part of the command and control structure of management, and competence of the worker. Adam Smith (1981: 25) recognised as long ago as 1771, that the economy was based on the efficiency (competence) of people doing their work.

"The successful implementation of *Project* Management will require that managers find ways of identifying how implementation is proceeding and the extent of variance from what is expected. The underlying notion in such forms of control is that if people are clear on what is expected of them and are provided with information that shows the

extent to which these expectations are, or are not, being met, they will change their behaviour, or redirect their energies or attention, to remedy the situation" (Johnson 1993: 370-373).

There is an almost endless list of studies on human efficiency, when performing work from every conceivable angle. It narrows down to the previous paragraph "changing behaviour" as seen in conjunction with knowledge and skill, which equates with competence. The person doing the job **MUST** be competent in doing it (Tyson 1996: 73). Interest also plays a large role in the way work is done. Many projects have been seen to fail as a result of highly competent, but disinterested team members. It can also be said that a natural law exists in that competent people are busy and do not have time to take on additional work. This leaves the project manager in a predicament if the interested people are not competent and the competent people are occupied.

Responsibility charts are the perfect vehicle to resolve this conflict between interest and competence. Following the work breakdown structure through the levels, each strategic work package contains 10 operational activities and each operational activity contains 10 detailed tasks. This sets up the command and control structure where people who have taken the responsibility for performing detailed tasks report to the operational activity responsible person who reports to the strategic work package leader who reports to the project champion who is the task technical leader.

The team is assembled by inviting all competent people to a project start-up meeting, and by placing posters on the office notice boards for all interested parties to attend as well. At the start-up meeting the lifecycle is explained to all present, as are the stages and strategic level work packages. The audience is then invited to take on the responsibility for delivering the work packages. Those accepting responsibility for the work packages are asked to determine breakdown to the operational activity level **(Figure 4-7)**. This is done to check for competence, as interest has already been expressed by volunteering to take on the responsibility. If the person cannot determine the breakdown, it will be evident to all. Also, those competent people in the audience who have not taken responsibility are quick to point out mistakes in the breakdown.

Those accepting responsibility for operational level activities are then asked to break down the activity to the detail task level.

Figure 4-7: Operational level responsibility chart

Planning stage: Responsibility chart at the operational level	Name of responsible person	Time in hours	Target end date (S=10H00)
Start up meeting	Facilitator	3	Today
Formal investigation	**PAUL**	**1.00**	**11h00**
• menu	Sally	0.30	10h45
• venue	Annie	0.30	10h45
• theme	Paul	0.45	11h00
• guests	Paul	1.00	11h00
Design	**CHARLES**	**0.30**	**11h30**
• menu	Sally	0.15	11h15
• theme	Paul	0.15	11h30
Specify	**MIKE**	**0.30**	**12h00**
Tender	**PURCHASE**	**0.30**	**12h30**
Evaluate	**SALLY**	**0.15**	**12h45**
Risk analysis:	**CHARLES**	**1.00**	**12h30**
contingency plan	Paul	1.00	12h30
Fill in Form 3	**PAUL**	**0.15**	**12h45**
Sponsor approval: resource use 75% accurate	**SPONSOR**	**0.15**	**13h00**
Contract			**13h00**

Source: Van der Merwe 2000: 27.

Each person accepting responsibility at all levels then determines the time it will take to complete this accepted responsibility, and provides a target date for completion. With this information, the chart is constructed. Conflicts in time demanded and time available are avoided as the person responsible, according to his personal schedule, determines the duration. If an acceptable completion date cannot be reached with the audience, the client can be informed that expected durations were unrealistic, in advance of any work being done. The Project Manager and Champion together with the Sponsor and Client can then peruse other alternatives such as outsourcing and automation to achieve expected durations. If no one is found to work on the project, it remains dormant.

In more than 1000 applications of the responsibility chart to actual projects in industry, this approach is not known to have failed to deliver projects on time. Figure 4-10 is an example of an operational level responsibility chart for the planning stage of a project to provide a fictitious lunch (used in the project system for the purpose of explanation).

Depending on the duration of the project, progress meetings are set to take place at specific intervals using the following as a guide:

- ❑ If the project duration is in years then meet or report monthly
- ❑ If the project duration is in months then meet or report weekly
- ❑ If the project duration is in weeks then meet or report daily
- ❑ If the project duration is in days then meet or report hourly.

At these progress meetings the responsibility chart can be used as an agenda. The team assemble and only solutions to deviations are discussed and selected for implementation, in order to remain on time. Other problems such as people experiencing personal difficulties or suffering injuries, or tasks with material or delivery difficulties, are dealt with in the same way.

The 1995 PMI project of the year, Benfield Column Repair followed exactly this approach to progress meetings. In 1998, SPOORNET Informatics Department used this approach to progress meetings, thereby achieving their first ever software development project within budget and ahead of schedule. The average duration for a progress meeting during this project was 10 minutes. In 1997 a project was delayed due to one member of the team not performing his accepted responsibility. Having high-level political backing, this person became impossible to deal with, resulting in two project leaders being fired. After the introduction of responsibility charts, he resigned of his own accord.

Constructing a Gant chart simply means plotting the target end, and subtracting the duration to determine the length of the bar. This can be achieved using a pencil and

some graph paper. Pert diagrams present more of a difficulty. This approach bases relationships on the people working together to achieve accepted responsibility and not on the relationships of the tasks themselves. Relationships between tasks change frequently and become a burden to always map accurately in order to manage the schedule. Relationships between people remain fixed and enduring but when things go wrong their effect becomes much more visible, permitting the Project Manager who is the social and emotional leader to take appropriate action.

Pert diagrams can be constructed to solve time difficulties, but should only be constructed at the level and within the specific stage of the lifecycle. Once used to resolve the situation, they should be discarded. Pert diagrams have limited use in controlling the project. Research found it far more beneficial to equip each member of the team with a personal diary, encouraging its use through discipline and good time management education. A senior management project advised on as part of this research had experienced delays due to non-delivery of certain tasks undertaken by a particular individual even though he was considered highly competent. It was noticed that he was using a diary and was asked if his schedule could be examined. His time was booked for eighteen hours a day, seven days a week for the next four months, excluding his accepted responsibilities for the project. When this work was taken by another person with less constraint on his time, the project was brought on schedule within two weeks.

4.2.4. Alarm state navigation

Since the Three Mile Island nuclear incident it has been recognised that alarm processing in control rooms could be improved on. In Kirk-Othmer (1996: 129) Encyclopaedia of Chemical Technology, volume 20, it states that processes are in a continuous state of flux and that if they are not controlled to a steady state the processes will stop functioning. This is a natural law. "These laws and relationships characterise how the systems state is affected be external and internal conditions".

Instruments are used to measure the fluctuations, and through the control loop keep the process at a steady state. For example, a car's engine when started in the morning is cold. The internal combustion produces heat, which warms the engine. The cooling system keeps the engine operating below a specific temperature. Should this temperature be exceeded, damage will result which could render the engine inoperable. The temperature gauge is an instrument in the instrument panel, which informs the driver that the engine is within good operating temperature. When due to some fault the temperature exceeds normal limits, a warning light comes on or begins to flash in an **alarm state** to indicate that operating specifications have been exceeded.

To date, engineering philosophy has dictated that alarms are raised as they occur. This means that the alarm is raised at the precise moment in time that the condition is reached that specifies the alarm i.e. in **chronological** order. The operator must interpret the reason for the alarm and also conditions surrounding the alarm. It is this interpretation that is thought to have been a contributing factor to the Three Mile Island incident, as when things go wrong the operator faces a stream of hundreds of alarms, and cannot interpret their individual causes.

Alarm state navigation endeavours to give alarming information in geographical order rather than in chronological order. For example, a car owner receives an alarm to say that there is something wrong in the engine. He interrogates the alarm, and finds both a cooling system alarm and a lubrication system alarm. Interrogating the cooling system alarm, he finds level, pressure and flow to be in order, but temperature is high. Interrogating the lubrication system, he finds low oil level, low oil pressure and low oil flow. Interpreting this information leads to the conclusion that there is no oil in the engine, which is causing the high temperature, and that the engine should be stopped immediately to avoid damage.

This result of alarm state navigation has two features. Firstly, it removes one, from the **detailed information flood** of alarm stream information to a new position where one can objectively and selectively determine the cause and result of the alarm situation. Secondly, the alarm state is conveyed in a predictive manner giving one a chance to

react to the cause, thus preventing long, expensive repairs. It has been observed at project progress meetings, that the project team assemble to discuss their respective problems (**alarms**) and to give reasons as to why these exist. The team normally end up having protracted discussions defending their positions in detail and discussing the past.

A natural tendency exists at progress meetings to endlessly discuss more and more detail. It is as though one's position can be justified by detailed knowledge of the problem. This can be compared to being lost in the forest and then asking scientists to analyse the soil to see why the trees are growing, when what is needed is to climb a tree to find direction. Climbing the tree represents less detail as opposed to the endless requests for more details requested by management when the project seems lost. When asked to advise on ESKOM's electrification project, it was found to be several months behind schedule. Yet, at the same time management requested so much detail in the month end report that it took the project team 49 days to compile.

Applying the principles of alarm state navigation to project management, stops protracted detailed discussions of problems that have occurred in the past. Instead, using the levels of detail that exist in the work breakdown structure, only the strategic level is discussed at meetings. This amounts to around 10 activities. The geography of the problem is discussed and not the detail, which make solution apparent. Being proactive means that only solutions are presented at the progress meeting where the team selects specific solutions for implementation to solve problems. In this way progress is made at the progress meetings and problems are dealt with proactively.

4.3. Project system

4.3.1. Development of the forms

Using the Life Cycle Model **(Figure 4-7)**, forms can be developed for each strategic level work package. A life cycle can be created to represent the knowledge and skill content for each strategic work package, by placing the information required and what needs to be achieved in order to complete each work package, in a specific position. By doing this, the Proposal stage could be managed as a project on its own. Each work package could also represent a project.

In one organisation, where 300 000 projects a year were managed, this is precisely what was done. A virtual production line was built where each strategic level work package represented a station, which had a small production line to deliver onto the main line, which delivered project proposals or contracts, or completed implementations. **Figure 4-7 cannot be referred to as a methodology as it is a container of the processes required to complete each strategic level work package.**

Each form depicted in **Figure 4-8** comes with a set of notes containing instructions and examples on how to fill in all the spaces. Forms 1 to 6 were audited by KPMG for content when this model was used by the Electricity Supply Commission of South Africa (ESKOM) to successfully increase the delivery of rural township electrification projects from 200 000 connections per annum to in excess of 600 000 connections per annum.

Figure 4-8: Strategic position of forms

PROPOSAL	PLANNING	IMPLEMENT	CLOSE-OUT
Mind map	Start up meeting	Start up meeting	Start up meeting
Life cycle	Responsibility chart	Responsibility chart	Responsibility chart
Form 1 Project registration	Activity checklist	Activity checklist	Project Overview
Feasibility study:	Project overview	Project overview	Progress report
Project risk	Prospective client checklist	Detail task cards	Meeting checklist
Communication plan &	Product risk	Activity checklist	**Form 5** Completion checklist
Stakeholder analysis	Progress meeting	Progress meeting	**Form 6** Project close
	Meeting checklist	Meeting checklist	
	Problem solving		
	Negotiation		
Form 2 Project budget allocation	**Form 3** Project capital vote approval	**Form 4** Beneficial operation	**Post project evaluation**

Source: Van der Merwe 1998a: H11-4

All forms are published in a "Project system" package available from the author (Van der Merwe 2000). The content of each form is discussed as follows:

Mind map

The shape of the mind map mirrors the brain's natural structures, and traces the logical links between ideas. It also combines pictures, words, colours and dimensions to stimulate different areas of the brain, allowing it to link the information in various ways to the existing structures in the mind.

Life cycle

This forms the basic model for assembling information in order to compile a strategic level work breakdown for a project. A fifth stage representing the commercial life cycle is added to note maintenance and refurbishment issues.

The Strategic Plan becomes the primary means to communicate the project's intention to all. It is the concept put on paper, so that changes can be made to improve delivery.

Form 1: project registration

Form 1 is used to give permission to spend time on the feasibility study, to document requests and set up the five-year plan for capital expenditure. Generally speaking, a project entering a Form 1 will not be designated for the current year's expenditure. This Form is used to get a unique registration number for the project, to estimate the requested budget for the project, in the year that expenditure will be required, and to assign a Project Manager and Champion to the project.

Feasibility study

Formal feasibility is conducted to explore all possible options for implementation of the project, to achieve a clear understanding of the SWOT issues involved, and to produce enough information to rank the options so that clear objectives of the way forward can be obtained. The "Strengths/Weaknesses" fields are used to enter details of the factors over which control can be exercised. In the "Opportunities/Threats" fields, a list should be made of external factors of which the project should be aware of. These fields can then be used as input for the Critical Success Factors (Risk Analysis) form. When exploring the options, as many ideas as possible, should be explored to render the best solutions.

Risk analysis form

At this stage only project-related risks, such as environmental, funding, regulations, geographical and political, can be evaluated. Product related risk such as poor design, failure of third parties, or inappropriate solutions can only be assessed in the planning stage. As many risks as can be thought of are included. A separate sheet is used for Product related risks. The Risk Analysis form (Critical Success Factors) is an analytical tool, which will help the project

prepare to react to happenings and events, which, while outside of direct control, need to be anticipated and prepared for. The likelihood of these events occurring will vary, as will their influence on the project. As a rule of thumb, one should concentrate on planning for the eventualities which are probable or possible and which will have the greatest effect on the project.

Communication plan

The project environment consists of two main groups of stakeholders: those 'internal' to the project with direct responsibility; and those 'external' who are affected by the project or have an interest but are not part of the main project team. The behaviour and performance of the 'internal' stakeholders are, theoretically, controlled and predictable. However, the stakeholders of the 'external' group are free to behave in any way they choose without any regard for the project.

To understand how these stakeholders will behave it is necessary to fully appraise their level of power, interest, predictability, knowledge, skill and information needs. The project manager and team need to draw on the full range of communication methods and media to communicate successfully with both the internal and external stakeholders of the project environment. The plan should include contingencies for dealing with possible detractors and to include those with pertinent skill and knowledge in the team so that communication is managed as proactively as possible.

Form 2: project budget allocation

No further work is to be done on the project until the Form 2 is signed by the sponsor. The Form 2 is used to give permission to spend money or time to complete the detailed design of the project and to increase the accuracy of the estimated cost of the project. Generally speaking, a project entering Project Budget Allocation, will not be intended for inclusion in the current year's expenditure. Form 2 is also used to set the three-year plan for capital expenditure.

Start-up meeting checklist

For a systematic approach to start-up to be successful, the participants must understand the objective of the process at any stage, and must be aware of the specific outputs needed to achieve the necessary level of understanding. These objectives are: to create a shared vision or mission for the project by identifying the project's context, its purpose and objectives; to gain acceptance of plans by defining the scope of work, project organisation, and constraints of quality cost and time; to get the project team functioning by agreeing on its mode of operation and the channels of communication; and to re-focus the project team onto the purpose of the project and the method of achieving it.

These objectives in turn influence the emphasis of the work of the project team which is: analysis of the project's context, previous plans, future tasks and management routines; planning of objectives, scope of work, organisation and routines; communication between participants of the results of the analysis and plans; and lastly, motivation of participants, to carry out work or to make decisions.

Responsibility chart

It is imperative that the team be made up of those who are to perform the work in delivering the product that the project is to produce. It is self-evident that the people who have the required skill will not be available. Therefore it is important that a) the team be made up of people who are interested, and b) they are provided with the knowledge and skill to secure them to the project. (Concept of life long learning)

The facilitator begins by asking who will volunteer to take responsibility for the strategic level work packages. The person who volunteers is then asked to break down the activity to the operational level. Next, volunteers are requested for the broken down activities and they determine the duration of the task and schedule their availability to perform the work of the activity. In this way, the mistake of

recording the demanded duration of the task is avoided and the available time of the person is taken into account.

Project overview form (bar chart)

From the responsibility chart, the strategic and operational work packages should be copied onto the project schedule, and the target end date marked on the schedule. Next, the duration given on the responsibility chart is subtracted from the target end and marked on the schedule, and the space between the two marks is then coloured in.

Prospective client checklist

This form is used to investigate the availability of those aspects of the project deemed feasible and viable i.e. Who has it? How much do they want for it? and What are the procurement considerations? This helps the design team to include items in the specification that they know are available and of which the cost estimate can now be improved to about 80% accurate.

Progress meetings

At progress meetings, progress is checked and problems are dealt with using the six fundamentals of control against the responsibility chart and progress report. A common error made in project management is for the progress report / meetings to discuss the accuracy in recording history. Not enough attention is given to predicting future events. By planning and reporting on future events only, one avoids the mistakes of the first, and can present solutions for the second.

Meeting checklist

Before, during and after meetings this list is used first to set the agenda, participation, location and start time. During the meeting, the list is used to note the discussion, and to record the decisions made. Actions are transferred to the Activities checklist of those concerned.

Problem solving

Based on Mind Mapping approaches, this form helps to define the problem, establish the decision criteria, generate alternatives and come up with a preferred solution.

Negotiation

Similarly, the negotiation form is based on Mind Mapping and considers "them", "us" and "solutions" to be used before, during and after negotiations to help bring about a successful contract for the delivery of the product during the implementation stage of the project.

Form 3: project capital vote approval

No further work is to be done on the project until Form 3 is accepted by the sponsor. Form 3 is used to firm up on the quantitative estimates for the delivery of the product of the project. This provides a hold point for the project around which the commercial issues are finalised. Acceptance of form 3 gives permission to spend money and time to complete implementation and derive the benefit of the project. A project entering a form 3 is intended for the following year's expenditure. Form 3 is used to set the one-year plan for capital expenditure.

Activity checklist

Each person who has accepted responsibility for completing a work package, activity or task (i.e. Strategic, Operational and Detail Level), fills in an activity checklist recording expected duration, delegation and target end. This checklist is used to schedule the work into the daily plan to ensure that time is allocated to performing the task, and to eliminate the discrepancies that exist between the time demanded by the activity and the time available to the person who has to perform the task.

Detail task cards

The operational level responsible person issues and keeps track of the people and tasks at the detail level during the Implementation Stage. These cards can also be seen as a job card and are issued to specific people to perform and complete detailed level activities. Tight control is required during this stage and checks need to be made to see that time is scheduled in the diary of the detail responsible person for the task that needs to be performed at the appropriate priority level.

Form 4: beneficial operation

This form records the Beneficial Operation of the product produced by the project by clearly identifying the portion of the project to be "livened" and beneficially operated. A sketch is attached which has clearly been marked up so that positively no confusion exists between "live" portions, and those still under construction. Indicate whether other portions of the project will be "livened" and operated before total physical completion and hand-over of the project as a whole. Estimate as accurately as possible the value of the portion now being handed over to the client for beneficial operation. The form is also used to summarise Project Approvals against expenditure by recording a summary of all the capital vote approvals and additional approvals in accordance with the various revisions of the form 3's submitted.

Form 5: completion checklist

Form 5 is used to close the contract and close the administration of the project. Scope is verified, a project report is written and the final meeting is called. At the final meeting, performance can be discussed and lessons learnt can be recorded. The project manual / report is compiled, the team is disbanded and the project is closed.

Form 6: project close

Form 6 is used to place the value created into the asset register.

Post project evaluation form

The Post Project Evaluation Form can now be completed and filed for future reference.

A major error at this point is to allow modifications of installed plant to delay the closure of the project. Modifications, refurbishment and replacement should be seen as separate projects, which occur in the commercial operation stage of the life cycle which the project has now entered.

4.3.2. Development of the training

Forty contact hours of training is provided, of which 24 (module 2, 4 and 5 below) are essential to start using the system. The training is presented in five 8-hour modules and can be presented in a variety of ways. It has been found that presenting from 12h00 to 20h00 for five consecutive days is the most beneficial course of action. Mixed cultural and educational level groups have experienced no difficulty in assimilating the information, with groups covering a range from basic literary skill to PhD in the same room at the same time. Space does not permit a detailed discussion on the content of each module, but an outline of each day's training follows:

Module 1: Business system

1. Introduction and objectives
2. Setting up the Business System
3. Prioritising activities
4. Mind Mapping
5. The DataBank™ section
6. Practical communication
7. Time management issues
8. Four-phase planning
9. The Monthly Plan
10. The Daily Plan
11. Summary and questions

Module 2: Project management theory

1. Introduction and objectives

2. Equipment for Project Managers

   ❑ Communicating

   ❑ Problem solving

   ❑ Speed reading for solutions

3. Discrepancies between customer expectations and product configuration

4. Project success and failure criteria

5. History of project management and its global status

6. Comparison of International standards

7. Project management procedure

8. Summary and questions

Module 3: Project system™

1. Introductions and objectives

2. Successful projects

3. Project system™ supplement

4. Proposal Stage

5. Planning Stage

6. Implementation Stage

7. Close-out Stage

8. Integrating with The Business System

Module 4: Project simulation

Students are arranged into groups and each group now has to apply module 1 to 3 to manage a project. The brief is given for each group to manage a project to host a tea party for two guests. Using the forms from the project system in sequential order, the proposal stage is completed when the group finds a sponsor to approve their resource constraints. Next, each group calls a start-up meeting and determines the responsibilities. After the meeting the planning stage is performed up to the point where

orders are placed at the "Shop". During the implementation stage they realise that there is only one tea set. They must solve the problem and complete the implementation stage. Once the guests have had their tea the project is closed. A cash flow statement and presentation of lessons learnt ends the day. Tea is used, as being irrespective of country, culture or education, knowledge of a "tea party" remains relevant and provides an easy platform to transfer knowledge to skill.

Module 5: Advanced practice

Students individually spend 2 hours developing a real project of their choice (one they will be working on after the training) from concept to sponsor's approval. One hour is spent at a "sponsor's meeting" where each student presents his/her project to the class to learn from and question each other. Discussion on the practical application of: project funding and control of expenditure, effects of product risk, monetary value of time, prioritising projects and the management of multi-projects by cross functional teams within an organisation, ends the course.

4.3.3. Test projects

Three programs of 10 projects each have been set-up to test the model and to develop it into a product for public consumption. Each program is set in a different country and different economy, representing emerging markets, developing markets and developed markets. As the emphasis here is placed on emerging markets, only that programme will be discussed.

Eastern Cape Province, South Africa, Western Districts Council, a second tier government organisation responsible for development of a former homeland now incorporated into South Africa, is reported to be the poorest district in South Africa, and was chosen for the testing of the model. Conditions there would test the viability and usefulness of the model at the extreme lower end of the market. At present five projects are being completed. These are:

Project 1

Title: Bathurst TRC, Trappes Valley, provision of water for 11 houses

Project team: T. Pillay

Value: ± R60 000

Duration: 6 weeks

Location: Trappes Valley, ± 10 km north of Bathurst and ± 190 km from Port Elizabeth.

Beneficiaries: Trappes Valley community: 11 families.

Stakeholders: Bathurst TRC Councillors, Trappes Valley community, Spoornet, Western District Council, Adjacent landowners.

Description:

It is council's intention to provide a water tank for each dwelling and to install guttering and down pipes feeding into the water tanks. The community consists of senior citizens and casual workers who live on the property owned by Spoornet. The latter refuses to assist with maintenance or provision of any basic facilities. The community is currently using water from an adjacent dam, which is used by livestock as well. This is unhygienic and creates a health risk to the community.

Project 2

Title: Refurbishment of clubhouse and sports facilities

Project team: G Waggiet and V David

Value: ± R100 000

Duration: 6 weeks

Location: Enon and Berseba, ± 15 km east of Kirkwood and ± 100 km from Port Elizabeth.

Beneficiaries: The youth and sports enthusiasts living in Berseba and Enon and neighbouring towns, which fall under the jurisdiction of the Kirkwood TRC.

Stakeholders: Berseba community, Enon community, Kirkwood TRC, Western District Council.

Description:

The Enon/Berseba community is made up of two settlements on either side of the road some 15 km from Kirkwood. Enon originated as a Moravian church settlement. The Berseba community has largely been a squatter community until the council intervened during the past few years. The existing sports facility has been vandalised and needs urgent attention in order to uplift the young community of Berseba and Enon. It is anticipated that new ceilings, and all internal fittings such as doors, toilets pans and basins, seating benches etc. will have to be replaced. The whole facility will have to be painted, floors replaced etc. Further to the above, the rugby poles and netball poles need to be replaced and the netball court repaired.

Project 3

Title: Construction of garage at the Thornhill clinic

Project team: P Snyman and M Kwenaite.

Value: ± R40 000

Duration: 6 weeks.

Location: Thornhill ± 50 km from Port Elizabeth on the N2.

Beneficiaries: Community of Thornhill, as well as Department of Health.

Stakeholders: Thornhill community, Department of Health, Hankey Transitional Representative Council, Western District Council.

Description:

This Council provided the Thornhill community with a clinic about two years ago. At this stage, there is no parking available for the mobile clinic. This project is to provide a lock-up garage facility for this vehicle.

Project 4

Title: Provision of water to squatters

Project team: H Meiring and S Somngesi.

Value: ± R60 000

Duration: 6 weeks.

Location: Berseba, ± 15 km east of Kirkwood and ± 100 km from Port Elizabeth.

Beneficiaries: ± 40 families living in Berseba, forming part of the Berseba community, which falls under the jurisdiction of the Kirkwood TRC.

Stakeholders: Berseba community, Enon community, Kirkwood TRC, Port Elizabeth TLC (Manager of Water Purification Plant on Council's behalf), Western District Council, S.R.I.B., Kirkwood TLC.

Description:

The Enon/Berseba community is made up of two settlements on either side of the road some 15 km from Kirkwood. Enon originated as a Moravian church settlement. The Berseba community has largely been a squatter community until council intervened during the past few years. Most properties in Berseba have been provided with basic services. Water is available to most properties, some roads are surfaced and each property has electricity. Sanitation is by way of pit latrines. The affected families are on approved new sites, which are un-serviced to date, and it is envisaged to provide water to these sites. The bulk water supply for Enon and Berseba is obtained from the Sundays River Irrigation Board, is purified at the purification works, and pumped to the Enon reservoir. The purification plant is managed by the Port Elizabeth TLC on behalf of Council. Both communities are fed out of the Enon reservoir.

Project 5

Title: Erection of a model house

Project team: M. Preece and J.J. Badenhorst.

Value: R15 000

Duration: 6 weeks.

Location: Colchester Township, approximately 30 km from Port Elizabeth on the road to Grahamstown.

Beneficiaries: Member of Colchester community still to be identified.

Stakeholders: Colchester Community, Western District Council, Port Elizabeth TRC, Eastern Cape Housing Development Board.

Description:

It is the aim of the South African Government to house the people of South Africa. The normal process is to apply for project linked subsidies, which, once approved, allows the

developer to install services and erect houses. Unfortunately, there is a shortage of funds for the project linked system but there is a small amount of money available, on a monthly basis, for individual subsidies. It is this system which is to be used to start the housing process at Colchester. The sites have been surveyed and pegged, and the general plans approved. The water reticulation has been partly installed, and will be finalised in the near future with funds available from the IDT. A conveyancer is to be appointed, to prepare the necessary documentation for the opening of the township register etc., to ensure that at the end of the project, the houses are registered in the name of the beneficiary. It is the intention of this council to have a model house erected so that the Colchester community can see for themselves the type of housing that will be provided for them through the project.

Comments from the project teams

There was an immediate improvement in the management of personal time and on the second day of the course a vast improvement in time management, handling of interruptions and communication had taken place.

The project management theory was comprehensive and contributed to a general understanding that successful project management was dependent on the management of people and not on the management of tasks.

The system covers more loopholes than anything used to date. It was distressing to note how few aspects had actually been covered on projects until now.

The pencil and paper system was proving more comprehensive than originally thought possible. Projects are now better planned, with the correct emphasis placed on detail at the correct point in the project life cycle.

The form dealing with Communication management and stakeholder analysis has revolutionised the way our projects are now progressing. In fact we are using this approach on all our projects now.

The system has caused us to re-examine the way we are delivering development projects and we are now re-engineering our Council to follow the guidelines set out in this model.

A revolution has taken place in the delivery of projects by this Council. They are now able to deliver projects at a speed never before considered possible. Accuracy of time and cost has been greatly improved and, most importantly, acceptance by the communities and stakeholders of the projects delivered has been gained.

The model/system was subsequently audited on four working projects by Ernst and Young and found to be the "preferred approach to management of life critical Year 2000 compliance projects." for the South African Government's Transportation Department.

4.4. Step by step guide through the system

4.4.1. Proposal stage

The Mind map revolution

Research into the way the brain works has led to radical conclusions being drawn over the years, so it may seem unusual that man's style of communication has changed relatively little. In societies all over the world information is written down in a monotone, linear format - a style which does little to assist the mind's natural thought processes and recall mechanisms. Blaming things on a bad memory, or a lack of imagination may therefore be more a reflection of poor learning methods, than of the physical limitations of the brain.

When the brain receives a message, a multitude of electrical impulses are sent from one cell to the next, linking the information to structures already existing in the brain. In order to link this information to one of the infinite maps in the mind, the brain needs to clearly understand the message it receives and to attribute to it a variety of associations and contexts. The more associations, the more connections can be made within the brain, and the information will subsequently be easier to trace and recall. The brain is also believed to have two operational areas; the left side, which is stimulated by such things as logic, words and numbers, and the right, which is stimulated by such things as rhythm, pictures and colours. By presenting information that stimulates both sides of the brain, more associations arise, and the message will again be easier to store and retrieve.

The shape of the mind map mirrors the brain's natural structures, and traces the logical links between ideas. It also combines pictures, words, colours and dimensions to stimulate different areas of the brain, allowing it to link the information in various ways to the existing structures in the mind. It is possible to construct a mind map with the project brief in the middle of the page and to radiate out on four arms conceptually, the

activities foreseen for each of the four stages of the lifecycle. Thus armed with a much more detailed briefing than is normally expected, a project life cycle can now be conceived in four or five stages containing a strategic level work breakdown structure.

The project life cycle

In their original work, Cleland and King (1988: 191) identified up to 23 stages in the project life cycle. The PMI-BOK identifies 5-9 stages and British Standard 6079 uses 10 stages. Research has found that in most cases three of the stages remained constant. Only the planning stage was expanded into more stages. The primary reason for this was a direct result of product risk that the project carried. The more risk, the more stages. (Van der Merwe 1999c: 2). In short, four stages are used and when final design is completed, stages will be added to enclose the risk defined by the design of the product. The four stage model is developed from a time line **Figure 4-9** representing the start of the project and its end which is then divided into four parts.

Figure 4-9: Four stages

Start			End

Source: Own compilation

Next, the titles are added for each stage of the project **(Figure 4-10)**. As planning starts at the strategic level, 10 activities per stage are catered for. Further, space is left to accommodate the end condition for each stage, and for a project title. This forms the basic model for assembling information in order to compile a strategic level work breakdown for a project. However, before one can begin, the most important element of the project must first be determined. (A fifth stage representing the commercial life cycle can be added to note maintenance and refurbishment issues.)

The end condition (SMART goals) is the quantitative and qualitative end statement that will stipulate when the product that the project is to produce has been achieved. This is important as without this statement the project is without an end goal. Not only will the

project manager be unable to determine when the project is complete, but the project team will also be unable to determine when the project scope has changed.

Figure 4-10: Four stages with end conditions

Project Title

Start PROPOSAL	PLANNING	IMPLEMENT	End CLOSE-OUT
END CONDITION PROPOSAL STAGE	**END CONDITION PLANNING STAGE**	**END CONDITION IMPLEMENT STAGE**	**END CONDITION CLOSE-OUT STAGE**

Source: Own compilation.

For this reason the end condition must contain elements of both quality and quantity, so that changes to project scope can be evaluated against what was agreed. If the end condition is: "10 people enjoying lunch" then "10" is the quantity and "enjoying" is the quality. The end date is not a determining factor as it does not impact on the work to be done, only on when it is to be done. But if "10" becomes "100" or "enjoying" becomes "eating" then the scope of work to be done changes and has to be evaluated against the resource constraints. More people would have to be employed on the project team or use a less renowned chef to prepare the food.

On the other hand, if the end condition changes to: "10 dogs enjoying lunch", everything changes. It is surprising to note how easy it is for scope changes of this magnitude to

creep into a project without anyone noticing, when no end condition is evident. The end condition of the project can also be referred to as the end goal of the project. The acronym SMART can be applied to the goal interpreting it as: Specific, Measurable, Achievable, Realistic and Time bound. The end condition can also be referred to as a target. The project, as an arrow, is launched at the target with the intention of striking the centre. Measurements of project success are to see where on the target the arrow lands: whether the mark was hit or, due to scope changes, how far from the mark did the project arrow fall, i.e. by how much should the aim be corrected in order for the next arrow to be on the mark. This feature can also let the project team know when the client requires the project to aim at an entirely different target.

Next, the beneficial change required by the project is determined as a departure point of the project. This is equally important to the end condition as it pegs the project between two points, which the project team uses as a guide. This tells the project team where they are shooting from, that is, how long or how difficult is to shoot the project arrow at the centre of the target. A project is cost justified only if it provides a more effective solution to eliminate a problem, than to live with it. This defines the benefit that the project is to bring about or the solution that is being sought. A project can be within cost, quality and time and even deliver the very product it was designed to, but if the solution does not work, the project can still be seen as a failure.

To continue with the "steak lunch" example and stipulate a benefit to be "improvement in inter-departmental communication" it might put a particular slant on the design of the project. But if the benefit is to "meet the leader of the country" it will put a completely different slant on the design of the project, even though the end condition remains completely unchanged. Once stated, the beneficial change that the project is to bring about is used to focus the minds of the project team on solutions that need to be found while working towards the end goal.

Now that the end condition of the project is known, as well as what benefit is to be derived from it, a title can be extrapolated. This is not as easy as it may seem at first. Research has found on many occasions that project programmes contain thousands of

projects all with the same title and company executives complaining that they have no control of expenditure. No one can make sense of such a list.

The trick is that **real processes** only exist if they are continually and incrementally improved. Projects are those incremental improvements to existing processes which are in use. If project titles reflect the benefit and end condition, then the sum of all project titles will contain the evidence of the processes that are being improved, that is, those experiencing problems. Research done in an Engineering concern to establish a project programme, 150 projects all with the words "produce" and "report" in the title where found. After further investigation it was revealed that 73% of their income was generated by selling the information contained in these "reports" yet no process for producing reports existed in this company.

Here's the crunch: no one in the organisation had any formal training in report writing, and management had no process in place to manage it. That is tantamount to a car manufacturer having a separate production line for manufacturing buses that no one knew about and was making more money on than on the sale of the cars. The project tile must contain elements of the end condition and the beneficial change. The following example has been found to work best: Lunch for 10 to meet the President (11 May 1999)

Practise revealed that by placing the "by when" target end date in brackets at the end of the project title helps to keep everyone aware of the expected target end every time they see the title **(Figure 4-11)**. If 150 projects where found all with "lunch" and "to meet" in the title this could be investigate and in so doing something could be revealed to solve the problem in a global fashion, thereby eliminating the need for these projects. The title is now entered into the **Project Life Cycle Form** as follows:

Figure 4-11: Project title

Lunch for 10 to meet the President (11 May 1999)

PROPOSAL	PLANNING	Implement	CLOSE-OUT
To meet the new leader of the country			
END CONDITION PROPOSAL STAGE	**END CONDITION PLANNING STAGE**	**10 people have enjoyed lunch**	**END CONDITION CLOSE-OUT STAGE**

Source: Own compilation

Strategic level plan

The proposal stage starts with determining the beneficial change already defined for the project. A form 1 starts the proposal stage and a form 2 ends the proposal stage. The process model **(Figure 4-2)** also shows that the end condition for proposal is the acceptance of resource constraints by a sponsor. Research found a common error occurred whereby people's thoughts turn to performing the task while planning it. This leads to becoming distracted and to delve into detail at to early a stage in the life cycle. With practice a strategic level plan should take no longer than 10 minutes to complete. The beginning and end of the proposal stage is known and all that needs to be done is to identify approximately 10 logical steps to use as a guide from beginning to end of the stage using information from the Forms.

A form 1 is used to give permission to spend time on the feasibility study, to document requests and set up a five-year plan for capital expenditure. Generally speaking, a project submitting a Form 1 will not be for the current years' expenditure. The work to be performed in the proposal stage is to gather information to fill in the Form 2. That means that a feasibility study is done to determine resource constraints. Resource constraints are used to communicate the projects requirements. This is called lobbying or pitching the project. Once acceptance is gained from stakeholders a presentation is held to potential sponsors. If someone agrees to accept the constraints of the project, sponsorship has been achieved. **Figure 4-12** contains a project life cycle consisting of four stages and a strategic level work breakdown structure.

Figure 4-12: Strategic level plan

Lunch for 10 to meet the President (11 May 1999)

PROPOSAL	PLANNING	Implement	CLOSE-OUT
To meet the leader of the country	Start up meeting	Site establish	Contract close
PM: Champ:	Formal investigation	Procurement	Scope verify
Feasibility Study	Design	Delivery to site	Administration close
Resources: Number of people Labour hours Equipment Cash Total $ required	Specify	Prepare meal	Financial close
Communication Plan	Tender	Opening	Project report
Lobby / pitch	Evaluate	Serve meal	Final meeting
Fill in Form 2	Risk analysis	Close	Fill in Form 5and6
Presentation	Fill in Form 3	Fill in Form 4	(Asset register)
Sponsor approval: resource use 50% accurate	Sponsor approval: resource use 75% accurate	Sponsor approval: resource use 95% accurate	Sponsor approval: resource use 100% accurate
Sponsor(s) accepts resource constraints	**Contract**	**10 people have enjoyed lunch**	**Team disband**

Source: Van der Merwe 2000: 13

Now that the strategic plan has been developed by the project Champion and Manager, the work of the proposal stage is performed in a logical sequential manner until all the work of the Proposal Stage is done.

Fill in form 1

This Form is used to get a unique registration number for the project, to calculate the requested budget for the project in the year that expenditure will be required and to assign a Project Manager and Champion to the project.

Fill in the feasibility study form

It is understood that the feasibility study can be a project on its own and that for large projects it may take several years to complete. The Project/system forms are specifically aimed at the management of small business related projects with a typical duration of some months that are not necessarily spending capital money. The feasibility study is done in order to determine what is feasible. Using the lunch example that would be to determine: is the president available?, will he attend on the given date? is a suitable venue available? who will do the catering? who eats what? can this be done? when? what is an acceptable cost? If the project does not prove to be feasible, the project is cancelled. No further work is to be done.

Formal feasibility is conducted to explore all possible options for implementation of the project, to achieve a clear understanding of the **SWOT** issues involved, to produce enough information to rank the options so that clear objectives of the way forward can be obtained. Use the "Strengths/Weaknesses" fields on the feasibility study form to enter details of the factors over which direct control can be gained. In the "Opportunities/Threats" fields enter a list of the external factors of which the project should be aware. These fields can then be used as input for the Critical Success Factors (Risk Analysis) form.

Another way of doing the feasibility study is to analyse the options or alternatives to solving the problem. When exploring the options, as many ideas as possible should be

explored to render the best solutions. The issues relating to each option must be considered and used to weight available options so that the most acceptable ones can be chosen. The options are then prioritised in terms of quantity and quality to find the best acceptable solution. After the risk analysis has been done, the viability of the project is based on the use and cost of: people, time, equipment and cash that the project is to consume. At the very least the number of people working on the project is to be calculated as well as the number of hours they will be required to work on the project.

Taking into account the salaries of these people, multiplied by the hours they are to work, multiplied by the number of people, plus the cost of any equipment they may need to perform their duties, plus any cash contingency cost that may added, a 50% accurate figure of the supply account cost to manage the project can be derived. The exercise is repeated for the proposed implementation stage to derive a 50 % accurate figure of the expected capital account expenditure of the project. The feasibility study should result in a clear idea of future stages. The study must also provide an understanding of the factors that influence the Critical Success Factors of the project, normally referred to as RISK.

Fill in the risk analysis form
At this stage, only project related risks are to be evaluated such as environmental impact, funding, regulations, geographical issues, political interest etc. Product related risk such as poor design, failure of third parties, and inappropriate solutions, can only be assessed in the planning stage, once design has been established. Fill in as many risks as can be thought of and later add new ones, as they become known. Use a separate sheet for product related risks.

The risk analysis form (critical success factors) is an analytical tool which will help prepare a reaction to happenings and events which, while outside of direct control, need to be borne in mind and prepared for. The likeliness of these events occurring will vary, as will their influence on the project. As a rule of thumb, attention should be given to planning for eventualities, which are probable or possible and will have a strong or decisive effect on the project.

These factors can have either positive (Success Factors) or negative (Risks) effects. Those, which are positive, should be nurtured and, if possible and realistic, action should be taken to make them happen. On the other hand, the effects of the negative factors should be prepared for, and at the same time their likelihood should be monitored constantly. Use the reverse side of the Risk Analysis form to plan the steps to take should any of the events having a negative influence occur, and to plan how to influence the positive events and try to turn them into realities. Transfer the most important of these factors onto the relevant field of the project initiation form.

Fill in the communications plan form

Project stakeholders are defined as follows: "all the people or groups whose lives or environment are affected by the project, but who receive no direct benefit from it. These can include the project team's families, people made redundant by the changes introduced, people who buy the product produced by the facility, and the local community " (Turner 1995: 214).

Stakeholders are also those people or groups who believe they are affected by the project or who have an opinion on the project or the changes that the project will create. It is important to recognise that stakeholders are all the parties who may be affected by the project and not just the easily identified parties with direct involvement in the project. Although appearing as indirect players in the project environment, stakeholders can have a major impact on project success.

Failure to recognise their existence and their potential power at a project's strategic level may lead to serious problems in the advanced stages of project planning and implementation. The project environment consists of two main groups of stakeholders: those 'internal' to the project with direct responsibility; and those 'external' who are affected by the project or have an interest but are not part of the main project team. The behaviour and performance of the 'internal' stakeholders are, theoretically, controlled and predictable. However, the stakeholders of the 'external' group are free to behave in any way they choose with no regard for the project. To understand how these

stakeholders will behave it is necessary to fully appraise their level of power, interest, predictability, knowledge, skill and information needs.

The first step is to draw up a list of the stakeholders. The list should also identify what 'stake' these groups have in the project, that is their level of power and interested in the project. Their behaviour will be influenced by their predictability, knowledge and skill. Many of the problems experienced in projects, caused by stakeholders, have occurred because of poor communication from the project team. This can allow misinformation or no information at all to fuel the imagination of those with an interest. Communication is perceived as a vital ingredient for project success.

It has been calculated as being second only in importance to technical performance. The project manager and team need to draw on the full range of communication methods and media to communicate successfully with both the internal and external stakeholders of the project environment. Within the project team it is common practice to use drawings, bar charts, work breakdown structures, organisation breakdown structures, network diagrams, meeting minutes, memos, etc. to communicate information. Control of this information flow is usually formalised and agreed between team members using drawing issue sheets, project responsibility charts, communication plans and meeting schedules.

However, control of information to external stakeholders is rarely so well organised. Communication with external parties can be planned or unplanned. Communication to external parties must be controlled by the project team to ensure suitable information is given at the most advantageous time for the project and to reduce rumour and hearsay. To achieve this a communication plan must be formalised which will make best use of planned communications to reduce unwanted or unplanned communication. The project's external communication plan can be formulated by considering the stakeholders and environmental influences that were identified using the processes on the Communication Plan Form. In all cases it is likely to be beneficial to contact supporters and opinion formers to advise them of the project's aims and benefits.

The plan should include contingencies for dealing with possible detractors and to include those with pertinent skill and knowledge in the team so that communication is managed as proactively as possible. Consideration should be given to using any of the communication methods and media identified above. Proactive communication of information is cheap compared with reactive responses to information.

Fill in the form 2

No further work is to be done on the project until the Form 2 is signed by the sponsor. The Form 2 is used to give permission to spend money or time to complete the detailed design of the project and to increase the accuracy of the estimated cost of the project. Generally speaking a project entering a Form 2 will not be intended for the current years expenditure. Form 2 is also used to set the three-year plan for capital expenditure.

4.4.2. Planning stage

The planning stage is the single most important stage of the project. Its importance cannot be over emphasised. Research has revealed that it is almost impossible for a project to succeed when major errors are made during the planning stage. Projects experiencing difficulty in the implementation stage have almost always not completed the planning stage correctly. Two models exist as can be seen in **Figure 4-13** to explain the relation between planning and implementation.

Figure 4-13: Comparison of planning models

Western Model

PLANNING	IMPLEMENTATION

Eastern Model

PLANNING	IMPLEMENTATION

Source: Svensson 1994: 34.

From this it is clear why the proverb "More haste, less speed" was originated. De Bono has done a great deal of research into problem solving around the world, and has concluded that the eastern approach to spending more time planning, leads to faster implementation, with the advantage of being faster to market, with almost no rejects in the long run, thus giving a clear lead in market dominance (De Bono 1985: 29).

Of all the work, that makes up the planning stage, none is more important the start up meeting. Time must be taken to get the project off to a good start. It is here that people commit to doing work. If no commitment is given the work will not be done. Research has shown that if the people who are responsible for doing the work do not accept responsibility for performing the work **themselves**, the project will not progress. A detailed look at what happens during the start up meeting is required, and for this section an extract from Professor Turners' book "The handbook of project-based management" (Turner 1995) follows.

Project start up meetings

Introduction

A project requires the undertaking of a unique task using a novel organisation, which must be created from scratch at the start of the project. A project is subject to time constraints, so the process of team formation must be undertaken in a structured way to ensure that it happens quickly. The structured approach to creating the project organisation is called PROJECT START-UP. The term 'project start-up' is used to differentiate from the project start. The former is the process of team formation; the latter refers to a point in time.

Objectives of start-up

For a systematic approach to start-up to be successful, the participants must understand the objective of the process at any stage, and must be aware of the specific outputs needed to achieve the necessary level of understanding. These objectives are to:

- create a shared vision or mission for the project by identifying the project's context, its purpose and it's objectives;
- gain acceptance of plans by defining the scope of work, project organisation, and constraints of quality cost and time;
- get the project team functioning by agreeing to its mode of operation and the channels of communication;
- re-focus the project team onto the purpose of the project, and the method of achieving it.

These objectives in turn influence the emphasis of the work of the project team, which:

- analysis of the project's context, previous plans, future tasks, and management routines;
- plan's objectives, scope of work, organisation and routines;
- communicates between participants of the results of the analysis and plans;
- motivates of participants to carry out work or make decisions.

It is thus shown that during the life cycle the emphasis shifts from analysis and planning to communication and motivating until the end, when it switches back to analysis.

Methods of start-up

There are three standard techniques to project start-up:

- holding project or stage launch workshops where key people develop project plans in a joint team building process;
- developing a start-up or stage review report which collates the result of the analysis undertaken during start-up or from a previous stage in accessible form for use during the subsequent stage;
- using ad-hoc assistance from project management professionals.

These three techniques may be used individually or in combination. The choice depends on several factors. Firstly, the different methods require varying amounts of time. Secondly, the methods each differ in efficacy in achieving objectives. Thirdly, through

project start-up one should try to build as much historical experience into the project definition as possible, to minimise uncertainty.

A launch workshop held at the start of the proposal stage is called a PROJECT DEFINITION WORKSHOP, at the start of the design stage, it is known as an INITIATION MEETING, and at the start of the construction stage, it is a KICK-OFF MEETING. The START-UP or STAGE REVIEW REPORT is prepared at the end of one stage to launch the next. Ad-hoc assistance may be from internal professionals, external consultants or team members from similar earlier projects. The advantage of this method is that it provides additional "resources" with special skills, who may motivate people. Other methods of start-up include study tours, social events and education programs.

Workshop objectives

The main objectives of the workshop are:

Gain commitment and build team sprit.

This is the primary objective of a workshop. Many of the other objectives can be achieved by people working alone or by meeting in smaller groups. By coming together, they may develop a common understanding, and resolve items of confusion, disagreement, or conflict through discussion. If people are briefed after a meeting, they may nod their heads in agreement, but one often find they do not truly accept what they are told. If people agree to a course of action in a meeting, one usually find they have internalised that agreement, but if not, it is difficult for them to avoid their commitments later because several people have witnessed them.

Ratify earlier project definition

Whatever stage is being launched, it is vital for the team to agree on what the current level of definition entails, and that it represents a true interpretation of the users requirements.

Plan the current stage

The workshop is used to launch the current stage; therefore producing a plan for the stage is a key objective. This should consist of an operational plan and responsibility chart, as a minimum.

Prepare preliminary plans for execution

It is usually worthwhile to prepare a draft operational plan for execution, as this can be a useful basis for the feasibility study or design, even if the subsequent project follows a slightly different course.

Prepare preliminary estimates

These give the project team some idea of expectation of the cost and the benefit to be derived from the project. Although their subsequent work should not be constrained by these estimates, they can help to set the basic parameters.

Start work promptly

The workshop should be used to plan the initial work of the current stage, so that the team members can make a prompt start.

Agree on a date for reviewing the stage deliverables

Ideally the plan should contain a time scale and budget for the stage. An end date, at least, should be set for completion of the stage, to ensure that it does not remain open ended.

Workshop attendees

The workshop should be attended by key managers, including:

- ❏ the project sponsor and champion
- ❏ the manager of the current stage
- ❏ the manager designate of future stages, especially execution

- ❑ key functional managers whose groups are impacted by the project, including technical managers, users managers and **resource providers,** that is, the people who are going to do the work
- ❑ a project support office manager;
- ❑ a facilitator

Workshop agenda (refer start-up meeting from)

A typical agenda for a workshop contains the following actions:

1. Review the current project definition
2. Define the objectives of the current stage
3. Develop solutions and criteria for evaluation
4. Assess risk and assumptions
5. Prepare a operational plan for the current stage
6. Prepare a responsibility chart against the plan
7. Estimate work content and duration's for the work packages
8. Schedule the work packages
9. Prepare initial activity schedules
10. Prepare a management and control plan.

The most effort usually goes into the operational plan and responsibility chart, as they provide the most effective use of group working. Involving everyone present gains commitment to the plans produced. Estimates and schedules are best agreed on through a process of negotiation immediately after the workshop.

Workshop timetable

A workshop typically lasts one to four days. Two hours per item is usually scheduled except for items 5 and 6 which each takes four hours. However, it is important not to keep to the timetable too rigidly, but to allow discussion to come to a natural end as people reach agreement and a common understanding. When developing an operational plan, people often reach a blank, and the plan just does not make sense. However, when left for a while, it seems to naturally fall into place.

A key element to start up meetings are the production of responsibility charts, item 6 on the agenda. The following explains how this is to be achieved. From point five on the agenda: "Prepare an operational plan for the current stage"; a strategic level plan for the current stage is required. To turn this into an operational level plan, a break down of each strategic level activity is required in no more than 10 operational level activities. This breakdown has to be done by the person who accepts responsibility for performing the task. At the start, people from the attendees' list are invited to the start-up meeting and an advertisement (the agenda) is placed around the office and given to all interested parties.

It is imperative that **the team** be made up of those who are interested to perform the work in delivering the product that the project is to produce. It is self-evident that the people who have the required skill will normally not be available. It is therefore important that the team be made up of people who are interested, and that providing them with the knowledge and skills needed, will secure them to the project. (Concept of life long learning). When the start-up meeting is called, all interested people attend. Points one to five of the agenda and the form 2 are discussed. Point 6 of the agenda is then used to "Prepare a responsibility chart against the plan" as follows: (Refer: Responsibility Chart Form). **Figure 4-14** is a responsibility chart of the planning stage at the strategic level.

The form is completed by a facilitator who begins by asking for volunteers to take responsibility for the investigate activity. The person who volunteers is then asked to break the activity down further. Next, volunteers are invited for the broken-down activities and **they** determine the duration time of the activity. In this way the mistake of recording the demanded duration of the task is avoided and the available time of the person is considered. From this responsibility chart a few observations can be made: People who are team leaders can also be team members for other tasks. Not all tasks have to be broken down. Relationships between activities are determined by the people who will perform them. Only people who have accepted responsibility are on the team.

Figure 4-14 Planning stage responsibility chart completed

Planning stage Responsibility chart	Name	Time in hours	Target end date (S=10h00)
Start up meeting	Facilitator	3	Today
Formal investigation	**PAUL**	**1.00**	**11h00**
• menu	Sally	0.30	10h45
• venue	Annie	0.30	10h45
• theme	Paul	0.45	11h00
• guest's	Paul	1.00	11h00
Design	**CHARLES**	**0.30**	**11h30**
• menu	Sally	0.15	11h15
• theme	Paul	0.15	11h30
Specify	**MIKE**	**0.30**	**12h00**
Tender	**PURCHAS**	**0.30**	**12h30**
Evaluate	**SALLY**	**0.15**	**12h45**
Risk analysis	**CHARLES**	**1.00**	**12h30**
contingency plan	Paul	1.00	12h30
Fill in Form 3	**PAUL**	**0.15**	**12h45**
Sponsor approval: resource use 75% accurate	**SPONSOR**	**0.15**	**13h00**
Contract			**13h00**

Source: Van der Merwe 2000: 27

Applying the six fundamentals of project control :In what stage of the life cycle is the project? Which activity is presently being worked on? At what level of detail is the work being done? Is the person, the time or the task the problem? In **Figure 4-14** it would seem that a time problem exits. Formal investigation takes the longest, so a time solution should be found. Paul's activity is taking the longest so Paul is asked for a solution. Let's say he does not have time available. All the attendees can see that the project is in jeopardy and somebody else could volunteer to do the work in a shorter duration. If a solution cannot be found, the project is stopped. There is no point in proceeding. If no people volunteer to perform the work, then the project is without human resources, and must stop. The sponsor must be present, and also the

stakeholders. If solutions are not presented, all can understand the consequences, and that expectations cannot be met.

The advantage of responsibility charts are that these issues are found up front and that alternatives can be considered (like going to a restaurant, a late lunch 14h30 or making dinner instead) before it is too late. Conventional methods do not give this advantage. Once decisions have been made the project can now progress. A diary is used by the team to schedule work packages (Point 8 of the agenda) and the detail level can be planned on job cards by the operational level responsible staff.

Preparation of initial activity schedules (point 9 of agenda) in GANT format can be done if required. However it is recommended to stay **within the present stage of the life cycle only** by using the responsibility chart and project schedule form marked month, week, day or hour depending on the duration of the project. From the responsibility chart strategic and operational work packages are copied onto a project schedule and the target end date is marked on the schedule. **Figure 4-15.** By subtracting the duration given on the responsibility chart from the target end a bar is drawn by colouring in the space between the two marks like the following example:

Figure 4-15: Bar chart completed

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

08h	09h	10h	11h	12h	13h	14h	15h	16h	17h

Source: Van der Merwe 2000: 28

In PERT diagramming methodology, early and late dates are superseded by target dates. This can cause an abnormality in that late dates can be earlier than early dates. The responsibility chart avoids this by only using target dates. This makes the project super critical by definition, as no critical path can be calculated by computer, as all activities are critical, due to the use of a target end.

The project manager now manages the project by relating the time each member of the team has available to perform the task to the time the task demands to be completed. This means that it does not matter when a team member starts with an activity as long as it is done by the target end. The project manager applies the six fundamentals of control and prioritises work in order of efficiency, 20 60 20 rule (Van der Merwe 1995b: 3) to make sure that targets are met. All that remains is for the meeting frequency to be set. Preparing a management and control plan (point 10) of the agenda is achieved by determining the progress reporting, using responsibility charts and a strategic plan as the control plan. At progress meetings, progress is checked and problems are dealt with using the 6 fundamentals of control against the responsibility chart and progress report.

Research found that common errors are made in project management progress reports and meetings when discussions revolve around the accuracy of recorded history, when not enough attention was given to predicting future events. The maxim follows:

There are only two things you can do about the future:

You can watch it happen

or

you can make it happen

By planning and reporting on future events only, the mistakes of the former are avoided, and solutions for the latter are presented. Good practise finds that to draw up a responsibility chart for the implementation stage, as an exercise during the start-up meeting, cements future requirements in the minds of those present and leads to improved understanding of the required sequence of events.
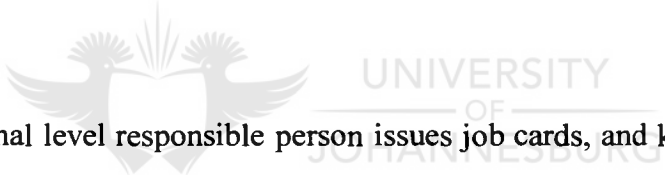
Now that the start-up meeting has been completed and the project team established, everyone understands what is to be delivered and by when, the work of the planning stage can get under way. Regular progress meetings ensure that the project stays on track and that solutions to future problems are dealt with. When quotes for the work

packages in the implementation stage have been received, the Form 3 is filled in with the actual budget demands for the execution of the project, and is presented for sponsor's approval. If the sponsor approves, contracts are placed, and the project now enters the implementation stage.

4.4.3. Implementation stage

A stage launch workshop can be held, if required, which follows the agenda for the start-up meeting. A responsibility chart **Figure 4-16** for the stage can be produced. With the work of the project under way and checkpoints in-place, all that is required is to follow progress until the goal of the implementation stage is reached. Ideally, the implementation stage responsibility chart will be worked out down to the detail level. Detail level activity cards are used like job cards for each detailed task that needs to be performed.

The operational level responsible person issues job cards, and keeps track of the people and tasks at the detail level. Tight control is required during this stage and checks need to be made, to see that time is scheduled in which the responsible person can perform the task he has accepted responsibility for, at the appropriate priority level.

Figure 4-16: Tactical level responsibility chart

Implement Stage Responsibility chart	Name	Time in hours	Target end date (S=13h00)
Site establish	PAUL	0.15	13h15
Procurement	SALLY	0.30	13h45
Delivery to site	CONTRAC		14h00
1. Prepare meal	CHEF	0.30	14h30
a) Starter		0.15	14h30
b) Main		0.15	14h55
i) steak		0.10	
ii) trimmings		0.05	
c) Desert		0.15	15h15
i) ice-cream		0.05	
ii) hot chocolate		0.10	
Opening	SPONSOR	0.30	14h00
Serve meal	CHEF	0.50	14h30
Close	GUEST	0.15	15h30
Fill in Form 4	CHAMP	0.30	16h00
Sponsor approval: resource use 95% accurate Form 4	SPONSOR	0.05	16h00
10 people have enjoyed lunch			**16h00**

Source: Van der Merwe 2000: 34

Once the meeting is over the work of the project can begin and progress is reported as for the planning stage. Progress meetings are scheduled to analyse the effect of late delivery of detailed tasks. Progress meetings are held and solutions are sought for future problems, while keeping track of implementation delivery. As this stage draws to a close, the product which the project is to deliver takes shape. When delivery of the product is complete, and it has been tested and commissioned, the Form 4 is completed signalling the end of the implementation stage.

4.4.4. Close out stage

Once a form 4 has been approved and signed, the work for the close-out stage can be performed at a strategic level as there is no need to break down work to any further level. On large long-duration projects one could have a stage launch workshop and progress the work as for the planning and implementation stage.

A form 5 is used to close the contract and close the administration of the project. Scope is verified, a project report is written and the final meeting is called. At the final meeting, performance can be discussed and lessons learnt can be recorded. The project report is compiled, the team is disbanded and the project is closed.

Form 6 is used to place the value created into the assets register. The post project evaluation form can now be completed and filed for future reference. Research has found that a major error can be incurred at this point when modifications of installed plant are allowed to delay the closure of the project. Modifications, refurbishment and replacement should be seen as separate projects which occur in the commercial operation stage of the life cycle which the project has now entered.

4.5. Conclusion

Development of the project management model (Objective 3) has shown how a four stage life cycle model is developed, containing a strategic level work breakdown structure and responsibility charts are used to control business development projects. Education in the use of the model was briefly discussed as it was deemed necessary to deliver education to general managers in project management and the application of the model. A "Project/system" was developed to form a complete product including the model, training in the use of it and a personal diary concept for the application of the system. The system was used to demonstrate how project management needs to change from the management of engineering development to the management of people who are doing the work of the project, in order to achieve the strategic objectives of the organisation.

The project life cycle was shown as the cornerstone of project understanding to the extent that it can be seen as the first natural scientific law of projects. All projects have and go through a life cycle. The number of stages that make up the life cycle may be in disputed but at the onset no one will argue that in order to come to grips with the projects content, a minimum of four stages are required. Tasks performed within these stages naturally lend themselves to contain breakdown structures. Each stage of the life cycle was shown to contain work to be preformed and managed. Devolving the work from a strategic level to ever lower levels of detail, keeps management focused on the strategic direction intended while the workers concentrate on the skill required to do the job. Managers can then manage people while people manage the work.

By constructing the work breakdown structure in three levels using the ancient Roman military command and control structures of 10 reporting to one, control can be gained over thousands tasks. Rolling wave planning was shown to require that the detail of only the current stage of the life cycle be managed, resulting in detail plans never exceeding the one thousand mark. The added benefit revealed was that the entire project team

focuses on only one stage of the lifecycle. Using responsibility charts to ascribe work to people who take on ownership for performing the tasks at all levels of the work breakdown structure, cements the command and control of the project. Alarm state navigation was used to proactively identify problems that may cause delays in the future. Progress meetings where then used to select solutions identified by the workers for implementation by them, resulting in real progress being made.

This research concludes that a pencil and paper approach to managing rural development projects, where members of the community with different political, cultural, religious and educational standards are members of the project management team as well as the implementers of the project deliverables, can result in successful projects. 40 contact hours of familiarisation with project management theory and use of the system was all that was required to bring about a significant change in stakeholder management and in managing people who are managing the work to bring about success in the delivery of projects even in very difficult communities where no success had been achieved before.

Most importantly, the use of the model has resulted in an understanding of project process dynamics across 1st, 2nd, and 3rd world components, bringing project management as well as the project implementers into a newfound relationship with one another, causing the projects to be delivered on time, within cost, quality, scope and to customer satisfaction.

Business Development:

A Project Management Approach

Chapter 5

Application of the project management model

Chapter 5

Application of the project management model

Synopsis

The development of a project management model based on international best practise will remain meaningless unless it can be deployed successfully to develop local business. Essentially the model has to display that industrial project management theory cannot be directly applied to business development and that general management needs some enhancement to differentiate between the task and the person performing the task. Three case studies are used to deploy the project management model and the concept of using life cycles, work break down structures and responsibility charts to manage projects led by a project manager and champion.

A procedure manual for project management, as is applied to the operations strategic business unit (SBU) of the Transmission group in the Electricity Supply Commission (ESKOM) of the Republic of South Africa, was produced to formulate a standard approach to project management. Transmission operations had no formal project management processes in place and it was the task of this research to develop these processes, as the group had adopted activity-based management as part of its business strategy. It was the similarity between activity-based management and project-based management that led to the request that research be carried out, as the group's personnel had no formal project management knowledge.

The second case study is based on the electrification project, which attempted to install electrical power in 3 million homes within 5 years. At the time this research was done, the project was in its second year and overspending its budget while not meeting the targeted number of new connections. Experience had shown that management of multiple projects involves three critical areas where things go wrong: organisational structure, prioritising projects and controlling project performance. An initial survey showed problems in all three aspects.

The third case study was based on Gauteng Provincial Government's re-engineering of their Corporate Informatics Department. With the incorporation of democratic government during 1994, the existing four provinces were broken up to form nine new provinces, one of which was the Gauteng Province, which incorporated most of the government personnel of the former Transvaal Province, who then had to relocate from their head office. This resulted in a high turnover of staff, placing undue strain on the timely completion of all projects involved with. From this position, the Premier instructed that the Corporate Informatics Department be re-engineered, and that a management by projects policy be adopted by the department. At the time of this research, strategic analysis of the department had just got under way.

Though an essential part of business, business process re-engineering (BPR) has often failed in the implementation stage of projects and although accused at one stage of being the flavour of the month in Europe, it remains of interest because of the efficiencies that can be attained. In an Arthur D Little survey published in Computer World in June 1994, 80% of executives surveyed expressed dissatisfaction with BPR efforts. Processes exist everywhere and are also found in nature. Processes are dynamic and change through continuous incremental improvement in business, or cease to exist through lack of improvement. Work requests from employees are requests for internal improvements to existing processes being used. Work requests from customers are external improvements to existing processes. These work requests are the evidence of the processes being used. They are projects to improve processes.

Business Development:

A Project Management Approach

# Application of the project management model

5.1. Introduction

In 1919, the Union Government invited CH Merz to study and report on railway electrification and electric power supply in South Africa. In 1920 Merz reported to General JC Smuts (Prime Minister at the time) his conclusions and recommendations, which greatly influenced the subsequent development of the electricity supply industry in South Africa. The Electricity Act No. 42 of 1922 heralded the formation of the Electricity Supply Commission (ESCOM). The first part of the Act provided for the establishment of a commission authorised to establish, maintain and operate undertakings for the provision of an adequate supply of cheap electricity wherever required. The second part of the Act provided for an Electricity Control Board, which would exercise control over the supply of electricity by the commission or by private undertakings (ESCOM 1973: 26).

In 1948 ESCOM purchased the Victoria Falls Power Company for the then amount of R 29 000, and became the largest electricity utility in the world. In 1949 ESCOM began construction on ten power stations simultaneously. An interconnected power system linking all the major cities of South Africa became a reality in 1973, immediately inspiring the Sub-Sahara grid (ESCOM 1973: 37). In 1985 ESCOM restructured, and replaced the commission with a council and a management board. The Electricity Act was promulgated in 1987, and the name ESCOM changed to ESKOM. The mission, strategy and philosophy were developed. ESKOM became an independent, self-financing institution. Without shareholders, ESKOM is financed through retained earnings and loans raised on the gilt market.

ESKOM forecasted a 14% growth rate for the 1970s, which realised an actual of only 4% by the 1980s. This led to a huge oversupply of electricity, as construction contracts for power stations could not be cancelled or stopped owing to their long lead times. As a result of this situation a marketing function was introduced to manage the oversupply.

An immediate discovery through the marketing function was that although ESKOM provided more than 97% of the electricity market it held only a 27% share of the energy market **(Figure 5-1)**. This followed segmentation of the market in terms of energy in which liquid fuel and coal were seen to be major competitors. Although no accurate figures exist for the use of wood fuel, it remains the sole source of energy for 60% of the South African population.

Figure 5-1: Energy consumption in SA
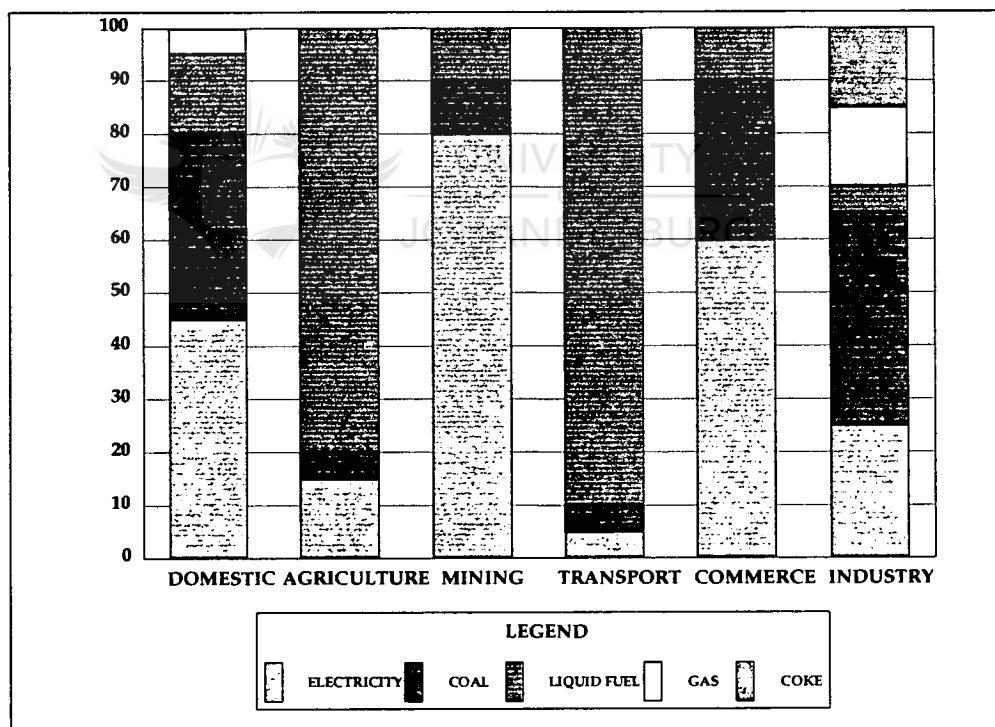
Source: ESKOM 1991: 3

ESKOM is a self-financed parastatal electricity supply utility, employing 40 000 people. With a financial turnover in excess of R2.8 million per hour, ESKOM is the largest earner besides the South African government (ESKOM 1992: 2). ESKOM adopted a

new structure in January 1992 **(Figure 5-2)** and was organised into three functional groups and four service groups, bringing the Transmission group into being.

Figure 5-2: ESKOM organisational structure
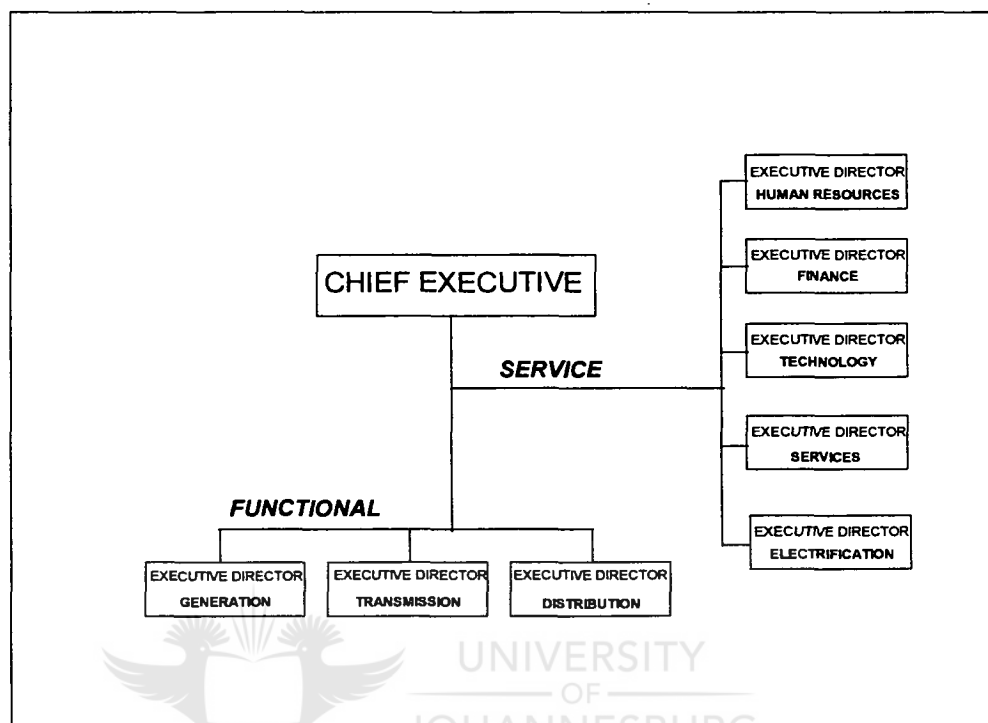
Source: ESKOM 1993: 9

The Transmission Operations Division mainly supports National Control which is responsible for dispatching electrical energy to most of Africa south of the Sahara. In this, the Transmission Group fulfils the role of a wholesaler (on an internal basis), buying electrical energy from the manufacturers (power stations), and selling it to the distributors. Transmission Operations had no formal project management processes in place and it was the purpose of this research to develop these processes during 1994. ESKOM had adopted activity-based management as part of its business strategy and it was the similarity between this form of management and project based management that led to the request.

The first[t] case study led to the production (by the author) of a procedure manual for project management as it applied to the Operations Strategic Business Unit (SBU) of the

Transmission group, in the Electricity Supply Council (ESKOM) of the Republic of South Africa (RSA). The approach to project management was based on "The handbook of project-based management" by Professor JR Turner, and was used as a standard reference text (Turner 1993). Work on this research revealed that unique solutions to attain beneficial change could be achieved through proper application of project management principles as set out in a project management procedure manual.

In the second case study ESKOM had set two major objectives: "electricity for all" as well as the reduction of the real price of electricity by 20% over five years. Further, ESKOM had targeted the domestic, agricultural and industrial market sectors **(Figure 5-1)** as those in which the sales of electricity could achieve the highest gains. In this ESKOM saw as its customers the people of Southern Africa. The electrification project attempted to install electrical power in 3 million homes within 5 years. At the time this research was being compiled, the project was in its second year and had overspent its budget, while not meeting the targeted number of new connections.

Research was carried out to find solutions for multi-project management of an industrial concern with no regard to how organisational structure, the prioritising of and controlling of projects influenced the performance of the organisation. An initial survey had revealed problems in these three aspects, which concurred with available information from current international project management journals from the USA and Europe.

In the third case study, carried out during 1997, research was undertaken to assist the Gauteng Provincial Government to re-engineer their Corporate Informatics Department. With the change of government during 1994, the existing four provincial structures had been broken up to form nine new provinces. With the creation of the Gauteng province the provincial government of the old Transvaal Province government personnel moved their head office from Pretoria to Johannesburg. This resulted in an almost 90% turnover in staff leaving the computer support systems and placed the remaining staff in a position where delivery of current projects was severely constrained. From this position, the Premier instructed that the Corporate Informatics Department be re-engineered, and that a management by projects policy be adopted by the department. At

the time of this author becoming involved, strategic analysis of the department had just got under way.

Business Process Re-engineering, (BPR) first started appearing in the early 1990s when Fortune 500 companies realised huge profits from this endeavour. As a derivative of strategic management, two approaches - internal and external - had proved popular. Even with all the research being done into the failure and successes of BPR projects, the most common errors are in identifying the processes that make up the organisation. This research identified key areas such as:

❑ Current employees not having experience or knowledge of BPR and therefore having difficulty in communicating with the analysts, with the result that they tell them what they want to hear.

❑ Processes cannot be defined, as the natural scientific laws that govern processes are unknown to business analysts, resulting in process measurement made in the wrong places, that is, management consultants measure process ABC, as they are instructed that this is the formally accepted process, while the employees know that ABC does not work as they have evolved process XYZ which does work, but they do not inform anybody about it. This results in only known processes being mapped.

❑ Only known information is gathered on known processes, that is, 10 white tshirts are sold per day while, in fact, 25 customers asked for red tshirts but none were in stock so none were sold and the potential sales are not recorded.

Processes exist everywhere, even in nature. Processes are dynamic and change through continuous incremental improvement in business, or cease to exist through lack of improvement. Work requests from employees are requests for internal improvements to existing processes already in use. Work requests from customers are external improvements to existing processes they are using. These work requests are the evidence of the processes being used which need adjustment. They are projects to improve processes.

5.2. ESKOM Transmission Group: development of a project management procedure manual

5.2.1. Purpose, scope, definition and organisation

Purpose

This project procedure manual was compiled to ensure that the personnel of Transmission Operations follow a common approach to the management of projects. This enhanced co-operation and co-ordination throughout the organisation by providing a training medium to reinforce learning.

Scope

The manual was written in four parts, of which part one provides an introduction and guide to the further use of the manual. The convention followed was that a project is viewed as a network of related activities aimed at the accomplishment of a predetermined objective at a given deadline. A project has a starting point in time and a pre-planned completion point and so does each activity within it (Gabriel 1988: 173).

Part two describes the approach to project management as adopted by Transmission Operations, and the philosophy on which it is based. Part three describes the procedures to be followed during each phase of the project's life cycle. At each phase the inputs and outputs are listed, and the management process required for the start and completion of each phase is shown.

Part four explains the administrative procedures required at all stages of the project. It contains methods for managing the system objectives. Methods of collecting data using standard forms is also shown in part four.

Definition of the manual

This manual was based on the following definition of a project:

'an endeavour in which human, material, and financial resources are organised in a novel way, to undertake a unique scope of work, of given specification, within constraints of cost and time, in order to achieve beneficial change, defined by quantitative and qualitative objectives' (Turner 1993: 8).

There are two essential features to this definition: the task is unique and the method of achieving it is novel. There are three further consequences of these features.

❑ **Projects carry considerable uncertainty and risk:** Because each project is novel and unique, plans and estimates cannot be guaranteed as correct. Therefore, time, cost and the successful outcome of the project must be established through careful design.

❑ **Projects only exist for a finite period of time:** If the task carries on indefinitely it is no longer novel and unique, and becomes routine and repetitive.

❑ **Projects require the integration of various resources:** This requires the management of the interfaces between the integration of resources as a key factor for project success.

Organisation

The organisation used to manage projects at Transmission Operations is uniquely created for each project, but conforms to certain constraints. As some of these constraints are in themselves unique to Project management and Transmission Operations, some discussion is required here. The concept through which all projects are to be managed makes use of a sponsor, a champion and a project manager as follows:

❑ **The sponsor** is the owner of the product which the project is to produce. As such he is also the person whose budget is to finance the project. In terms of the Transmission Operations organisation, the sponsor can only be the head of the SBU, his deputy or a portfolio manager.

❑ **The champion** fulfils the duties of both technical expert and project leader for the project. He represents the sponsor on the project team and defends the sponsor's cause, hence the name 'champion'. The champion is selected from the department who will best serve the sponsor's interests, or is the person who originates the project.

❑ **The project manager** always comes from the same quarter and brings to the project team project management procedural expertise. Further, he guides the project team by fulfilling the roles of consultant, facilitator and educator. The position of the project manager on the project team is not permanent, as he moves between many projects. Once the project manager has satisfied himself that the project is progressing well, he attends to the project only when asked to do so by either the sponsor or the champion.

In practical terms, the position in the Transmission Operations organisation that each of these parties holds is shown below in Figure 5-3 to 5 for three different projects.

Figure 5-3 shows the use of an internal sponsor and champion while **figure 5-4** shows the use of an executive sponsor and internal champion which represent 90% of organisations for projects. **Figure 5-5** shows the use of an external technical expert. A variation on **figure 5-4 and figure 5-5** is where the appointment of the champion and the manager would fall to the Senior Advisor Projects. The project team members can be chosen by management from any department as dictated by the required skills for the successful completion of a project.

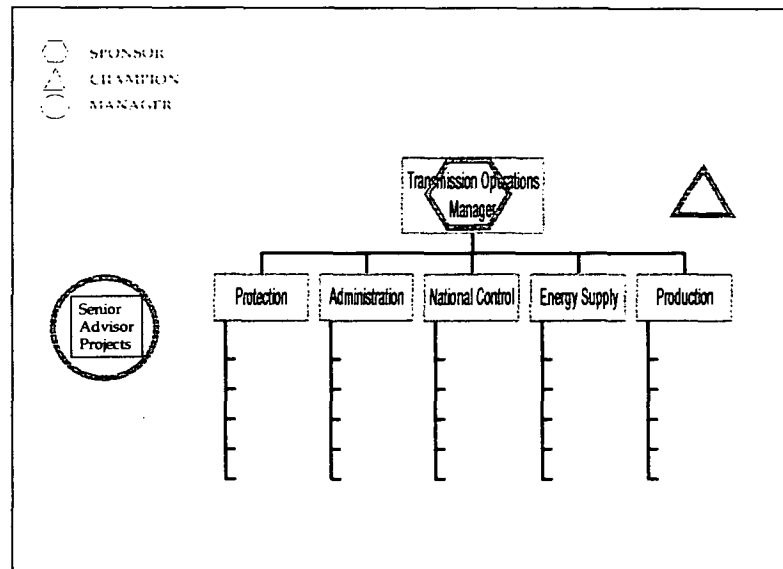**Figure 5-3: Internal sponsor and champion**
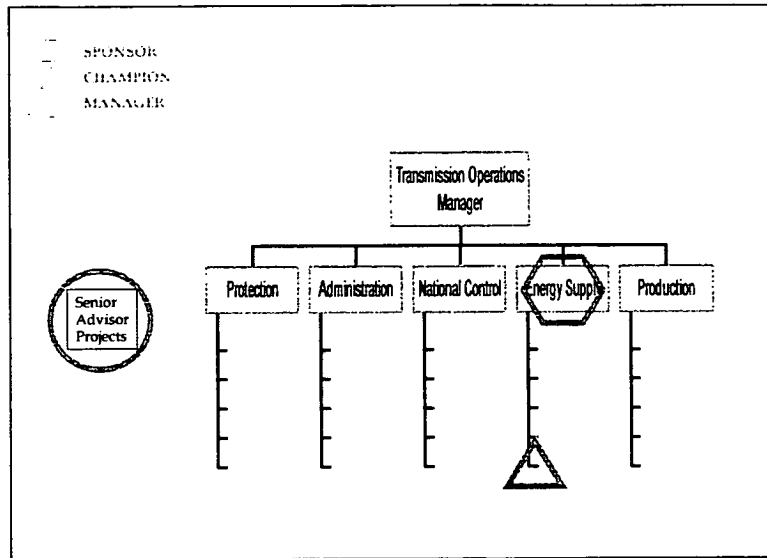
Source: Van der Merwe 1994: 5

Figure 5-4: Executive sponsor and internal champion
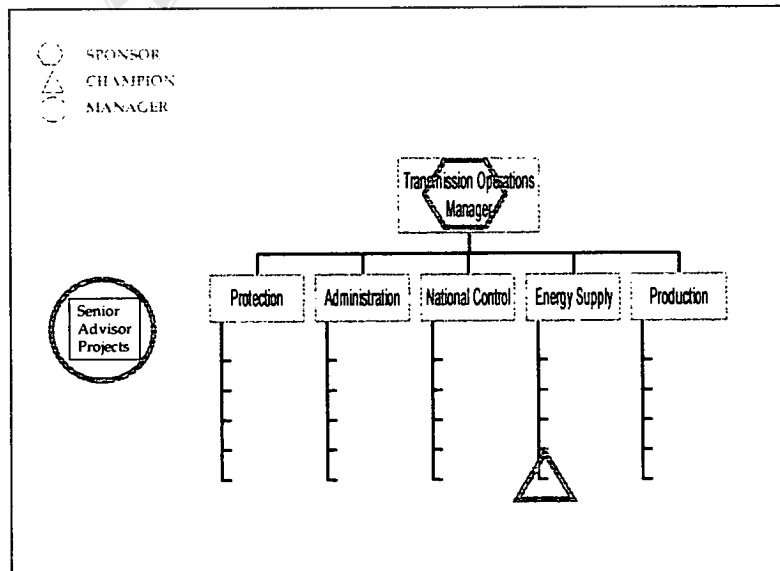
Source: Van der Merwe 1994: 6

Figure 5-5: Executive sponsor and consulting champion

Source: Van der Merwe 1994: 6

5.2.2. Premise, strategy and tactics

This section describes the approach to project management as followed by Transmission Operations. The organisation and the philosophy on which the project management approach is based as well as introduction to the project life cycle is discussed here. It also explains the need to manage the 5 system objectives. The approach to project management has three fundamental parts. The **Premise (A)** consists of the purpose, context and principles. **Project strategy (B)** consists of the methods: objectives, processes and levels. **Tactics (C)** contains the use of tools and techniques.

5.2.2.A. Premise

The premise defines the **purpose** of the project, then the **context** in which the project takes place, and finally the **principles** required to be followed in the management of projects.

Purpose

The purpose of a project at Transmission Operations is to deliver beneficial change by undertaking a unique scope of work using a project team made up of different personnel for each project. The change will have value only if it meets quality standards and is achieved within cost and time. Because the work undertaken for each project is unique, it involves a level of risk. The risk is that the change brought about during the project can cost more than the potential damage caused by maintaining the *status quo*. A project is therefore cost justified only if it provides a more effective solution to eliminate a problem, than to live with it.

Context

Projects at Transmission Operations are performed in the following context:

Corporate strategy

The change brought about by the project must comply with the future strategy of the organisation. Parties involved are: the owner of the product produced by the project, represented by the sponsor of the project, the users who will operate the product on behalf of the owner, represented by the champion of the project, the supporters who will supply the resources to undertake the work of the project directed by the project manager, and the stakeholders who are affected by the result of the project, but who are not otherwise involved.

Management of the project

Management of the project requires a strategic approach which in turn requires the management of the attitude of the parties involved, the purpose and objectives of the project, the approach to the management of the project, the management of the context of the project and the resources to undertake the project.

Principles

There are five principles applied to project management. The five principles adopted for managing projects at Transmission Operations were:

- ☐ Projects are managed through the use of work breakdown structures containing no more than ten activities for each level

- ☐ Only 3 levels are broken down to: strategic, operational and detail

- ☐ The focus of management is on results of the deliverables and not on how to achieve them

- ☐ A balance is maintained between technology, people, systems and organisational changes

- ☐ A formal contract exists between all the parties involved, defining their roles, responsibilities and relationships. The management of projects adopts a clear and simple approach and resists complicated solutions.

5.2.2.B. Project strategy

The method to be employed in managing projects for Transmission Operations has three dimensions: **objectives**; **process**; and **levels** of the project. These are as follows:

Objectives

The five objectives of managing projects are: scope, organisation, quality, cost and time. The need to manage these five objectives is essential to the management of successful projects. Managing the scope of the project is achieved by simply defining the project's purpose and the product resulting from the completion of the project. The organisation required to achieve the project is made up of personnel with the required interest and skill to bring each project to a successful conclusion. The quality of the product is to be established through the use of a specification which will influence the cost of the project. Determining the specification is the responsibility of the champion in

consultation with the sponsor. Once set, deviation from the specification without the consensus of all parties involved, will constitute failure of the project. The cost of the project is to be evaluated at the start of the first three phases of the life cycle in conjunction with the specification. Accuracy of the cost estimation is to increase with the start of these phases to the extent that phase one = 15%, phase two = 10% and phase three = 5%. The project manager must compile the cost justification and is responsible for its approval. Deviation from these norms will impact on the success or failure of the project. The project team must calculate the time to be taken for the completion of each activity at the start of each phase, as with the cost. The same narrowing band of accuracy is to apply for the purpose of determining the outcome of the project.

Process

The second dimension of the methods used to manage projects is the project management life cycle. Transmission Operations has adopted a life cycle containing four phases, which logically break down the progress of activities required for the progression of a project from start to finish. This is done in a way that enables monitoring of the progress, and conformation that the five project objectives may be achieved within logical blocks. The use of the project life cycle also ensures clean and effortless transition from one phase to another and provides a break-off point if any of the project team members need to be replaced at any stage. This may be required to bring more specific skills onto the team for a particular phase. The life cycle phases adopted are: **Proposal, Start-up, Construction and Close-out.** An outline of each follows:

Proposal

The proposal phase is used to bring the project to fruition. This stage is led by the project champion in conjunction with the project manager who are the only team members during this phase. The stage is used to convince the sponsor of the necessity for the project and to justify its cost. Once approval for the project has been gained and resources scheduled for it, this phase has ended.

Start-up

The start-up phase is the actual start of the project. The project leader and team are appointed, signifying the formal start of this phase, and the project definition report is compiled. Detailed design is carried out culminating in a specification determining quality, cost and time. On approval of the sponsor, the specification is issued for tender and once evaluation of the tender documents is concluded, the contract is placed. The end of this phase is indicated by the signing of the contract by the parties concerned.

Construction

Signing the contract also indicates the start of the construction phase. This phase is used for the manufacturing, delivery to site, erection, commissioning, hand over and take over of the product produced by the project. In certain cases the start of commissioning of the product can signify the end of this stage, but it is envisaged that under normal circumstances, hand over of the product will signify the end of this stage.

Close-out

This is the last phase of the project and is used to conclude the work on the project. The project definition report is used to confirm that the sponsor / champion requirements were met. Lessons learned and special contributions made by team members are remembered at the close-out meeting. The meeting is also used to determine the success or failure of both the project and the team members.

Levels

As previously stated, it has been determined by Transmission Operations management that there are to be a maximum of three levels assigned to any project. (Figure 5-6). These are: the **strategic** level, the **operational** level, and the **tactical** level. These levels are used to link the project objectives with management processes by determining the work breakdown structure indicating the activities required to complete the project. This is to be achieved as follows:

The strategic level

The work breakdown structure at the strategic level is to be made up of a single sheet of paper (A4), stating the context of the work to be done at the top of the page and a list of no more than ten activities below. Each activity is to contain a title, duration, estimated start and completion dates, and the names of the people who are to perform the work.

The operational level

Here, the work breakdown structure is to be made up of ten sheets of paper each containing the title of one of the activities from the strategic level at the top of the page together with the context of the activity. A list containing a maximum of ten activities, breaking the strategic activity down to the operational level is to be listed below, each containing a title, a duration, estimated start and completion date and the names of the people who are to perform the work.

The tactical level

The work breakdown structure of this level is to follow the same process as described for the operational level, only now there are to be 100 sheets of paper, each breaking one operational activity down to a maximum of ten tactical activities.

Figure 5-6: Levels of work break down
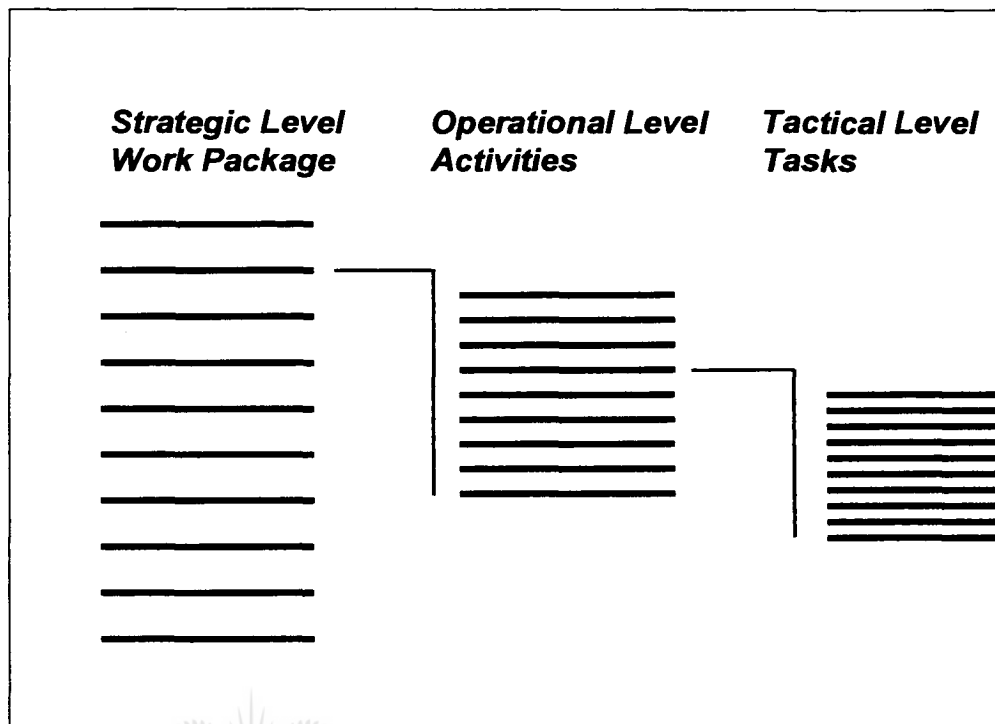
Source: Own compilation

5.2.2.C.   Tactics

Tactics are used to describe how the strategy is achieved by using tools and techniques as applied to the five management objectives. The principal tools and techniques are discussed here within the context of the five management objectives as follows:

Managing scope

Because this is the primary objective, the work breakdown structure is used as a tool to manage the scope. The technique used to accomplish this is through the use of the strategic and/or operational plan.

Managing organisation

The technique used to manage the project organisation is through the appointment of a project leader. The project leader applies the tool of responsibility charts to achieve his goals.

Managing quality

Quality is managed by using a specification agreed to by the sponsor as defining the quality acceptable to him. A performance standard is used as a tool to ensure that the quality criteria are met.

Managing cost

Cost is managed by staying within the cost agreed with the sponsor and is measured through system generated expenditure as audited by Transmission Finance Division.

Managing time

The technique used to manage time is through the use of critical path analysis of the tools using project networks and/or bar charts.

There is no better technique for managing all five system objectives than the practice of frequent meetings held at regular intervals during the project. To this end it is required that at least one meeting be held at the start and finish of each phase of the life cycle and that the minutes of those meetings be distributed to the management of Transmission Operations.

5.2.3. Four stage life cycle

Proposal phase

It is generally accepted that any project is preceded by a need for change to take place. The process applied to this phase presumes that a need for change has arisen and the procedure for the strategic level is as follows:

Figure 5-7: ESKOM proposal phase process model

Inputs	Process	Outputs
Establish the project champion	Basis of change identified	PP-1 planning proposal document completed
Introduction of the project manager to the project	Preliminary technical investigation launched	Project technically feasible and cost justified
Joint development of the proposal	Approval by direct supervisor	Project sponsor formally agrees to expenditure of resources
Project manager prepares formal proposal and presentation	Formal technical evaluation and first cost estimate	Project resource constraints agreed
	Search for sponsor	
	Formal project proposal to sponsor	
	Formal presentation of project justification	
	On approval scheduling of responsibilities and resources	

Source: Van der Merwe 1994: 15

Project start-up phase

Formal approval of the project resources and constraints signals the end of the first phase in the project life cycle and the start of the second phase, which is the most important in the life of the product to be produced by the project.

Decisions made here impact on the financial break-even point of the product of the project. A leverage effect is caused by the design on the pay-back period of the product which determines whether the project was applied in a cost beneficial way. Therefore, care needs to be taken to apply a "fit for purpose" quality perspective to the design.

Figure 5-8: ESKOM start-up phase process model

Inputs	Process	Outputs
Project leader appointed	Call project start-up meeting	Technical / performance specification document
Project team appointed for life cycle	Establish project organisation	Responsibility charts / role clarity for team members
Historical data	Establish work breakdown structure and level	Project network / bar chart
	Write the project definition	Contract document
	Establish responsibilities	Main contractor appointed
	Write specification and tender document	Operational plan
	Specify performance requirements	
	Issue tender	
	Evaluate tenders	
	Place contract	

Source: Van der Merwe 1994: 16

Construction phase

Appointment of a main contractor signals the end of the second stage of the project life cycle and the start of the third. The project team takes on a lesser role during this phase as its main function becomes one of monitoring the contractor. Careful attention is to be paid to the progression of work done in relation to the money spent.

Figure 5-9: ESKOM construction phase process model

Inputs	Process	Outputs
Project program / bar charts	Inspect manufacturing of system	Operational activities completed
Responsibility chart	Factory test	Installation completed within constraints
Operational plan	Delivery to site	Commissioning completed
	Installation	
	Commissioning	
	Take-over of system	

Source: Van der Merwe 1994: 17

Project closeout phase

This is the fourth and final phase of the project. As its name suggests, the phase is used to close the project and disband the project team. Care should be taken during this phase to keep up the quality of the work and not allow activities to be closed merely to get them off the books.

Figure 5-10: ESCOM closeout phase process model

Inputs	Process	Outputs
Project definition report	Close contract	Project report
Responsibility charts of all phases	Finalise paperwork	Financial closure
Operational plan	Finalise drawings, manuals	Project team closure
	Training in use of new system	
	Final meeting	

Source: Van der Merwe 1994: 17

5.2.4. Project administration

The documentation pertaining to each phase of the project is shown here with relevant comments on the required content of the various sections. The forms developed where published in "A project management procedure manual for ESKOM Transmission Operations" (Van der Merwe 1994). The following documentation is dealt with:

5.2.4.A.   **Project feasibility report**

5.2.4.B.   **Economic evaluation study**

5.2.4.C.   **Planning proposal**

5.2.4.D.   **Project definition report**

5.2.4.E.   **Responsibility charts**

5.2.4.F.   **Strategic, operational and tactical plans**

5.2.4.G.   **Contract document**

5.2.4.H.   **Project program / bar charts**

5.2.4.I.   **Commissioning report**

5.2.4.J.   **Completion form**

5.2.4.K.   **Project report**

5.2.4.A. Project feasibility report

The project feasibility report is discussed in detail in ESKOM standard EVS038. The main points as they pertain to projects at Transmission Operations are discussed here. The purpose of a feasibility study is to bring a project to the stage where all substantive decisions with respect to the technical, economic, environmental and financial details have been taken and the project is ready for approval.

The format of the document is normally in the form of a bound management report together with separate appendices, and contains whatever detail is necessary to fully describe the project. The report should contain:

Summary: A three paragraph page 1- introduction 2- findings and 3- recommendations.

Introduction: Background, need for project, alternatives considered, results of feasibility study.

Technical scope of work: Detailed plant specification, engineering drawing (sketch), bill of quantities.

Environmental impact: Statement on the impact that the project is to have on the stakeholders (people not involved in the project but affected by it) and on the environment.

Commercial issues: Capital expenditure, working capital (phasing), annual operating and maintenance costs, supplier interface for imported items; rates of exchange , and so on.

Economic evaluation: Inflation rate, discount rate, rate of growth in demand for the output of the project, rate of change in technical parameters, and the useful life of the project results.

Financial analysis: The financial analysis of a project consists primarily of projections of the changes to the ESKOM financial position that will be brought about by the realisation of the project over its useful lifespan. The minimum requirement is a forecasted cash flow statement.

Implementation program: Forecasted implementation schedule of construction.

Conclusion / recommendations: This should contain a concise summary of the key features of the project covering its purpose, main technical and economic features, and a forecasted date of commercial operation should approval be given. Further, a recommended course of action with due dates is to be provided for the selected option.

5.2.4.B.   Economic evaluation study

The economic evaluation study is based on ESKOM standard EVS023 and makes use of the following conventions:

Reference date: The reference date on which present values are to be calculated shall be 1 January of the year in which the project is expected to be launched.

Cash flow: Cash inflow is deemed to take place at the end of the year and cash outflow is deemed to take place at the beginning of the year.

Return on investment: All interest rates, discount rates and rates of return quoted and used shall be effective annual rates.

Price escalation: Prices are deemed to increase at the end of a year, and price escalation is to be applied to all prospective costs and benefits that are subject to the effects of inflation.

Economic life of assets: The economic life of assets used directly in the transmission of electricity shall be no longer than 35 years. The economic life of all other assets should be no longer than the fixed asset write-off periods quoted in EV1076.

Discount rate: The discount rate to be used shall be those quoted by the Financial Planning Manager.

Deferred payments: Cash payments shall be taken to occur as specified under the applicable agreement and not on the date of delivery.

Foreign currency: The spot rate ruling at the time of forward cover agreement.

Economic evaluation: The selection between alternatives shall be based on the present value of the associated cash flow.

Externalities: No cost or benefit accruing to any party other than ESKOM shall be taken into account for the purpose of justifying capital expenditure.

Documentation: The documentation referring to all economic evaluation studies shall include a description of the perceived opportunity or need to be served by the project in sufficient detail for evaluation by a review committee, a description of the alternatives considered, a summary of the results of the economic evaluation including the assumptions used to derive cash flows, a table showing the timing and amounts of cash flows, the discount rate used where

applicable, a table showing the annual changes in the ESKOM accounts that would result as a consequence of implementing the project

5.2.4.C.   Planning proposal: form PP-1

The planning proposal form is used to register the project on the ESKOM financial system for the purpose of allocation funds and for tracking expenditure.

5.2.4.D.   Project definition report

Preface: Outlines the objectives of the document.

Summary: As for project feasibility report.

Background: The context of the project as it exists.

Purpose, scope and objectives: The reason for undertaking the project.

Work breakdown structure (Strategic Level): The work required to produce the product of this project for each phase of the project.

Project organisation: The type of organisation used, the organisational units within the business used, their involvement in different areas of the work, managerial responsibility for different areas, location of project resources, source of the project manager, source and limits of authority and the sponsor, champion and manager for the project.

Project management systems: Defines the tools and techniques for planning and controlling:
scope, organisation, quality, cost and time. One meeting is to be held at the start and end of each phase of the life cycle and the minutes of those

meetings are to be distributed to the management of Transmission Operations.

Risk assumptions: Stated for future reference.

Project budget: Initial estimates for the project as reflected in the PP-1 document.

Project justification: As reflected in the PP-1 document

Appendices: Preliminary plans

5.2.4.E.   Responsibility charts

This chart shows a list of activities, the person responsible for achieving each activity, the duration of the activity and a due date, as follows:

Figure 5-11: ESCOM Responsibility chart

Description	Responsibility	Duration	Due date
Design new system	Specialists	90 days	Dec 93
Specify performance requirements	Specialists	30 days	Nov 93
Issue specification for tender	Procurement	30 days	Jan 94
Evaluate tenders and provide short-list	All	10 days	Feb 94
Appoint main contractor	Sponsor	1 day	Feb 94
Provide contract document for signature	Procurement	5 days	Feb 94
Confirm contract placed	Procurement	1 day	Feb 94

Source: Van der Merwe 1994: 28

(e.g. A specialist working group is to provide the first two items. The group is to consist of: the project leader , internal specialist and external specialist.)

5.2.4.F.   Strategic, operational and tactical plans

These plans can be completed at various levels for each phase of the project life cycle as for 5.2.3 above.

5.2.4.G.   Contract document

The contract document is compiled by the finance division and is subject to a range of conditions too vast to be entered into here. The document has essentially three parts. Part one deals with ESKOM's conditions of contract and should be studied by the project team. The second part is the contractors tender document in total and the third part contains special agreements not covered by the original tender. The project team needs to be familiar with the content of the contract document to the extent of being able to quote page and paragraph.

5.2.4.H.   Project program / bar charts

Bar charts are preferable for the strategic and operational levels. Project programs are to follow the general methods used in critical path analyses. For small projects (less than 100 activities) these may be hand drawn, and should include the following information as a minimum: Activity description, start date, duration, end date, preceding relations and following relations

5.2.4.I.   Commissioning report

The commissioning report is compiled at the end of commissioning and is made up of copies of all test procedures completed for the commissioning of plant and equipment. This document is only compiled for relevant projects.

5.2.4.J.   Completion form

The completion form is used to record all final expenditure for financial purposes and to record the final assed value registered.

5.2.4.K.   Project report

Project description and objectives: Summarises the project definition report

Master project plan: Summarises the design and appraisal process.

Performance specification: Defines the performance level of the project.

Technical specification: Explains the technology used.

Acceptance tests and criteria: Duplicates the commissioning report.

Project constraints: Are derived from points 4, 5 and 6 above.

Lessons learnt: Learning points discovered during the course of the project and / or special contributions made by specific personnel.

## 5.3. ESKOM distribution group: electrification project

/14/

5.3.1. Organisational structure

As shown in the previous section the sponsor, champion and manager concept was not being applied in ESKOM, but could be of value to the corporate organisational structure of this project if combined with the procedural grouping **(Figure 5-12)**. Already mentioned, the Project Manager is seen as a facilitator / consultant / educator in this relationship and would assist the Project Leader as champion in the functional part of the organisation by means of his knowledge of the **Project Management Process thus attaining the split in technical and procedural expertise.**

Studies of organisations have shown that four levels of involvement are present in performing the work of the organisation. These are: Decisionary, Steering, Anchoring and Operational. One could explain these levels of involvement as: Those who create the vision, those who set the objectives, those who implement ideas and those who perform the work. The two middle levels are normally referred to as Management with the key difference being in the level of preoccupation in the visionary process of the organisation (Lawrence 1967: 157).

Studies of Group Dynamics done by; Bales, Carter et al., Chapple, Lewin, White and Lippitt who studied groups from Anthropological, Sociological and Psychological perspectives, showed the effects of different kinds of leadership on group morale and productivity. This means that those who are doing the work have their efficiency affected by management. i.e. management can either help the workers to get the work done or they hinder the workers in the performing of their duties (Schein 1988a: 17).

Figure 5-12: Distribution group sponsor, champion and manager
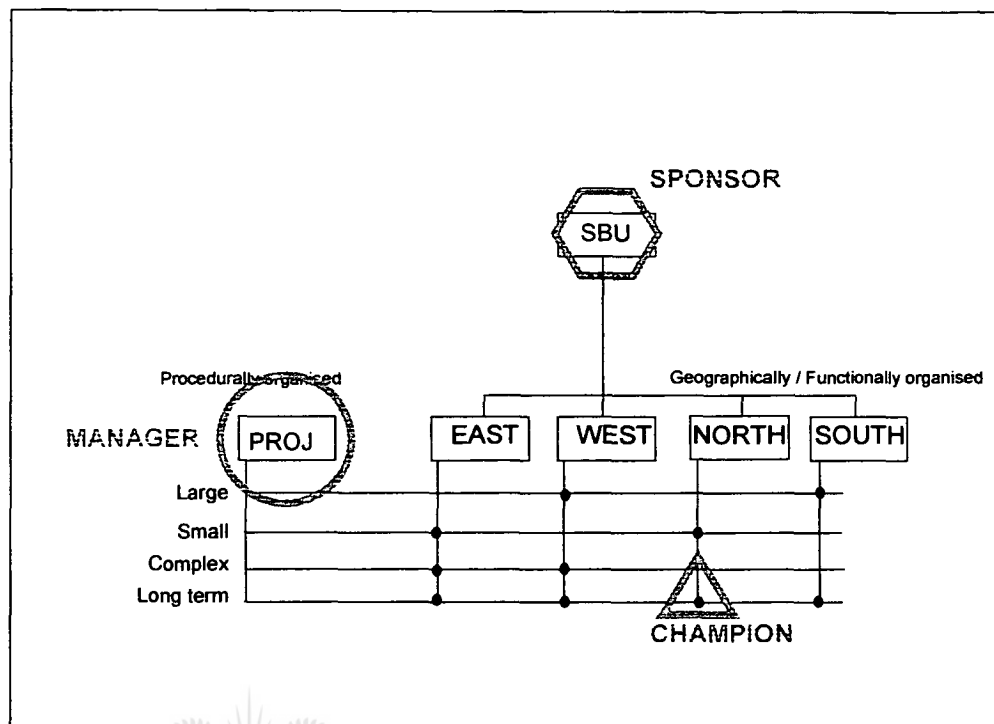
Source: Van der Merwe 1995a: 8

These studies of Group Dynamics clearly showed that effective and efficient workers had two kinds of leader: a task leader *(technical leader)* who helps the group to do its job and a "socio-emotional" leader *(process leader)* who helps to build and maintain good relations among group members.

Only rarely were these two kinds of leader the same person. Studies done by: Arensberg, Dalton, Dickson, Homans, Mayo, Roethlisberger, White, and Schein into group interpersonal relations, showed that how people actually relate to each other bears only limited similarity to how formal organisation structures says they should behave. These studies illustrate the need to study human processes in organisations by actual observation rather than that which people say in interviews or on survey questionnaires (Schein 1988a: 18).

Process Consultation developed by Prof. Edgar Schein of MIT, sets out to define how the roles of the "technical leader" differs from the "process leader" and how they influence the performance of the workers.

The formal definition of Process Consultation states:

> *Process Consultation is a set of activities on the part of the consultant that help the client to perceive, understand, and act upon the process events that occur in the clients environment in order to improve the situation as defined by the client* (Schein 1988a: 11).

A process consultant (i.e. process leader, socio-emotional leader) helps the "technical leader" (i.e. task leader or functional manager) to assess the consequences of different alternatives or suggest alternatives that have not been considered. Process leaders do not have pat answers or expert solutions, they assist in adding perspective. Detailed analysis of small group problem solving, showed that groups best develop solutions with the aide of a process leader in conjunction with the technical leader and the team of workers.

Functional management however has the advantage that task leaders (general managers) are usually thought of as having formal responsibility for defined organisational outcomes; they have line bosses; they have specific resources at their disposal with which to exercise the authority they have been given.

They are accountable, and this accountability cannot be delegated. Project managers (process leaders) have delegated resources from across the functions which still have functional demands placed on them. The project team members must balance loyalty to the cost centre that pays their salary with the demands of the project. **They are deemed to be responsible for the outcome of the project but rarely are they seen to be accountable.**

The organisation used to manage projects is uniquely created for each project, but conforms to certain constraints. As some of these constraints are in themselves unique to Project management, some discussion is required here. The concept through which all projects are to be managed also makes use of four levels of involvement which are: the sponsor, champion, manager and team.

The sponsor is the owner of the product which the project is to produce. As such he is also the person whose budget is to finance the project.

The champion (technical leader) fulfils the duties of both technical expert and initiator of the project. He represents the sponsor on the project team and defends the sponsors cause, hence the name 'champion'. The champion is selected from the department which will best serve the sponsors interests, or is the person who originates the project.

The project manager (process leader) brings to the project team project management procedural expertise. As a process consultant, he instils the fundamentals of management: What to change, What to change to, and how to implement change (Goldratt 1992: 337). Further, he guides the project team by fulfilling the role of advisor, facilitator and educator. The position of the project manager on the project team is not permanent as he moves between many projects. Once the project manager has satisfied himself that the project is progressing well, he attends to the project only when asked to do so by either the sponsor or the champion.

The team is made up of those who are to perform the work in delivering the product that the project is to produce. It goes without saying that the people who have the required skill will not be available. Therefore, it is pivotal that the team be made up of people who are interested and that they are equipped with the knowledge and skill that will secure them to the project. **Figure 5-13** shows the compilation of the project organisation (team) for an individual project within a distributed area as well as the fit between the functional organisation and the project management process, revealing the location of the sponsor, manager, champion and team members:

NOTE: The position of role players in the project team has no bearing on their functional position. ANYONE with the required interest, skill and knowledge can play ANY role, BUT THE CHAMPION AND THE PROJECT MANAGER CANNOT BE THE SAME PERSON using the research from Schein (1988: 18).

Figure 5-13: Distribution group multi-project team structure

Source: Van der Merwe 1995a: 9

5.3.2. Prioritising projects

In the case of the electrification project, procedures can be expressed in terms of urban, rural and squatter camps, as the procedures applied to the electrification of the houses in each of these groups will differ intrinsically. In applying a prioritising matrix (Van der Merwe 1995b: 44) to each group of projects, one could consider the same parameters and range for all the procedural groups, as the organisation of the dwellings and accessibility would be intrinsic to each procedural group. By adding the number of dwellings per site and number of people per site as parameters to the organisation of dwellings and accessibility, one could consider a range for each parameter as follows:

Organisation of dwellings:

in rows = A

in groups = B

widespread = C

Accessibility:

easy = A

difficult = B

inaccessible = C

Number of dwellings on site:

more than 1000 = A

500 to 1000 = B

less than 500 = C

Number of people on site:

more than 10 000 = A

5 000 to 10 000 = B

less than 5 000 = C

The construction of a prioritising matrix **(figure 5-14)** could now take on the following shape:

Figure 5-14: Distribution group prioritising matrix

	Parameters				
Town	1	2	3	4	**TOTAL**
Vosloorus	C	C	B	A	C
Crossroads	B	B	B	B	**B**
Kathlahong	B	A	A	A	**A**

Source: Van der Merwe 1995c: 45

Towns or sites with a total rating of A will have their dwellings arranged in rows, be easily accessible, contain more than 1000 dwellings and affect more than 10 000 people or some configuration closely resembling the argument.

An effort can now be made to electrify these houses first, as they represent the best resource efficiency and will result in the greatest impact on a politically sensitive and internationally important project such as this.

5.3.3. Programme control

A third element of managing multiple projects is the use of a control mechanism that uses a uniform measurement to gauge the progress of the projects across the procedural spectrum. All projects have time as a common denominator, so it makes sense to build a control mechanism to gauge this resource. Time is also a good indicator of functionality

and if time is controlled then so is cost. Time is the one universal element that all projects share.

A simple hand-drawn matrix can be used to control time **(Figure 5-15)** for a multi-project environment where four people make up a project team to manage seven projects.

Figure 5-15: Distribution group time control matrix

	One	Two	Three	Four	Five	Six	Seven	Expec	Actual
John	10/05	00/05	05/05		20/15			35	30
Peter		15/20			05/00	20/20		40	40
Paul	10/05	10/10	05/05	05/05	05/05	05/10	05/10	45	50
Mary	10/05	00/05		10/10			15/15	35	35
Expected	30	25	10	15	30	25	20		
Actual	15	40	10	15	20	30	25		

Source: Van der Merwe 1995c: 45

Figure 5-15 illustrates control of weekly time on a 40 hour work week. It is seen that projects one and five are receiving less attention than expected, from which one can deduce that they will be late; projects two, six and seven are taking more than the expected time which could mean that more resources may be required; however, projects three and four are progressing well. Project 2 is further utilising resources not allocated to it and could be the biggest problem on hand, so it requires immediate management attention. On the other hand John and Mary are under-utilised, Paul is over-utilised, Peter is proceeding as expected, and three of the four projects in which John is involved are performing better than expected.

From this information several management decisions can be made in order to utilise time more effectively by applying a few rules: (a) Ignore all aspects of projects performing as expected, (b) Learn from projects performing better than expected, and (c) Apply what you have learnt from (b) to those projects performing below

expectations. The matrix can also be used when forecasting labour usage, and can be a valuable tool in trying to determine whether one is overexposed in terms of projects, or under-utilising labour resources.

Using actual time taken as measured against a forecasted time (which coincides with the project's duration) provided by the team at regular progress meetings, the control matrix becomes an invaluable tool. As a management tool the control matrix is used to highlight only abnormal performance, so that lessons learned from good performers can be applied to poor performers. Management time is therefore not spent on those projects which are progressing according to plan.

There are only a limited number of hours per day and if time is well managed by applying it to those areas where it is needed most, a larger degree of project success in terms of time and money will be attained. Use of the control matrix is demonstrated for the Electrification Project in **Figure 5-16.** In order to control such a large number of projects a computerised matrix using MS Excel under MS Windows was devised. The projects were small towns or suburbs and the names are those of the team leader responsible for completing the projects. The time taken for the number of houses falling within the project to be connected to the electricity grid is used as a measurement resource to best analyse project efficiency.

From the analysis of the example control matrix **(Figure 5-16)** it is clear that John's team takes less time than forecasted, and project five has taken longer to complete than planned.

Figure 5-16: Distribution group use of time control matrix

Name	Activity one	Activity two	Activity three	Activity four	Activity five	Activity N		Total actual	Total forecast
John	1		5		4			10	15
Peter	3			7				9	9
Paul	1	4		2				7	7
Total activity	4	4	5	9	4			26	31
Forecast	4	4	6	11	3				28

Source: Van der Merwe 1997: 232

From the analysis of the example control matrix **(Figure 5-16)** it is clear that John's team takes less time than forecasted, and project five has taken longer to complete than planned.

This matrix is used to evaluate progress and the manager can now investigate those projects which do not meet the forecasted time or those which use less than the forecasted time. In this manner lessons learned from those projects or teams progressing better than expected, can be applied to those that are not. The projects that are progressing as expected are left alone.

Responsibility charts built from lifecycles containing four stages and a strategic level work breakdown structure for individual projects supplied the information required to effect centralised control over distributed projects. Five Forms were used as stop-go points to each stage of the lifecycle as represented in **Figure 5-17**.

Figure 5-17: Distribution group positioning forms

	Proposal	Planning	Construction	Close out
Stage start	**Project start Form 1**	**Form 15**	**Form 150**	**Form 151**
Stage end	**Form 15**	**Form 150**	**Form 151**	**Form 101AandB Project end**

Source: Van der Merwe 1995a: 19

The procedure manual developed for ESKOM transmission group (Van der Merwe 1994) was modified to incorporate the concepts of project organisational structures, lifecycles, work breakdown structures and responsibility charts, functioning on strategically positioning the forms at the beginning and end of each stage of the lifecycle. This was done in conjunction with Albert Koeslag of KPMG who drafted the initial form content and completion notes. The forms where then modelled by the author, repositioning them and transferring content between the forms to logically fit a four-stage lifecycle, and publishes as "A procedure manual for project management in Electrification" (Van der Merwe 1995a).

No training was given in project management generally, nor in the use of the procedure manual or the forms, but use in the relevant departments became widespread. The result was that during the following year annual connections in this programme rose from 250 000 to over 600 000. Other measures had also been implemented, so that the direct contribution of using the procedure manual cannot be established.

However, two effects can be directly attributed to the use of the manual. Firstly, the unreasonable request by management that project proposals be 98% accurate was recalled, due to the understanding of the project lifecycle and cost estimating theory,

that it was imposable to be this accurate so early in the project. Secondly, the practice of projects going through the design office up to twenty-eight times in order to improve accuracy of cost estimates, was stopped, thus reducing the work load and increasing the throughput.

5.4. Gauteng provincial government: re-engineering corporate informatics

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5.4.1. Strategy

There are three fundamental elements to strategy: Strategic Analysis, Strategic Objective Setting, and Strategic Implementation. The first leads to "analysis paralysis", the second is where you make your choice and pay your money. However, it is in the third element that strategy fails. Strategy is a vehicle for the organisation. It moves the organisation from one position to another. Nothing happens until you get into your chosen vehicle and proceed to your selected destination.

Strategic analysis is a view of where you are at present and what your internal and external environment looks like. The objective setting process is to determine short, medium and long-term objectives of where it is you want to go. Strategic implementation is about getting there. It is only once you are on the chosen path, and have reached a vantage point from which you can see that this path is not going in the right direction, that the trouble starts. It is here where you ask: "How does one stop this thing?" or "how does one change direction?" In other words, where are the controls? One of these controls discussed in chapter three that has been clearly described in theory, is "**structure**" which controls the stability of the organisation or which can be described as the effort needed to change strategic direction.

The other, "**processes**", controls the overall speed at which the organisation moves toward meeting customer demands. Inefficient processes take too long to satisfy customers, resulting in their going elsewhere. "**Projects**" are incremental improvements to processes, keeping them highly tuned to customer requirements. If you view the organisation as a wheel constantly on the move seeking to satisfy customers, then there are four forces acting on it to execute control. These are strategy, structure, processes, and projects. These four forces act in chorus, or can oppose one another, resulting in the

organisation not moving at all. When not applied in unison they can cause sporadic changes in direction.

Modern business strategy is to do with the matching of the activities of an organisation to the environment in which it operates. Europe's best selling strategy text "Exploring corporate strategy" by Johnson and Scholes define strategy as: *"the direction and scope of an organisation over the long term: ideally, which matches its resources to its changing environment, and in particular its markets, customers or clients so as to meet stakeholder expectation"* (Johnson, 1993 : 10).

A view supported by Johnson and Scholes was used as a rough guide not to determine the strategy but to find evidence for the actual processes that would provide their clients with what was demanded from an Information Technology Department. This was a strategic analysis process which included an external environment analysis, internal resource analysis and SWOT analysis. A strategic objective setting process to generate strategic options, evaluate criteria, screen options, do strategic evaluation and select strategic objectives Finally to complete a strategic implementation process by planning and allocating resources, re-mapping organisational structure and design and to managing the change with the aid of project management (Johnson 1993: 23).

The strategic management process is about moving the organisation from its present position to a future strategic position in order to exploit new products and markets. The strategic analysis process is about investigating the current and future positions. The strategic objective setting process is about planning the trip , its duration and effort. The strategic implementation process is about getting the organisation to move. The strategic process is like growing a garden. First, you find out where you are geographically, the prevalent climate and the altitude. This is akin to an external analysis. Next, you test the soil conditions, which is akin to doing an internal analysis. Combining the external and internal analysis will provide information on which plants are likely to grow in this location.

It might turn out that the plants you had in mind will not grow at this site, and that the garden should move to another site, or that different plants you have no experience of

would thrive at this location, requiring you to change your plans. This is the strategic objective setting exercise. You decide where you want the garden; then, what will grow in it; short, medium and long term goals and, finally, what you are capable of in terms of time, money and effort. A plan can now be devised to find sponsorship and expertise as required, to bring about the chosen objective. These methods will help you to do a detailed design, planning for the risks to be taken, while determining a more exact figure for the resources to be used, as well as a construction plan. Only now can construction begin. The soil prepared, seed sown and the garden tended. The construction complete, the desired environmental conditions prevailing the allotted time passed, the garden will develop into the spectacular display you intended it to be. All who see it applauds your efforts and insight.

But you know only too well that in order to keep this garden flourishing, a careful eye must be kept on the environmental conditions for as the seasons come and go; certain plants are added, and some are removed to keep the garden progressing, or it will be soon be overrun by weeds and grow wild. This is the true mastery of the strategic planner, having sown his seeds some time ago when the conditions prevailing today were not evident, having kept an eye on the changing environment so that the right plants bloom in the right season. In the third world these conditions can change with frightening speed, and competitors are willing to destroy you in order to survive themselves.

The Gauteng Provincial Government decided to proactively embrace IT/IS to become the most technologically advanced provincial government in South Africa as it had incorporated the former Transvaal Provincial Infoplan into its Informatics Department. As time was of the essence, and the required outcome was to please the customers, a decision was made to attempt a different route. All the employees of the department where called together with representative customers from as many departments as would attend and some of their suppliers. The objective of this meeting was to spend the day making a list of the things they were asked to do in the past, present and expected future as seen from the employees, clients and suppliers.

This would constitute the information gathering portion of the strategic analysis with clients and suppliers representing the external environment and employees the internal environment. Three lists were put onto whiteboards for each of these groups. Thousands of entries were made for issues relating to the past, less to the present and few to the future, which primarily answered the question "What would delight the customer in terms of IT/IS?" Research of the work requests was undertaken to find evidence of processes by grouping similar requests into process groups that would address the main issues. This proved to proceed quite rapidly, as the information offered up, could be placed into the following groups: Hardware, Software, PC's, Networks, Systems and Policy.

Specific issues within these were the supply, installation and repair of faulty equipment, with the latter giving special reference to the reporting of faults, and the response to effect the repair. Here a surprise issue appeared in that the repair staff reported that 40% of faults were related to the staff not having been trained to use the computers and software, and 35% of faults reported were due to the network being entirely occupied.

Discussion of these findings led to accepting the main processes identified as the real processes and sub-defining the specific issues in each process to identify the route ahead. The number of items relating to each identified issue was used to indicate importance that would influence the creation of an organisational structure in the next session. This resulted in a clear map of the business process for the present and future organisation.

5.4.2. Structure

From the strategy meeting a structure was created to supplement the processes identified to accommodate the 95 personnel employed in the department at that stage. An organisational structure (Figure 5-18) was created, the department divided into four sections, and the business processes uncovered in the process research were mapped.

The next task was to fit the budget of the staffing levels to the structure, which was a fit to the processes. This was no easy task as the budget was fixed, and could not accommodate the 120 staff needed to service the processes that the analysis showed would be required. In fact, it was found that the current budget would not support the current 95 staff members. Fortunately, 20 staff could be transferred to a data capture unit formed in the Finance Division leaving 75 staff on the payroll.

Figure 5-18: Gauteng government process based structure
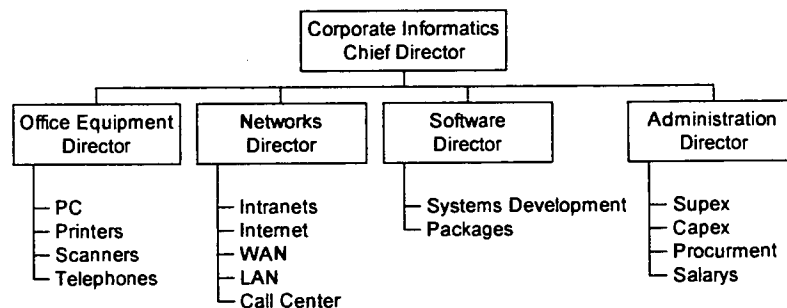
Source: Own compilation

After much consideration, it was found that each section could only support one director, three assistant directors, three technologists and five technicians. The administrative staff would have five additional staff at secretarial level. To service the five offices, 20 operators were appointed to the call centre, making the Networks Directorate the largest section.

Each directorate was given carte blanche to move people around the levels, trading a senior post for more lower-level posts, but after a work study program the staffing fit was exactly where the author had initially placed it.

5.4.3. Processes

Since the initial analysis, the processes identified have remained accurate. The staff within each process continually analysed their work to find more effective ways complying with customer demands. Ideas for improvements were put forward at

monthly staff meetings and selected for implementation, resulting in continuous incremental improvement of the processes.

The Office Equipment section found customers frustrated by the selection of equipment on offer. The purchasing standard RT222 was re-written into GT222 and fashioned after a mail order catalogue, complete with an office where all the equipment on offer could be seen and worked on. The same office would also try out equipment on offer by suppliers for possible future inclusion in the standard. GT222 has now become the de-facto standard for all the provincial governments.

Every year the standard is updated and put out for tender to suppliers. One supplier suggested the idea to rent PC equipment at 10% of the annual cost of purchasing it outright, leading to a cost saving for the Gauteng Provincial Government while speeding up the delivery of PCs. Another supplier offered the Gauteng Provincial Government everything to be found in an office, from desks to stationery and PC's including a 12-hour repair or replace guarantee.

The Networks section found that the base load of the network was near 90%. While designing new networks would take time, and was indeed under way, a short-term solution needed to be found. It was noticed by the author that many PCs were logged on after hours and questioned this late usage of the network. Investigation found an earlier policy document stating all PCs should be left permanently switched on. A memo was sent requesting everyone to switch off their PCs when they left their desks for security reasons, this resulted in the base load falling to 45% during the day and to 10% after hours.

The Software section found that many system developments could be bought off the shelf. In fact, one such development was 7000% more expensive than a similar product off the shelf. This section then switched to evaluating and buying more proprietary software than to developing their own, leading to cost saving while speeding up delivery. The Admin section found that CAPEX was not managed at all and became a project support office, managing the finances of all projects according to a chart of accounts and asset register.

5.4.4. Projects

Before this initiative, no formal project management had been deployed in government. The Log frame technique had been tried but had completely failed during an implementation attempt. Building on the success achieved at ESKOM Distribution Group, the author put forward the procedure manual for approval. The manual was entirely rewritten and the forms redesigned to accommodate the method of operation at Gauteng Provincial Government within accepted international best practice of project management. In all, more than 600 people were trained in the use of the procedure manual, from: Corporate Informatics, Housing and Land Affairs, Corporate Finance, Security, Education, Health, Nature Conservation, Works Department and Geographical Information Systems. In many of these departments, use of the procedure manual became policy when dealing with projects, and it remains in use to the present.

Within Corporate Informatics, projects that had been dragging on for years were abruptly implemented and finalised. Project lead-time came down from three years to three months, and from 50% under spent to on budget within one year. Overall, there was a 300% increase in the number of projects delivered in one year. On one specific project, success was achieved from conceptual idea to commissioning the system within five months. Project proposal stages were regularly completed within three weeks, planning stages in five weeks, implementation stages in 12 weeks and close out stages in 2 weeks. One department with 9 staff members completed over 150 projects to the value of 15 million Rand in one year.

Success achieved at Gauteng Provincial Government led to 17 other Provincial Government Departments and 4 National Government Departments accepting the procedure manual as policy and using the project lifecycle model as best practice. To date more than 200 semi state companies have been trained in the use of the procedure manual and use the forms it contains to manage projects using lifecycles, work breakdown structures and responsibility charts as best practice. Forms 1-6 developed for Gauteng Provincial Government where published as part of "Practical project management" a training course developed by the author (Van der Merwe 1996).

5.5. Conclusion

Application of the project management model (Objective 4) focused on the use of the model to change strategic direction and transform organisations from functional bureaucracy to effect management by projects.

The ESKOM Transmission Group, Systems Operations Manager accepted the "Procedure manual for project management" as policy under instruction number SS/162. In all, 125 personnel were trained to apply the manual. During 1996, this department successfully completed 150 projects with a total value of R 100 000 000. Over a period of 5 years, the procedure manual was used to manage a programme consisting of more than 2000 projects with a combined value of R 850 000 000, to within 99.5% of time and budget. To date more than 2500 people have used the procedure manual to successfully manage many thousands of projects, without a single project having failed because of using the principles contained in it.

Although well received by ESKOM Distribution Group, the implementation of multi-projects and the effect on organisational structure, control and priority has not been researched over a range of projects. Interest was expressed by various organisations in adopting all or at least some of these concepts. Of these, SPOORNET, Gauteng Provincial Government and Western Districts Council have adopted all the measures and are experiencing a reduced time frame to implementation and more accurate consumption of CAPEX. Use of the control matrix has been made in the Transmission Operations Division. Some resistance to control measures was encountered, however making use of the control matrix public for personnel to gauge their own performance, met with some success. The essence of project management is to "be organised"; therefore to deal with multiple projects without prioritising them epitomises disorganisation. If people are able to measure importance they generally tend to perform better at the more important tasks, resulting in a knock-on effect in efficiency.

For Gauteng Government Corporate Informatics Department, the strategic management model from Johnson and Scholes (1993) was modified to analyse customer and supplier

requests to find evidence of real processes and sub-defining specific issues in each process to identify the way ahead. The number of items relating to each identified issue was used to indicate importance that would influence the creation of an organisational structure. This resulted in a clear map of the business process for the present and future organisation.

Each directorate was given full authority to move people around the levels, trading a senior post for more lower-level posts, However, after a work study program, the staffing fit was exactly where this research had placed it. A later independent investigation found the organisational structure and staffing levels "a near perfect fit". Since the initial analysis, the processes identified have remained accurate. The staff within each process have continually analysed their work to find more effective ways complying with customer requests. Ideas for improvements were put forward at monthly staff meetings and selected for implementation, resulting in continuous incremental improvement of the processes.

Success achieved at Gauteng Provincial Government led to 17 other Provincial Government Departments and 4 National Government Departments accepting the procedure manual as policy, and using the project lifecycle model as best practice. To date more than 200 semi-state companies have been trained in the use of the procedure manual and use the forms it contains to manage projects, using lifecycles, work breakdown structures and responsibility charts as best practice.

Business Development:

A Project Management Approach

Chapter 6

Project management vocational model and apprenticeship programme

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Project management vocational model and apprenticeship programme

Synopsis

Project management has been associated with the engineering discipline for many years. As a management discipline, project management is emerging as a subset of general management and as a meta-skill encompassing all of general management as the term "management by projects" suggests. "General management skill provides much of the foundation for building project management skill." (PMBOK, 1996: 20) suggests that project management is more than general management.

Business develops by strategy, structure, processes and projects. Structure develops to accommodate rapid changes in strategic direction where management by projects places the entire organisation in project teams and no functional structure is accommodated. Project management theory is still decidedly light on exactly how the business functions as a project. One of the key elements required is to establish exactly how the project manager is to be educated and trained to function in the development of the business.

The classical school of thought attempted to create a set of rational techniques that defined one best way of doing things. The theory was founded on fourpillars: division of labour, scalar and functional processes, structure and control (Scott and Mitchell 1976: 31-35). In order for work to be done, tasks have to be allocated to a person who will perform them. As it has always been understood that there is a process by which the task is performed and a process by which the performance of the person is controlled, the project manager, in developing the business, must combine these processes.

The project management vocational model examines the relationship between knowledge and skill as it applies to the competence of the project manager when developing a business. In an attempt to create professional project. managers, project management must first be recognised as a profession. To recognise the profession a

governmental accreditation authority must set standards for education and practice, which are supported by the discipline and by commerce.

Slowly but surely it is being realised that if social development is to succeed, formal education must include project management education as a life skill. Outcomes based education or skill based education throughout the world is set to alter how and in what areas people are to be educated, with the realisation that it is skills that drive the employment market.

An apprenticeship programme needs to be attempted, combining the International Project Management Association's (IPMA) competence baseline with the Association for Project Management's (APM) body of knowledge and the South African Qualifications Authority's (SAQA) initiative to develop standards and qualifications for project management as a business discipline. Just as the project manager is to manage the people who manage the work, the project team is to be made up of technically competent people interested in completing their accepted responsibility. However, a chasm exists in the project manager's procedural expertise in managing the project, and in the technical expertise required by the team to perform the work.

This requires a second task technical leader or champion to guide the project team in performing tasks to technically achieve the required product of the project. The technical expertise is gained by traditionally accepted education and does not form part of this research. The procedural expertise of the project manager to guide the team socially and emotionally to perform efficiently forms the basis of this research.

Business Development:

A Project Management Approach

Project management vocational model and apprenticeship programme

6.1. Introduction

Project Management is inextricably linked to development. Without development, there are no projects to manage. From this premise arises some agreement that modern project management has its origin established in industrial development, its present in business development and its future in social development.

Using a project life cycle with fourstages, proposal, planning, implementation and close-out, one realises that **industrial development projects,** for example buildings, power stations, petrochemical plants and bridges, · have their emphasis in implementation. Here project management is at its most mature, with many tools, techniques, methodologies and a great deal of understanding on how to enable projects to succeed.

Business development projects, for example implementing strategy, re-engineering business processes, developing software and reorganising structures, have their emphasis in the planning stage. Experience shows that if the plans are not well made, implementation fails. It is here that project management is presently formulating theory and practice, with some understanding that there are relatively few tools, techniques or methodologies on how to make these projects succeed.

Social development projects for example land reform, housing, sanitation, health care and education, have their emphasis in the proposal stage. In a letter from the European Commission, Director General: Development, dated September 1996 it is stated "Since

January 1993 the European Commission has adopted Project Cycle Management"...
"which is based on the Logical Framework approach"..."as developed by the European Commission". The methodology is concerned mainly with the greater good of the community at large by getting the community involved in the proposal. Some project management theory address external stakeholders (BS6079 1996: 3), some address internal stakeholders (PMBOK 1996: 15), and some confuse the two. In social development projects there is no such luxury. If external stakeholders are not properly consulted in the proposal stage and brought on board to become internal stakeholders on the project team, all planning and implementation will fail, no matter how well it was done. It is here that project management has no formal presence, no tools or techniques and few methodologies on how to make projects succeed.

Henceforth it can be realised that in terms of all money spent internationally on projects, industrial development projects spend about 10%, business development projects about 20%, and social development projects about 70%. (Unpublished research done by Sulabh, India) Already the International Monetary Fund (IMF) and the World Bank are calling for the withdrawal of funds from social development projects. Even though US $600 billion was spent in 1998 in India alone, there is not a single successful project to show for it (Vohra 1998).

The world has come to realise that for social development to succeed, formal education must include project management education as a life skill. Outcomes based education or skill based education the world over is set to change how, and in what areas, people are to be educated, with the realisation that it is skills that drives the employment market.

Baroness Blackstone, Minister of State for Education and Employment in the UK, stated in a guest editorial: "In an increasingly global economy, Britain simply cannot afford to see its economic performance restricted by poor skills. The most successful businesses in the 21st century will be those that invest in the best-educated and trained workforce. As a consequence, the best way of getting and keeping a job will be to have the skill needed by employers. Furthermore, the concept of a job for life is no longer relevant" (Blackstone 1998: 3).

The International Project Management Association (IPMA) has developed a fourlevel validated certification programme that will provide a harmonised standard across its member associations. This will encompass a common technical content, or body of knowledge, and a common process, based on a quality manual, which will lead to mutual recognition of certificated project managers in each country.

The benefits of the certification programmes for project management personnel are to offer an internationally acknowledged certificate of qualification and competence. For suppliers of project management services this is to demonstrate their employees' competence which in turn offers their clients more certainty to obtain services from project management professionals.

A proposal to establish a South African project management certification programme validated by IPMA is currently envisioned. This proposal will provide the profession with a competency improvement system and with international competency recognition, in order to improve the competitiveness of the South African industry, both domestically and internationally.

The South African government established the South African Qualifications Authority (SAQA) by publishing Act No. 58 OF 1995. This Act enables South Africa to develop its own National Qualifications Framework (NQF). The NQF is to transform education and training in South Africa by integrating learning into a coordinated system designed to promote life-long learning.

At the close of 1999, the National Standards Board 03 for business, commerce and management registered a standards generating body for project management. At the Global Symposium on Project Management held in Moscow in December 1999, the leading question asked was: **"how to educate future project managers?"**

6.2. Project management vocational model

6.2.1. Vocational model

The need for a model becomes evident when one considers that according to basic macro economic theory, the global economy grows through investment by the first world in the development of the third world (Heilbroner 1968: 3). This accelerates the pace of development and determines the position of countries on the list of global competitiveness. The higher a country climbs on the list, the more efficiently and effectively its economy functions.

From this position two problems arise. Firstly, the increased pace of technological advancement increases the rate of vocational redundancy. (This is the rate at which jobs become redundant due to people being replaced by machines to increase efficiency.) Secondly, employers demand competent labour for the new positions, which the educational system must provide. *Competence is defined as the knowledge, skill and behaviour of a person in performing the function for which he is employed* (Tyson 1996: 73). Employers have become disenchanted with the educational system, because the individuals that the educational system delivers, are knowledgeable but not skilled enough to perform the work required of them, and need further on-the-job training to become gainfully employed. The problem is that by the time the employee becomes skilled, the vocation may no longer be required.

Research done by the Ministry of Education and Employment in England, now points an increasing rate of vocational redundancy. Your ability to have and hold a job will depend on your skills as required by the employer. The problem here is that in the past a chosen vocation may have been good for three generations. It is estimated that present vocations may become redundant within ten years. What this research points out is that due to an increasing rate of vocational redundancy, future vocations may change every fouryears. If education in a chosen vocation takes four years a person may not be able to find a job once theire studies have been completed (Blackstone 1998: 3-4).

What a vocational model needs to show is how repeatability and reuse of educational modules can accelerate competence to negate the effect of vocational redundancy.

Outcomes based education, through the creation of a statute, National Qualifications Authority (NQA), a Standards Generating Body (SGB) and an Education and Training Quality Assurance Body (ETQA), governments in future, are set to change education to better match skills required by employers. This should result in faster vocational turnaround, giving employers the skills they need when they need them resulting in improved workplace efficiency and effectiveness while improving overall economic performance.

Under outcomes based education (**Figure 6-1** the green section in the middle), the (NQA) in South Africa set up the National Qualifications Framework (NQF). This was done in order to determine a National Vocational Qualification level (NVQ) (**competence**) in an attempt to match the job with the education in a more or less horizontal line from theory to practice through a NVQ level. This is done under the auspices of a SGB (**Certification**) made up mostly of academics and some practitioners, and audited by the ETQA (**Accreditation**) made up of mostly practitioners and some academics. In the case of project management the ETQA fits into the role of the Certification Council of a National Association as stipulated by IPMA.

It is envisaged that through a national qualifications authority, one certifies the education/training provider, certifies the lecturer as a vocational professional in that specific subject, certifies the course material, and then accredits the qualification. Competence of the individual project manager is certified by a professional body through an evaluation of knowledge plus experience plus attitude (Caupin 1999: 16). It is interesting to note that competence is defined as the knowledge, skill and behaviour of a person in performing the function for which he is employed. (Tyson 1996: 73). A third definition used by computer societies is that of knowledge, skill and interest of which interest is seen to be the most crucial factor.

Figure 6-1: Project management vocational framework model
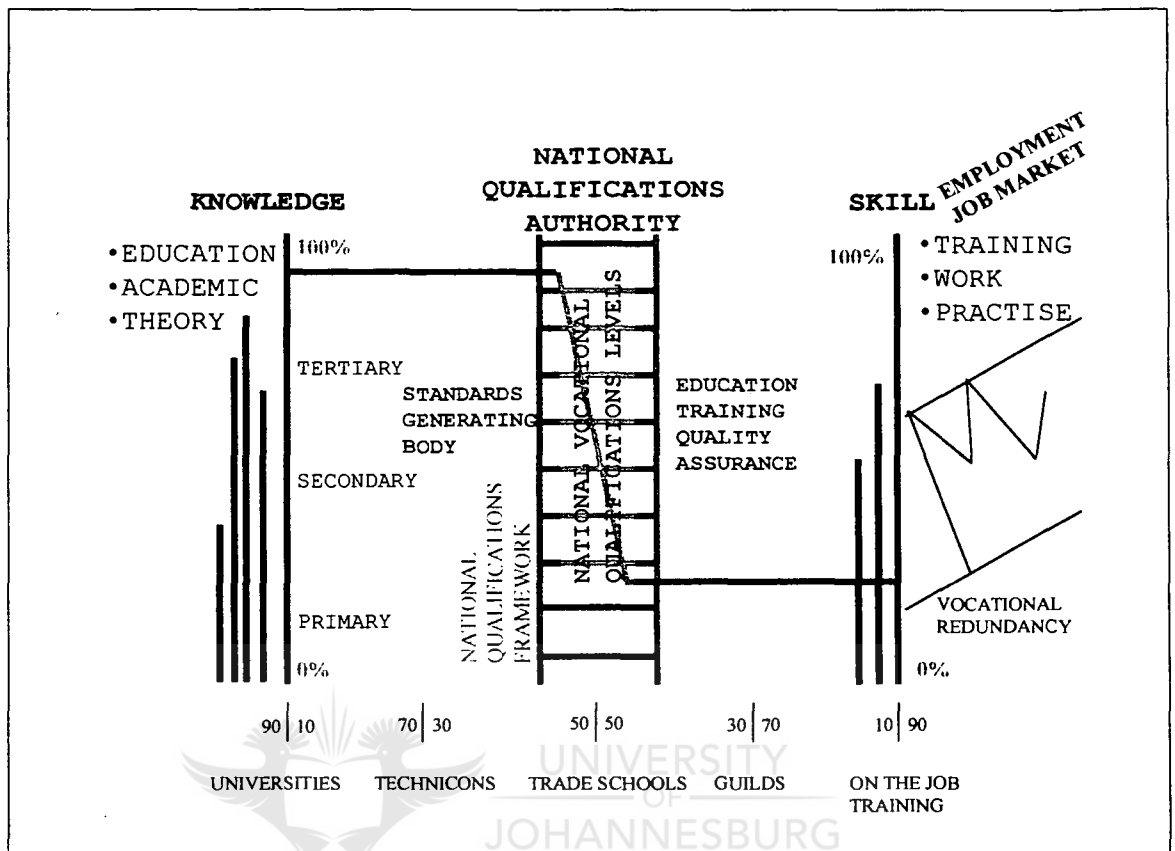
Source: Van der Merwe 1999b: 194

Accreditation is achieved when a national authority certifies the education/training provider, certifies the lecturer as a vocational professional in that specific subject and certifies the course material. This accredits the qualification by finding the student competent, having displayed the required knowledge, experience and attitude.

In **Figure 6-1** formal education is represented on the left and the height of the model (0% to 100%) the level of education achieved in a specific area. Different columns represent "Organising Fields" or "Faculties" or "areas of study". There are generally twelve of these, namely: Agriculture and Nature Conservation; Culture and Arts; Business, Commerce and Management Studies; Communication Studies and Language; Education, Training and Development; Manufacturing, Engineering and

Technology; Human and Social Studies; Law, Military Science and Security; Health Services and Social Services; Physics, Mathematics, Computer and Life Sciences; Services; Physical Planning and Construction. In South Africa, project management has been placed under "Business, Commerce and Management Studies"

The width of the model represents the knowledge / skill mix obtained from different formal education and informal training institutions, moving from left to right: Universities = 90% knowledge / 10% skill. Technikon = 70% knowledge / 30% skill. Trade School = 50% knowledge / 50% skill. Guild = 30% knowledge / 70% skill. On the job = 10% knowledge / 90% skill. On the right are the skills as required by the employer in a specific job, with 0% at the bottom and 100% at the top as for education. Different columns represent different jobs requiring different skill sets, such as nurses or engineers.

To explain the model use is made of the vocation of an aeroplane pilot (follow the horizontal line from left to right in **Figure 6-1**). If a person attend university and achieve a PhD in Aerodynamics, they will be at the top of the scale on the left. This does not mean that one can fly an aeroplane. In the job market skill is demanded which places the PhD at the low end of the skill scale on the right.

On entering into his vocation as a pilot, this PhD finds his education does not provide skills. As he become skilled in flying, his education accelerates his skill up the scale, provided he displays the necessary aptitude for the job. This acceleration is the mutual influence required of a vocational model. However, at this point in time, it is not known if knowledge accelerates skill or skill accelerates knowledge.

The horizontal line in **Figure 6-1** can also be used to explain the initial NVQ level of an Engineer. Upon leaving a university with a tertiary education an engineer starts to work at the low end of the skill column. After working for fouryears experience moves one up the skill column to a point where skill is level with knowledge and examination can be undertaken to gauge competence for a Government Ticket to register as a professional engineer. On passing this examination he is registered as being competent.

Lifelong learning starts on the bottom left, moves a little up the knowledge scale, then switches to the skill scale on the right, moves up the scale a bit more, and then switches back to the knowledge scale and so on. Pure knowledge-based education keeps personal development to the left and purely skills based education to the right.

A third dimension **(Figure 6-2)** can be added to the model if one visualises the jobs and education fields stacked along the opposite sides of a cube.

Figure 6-2: Vocational redundancy model
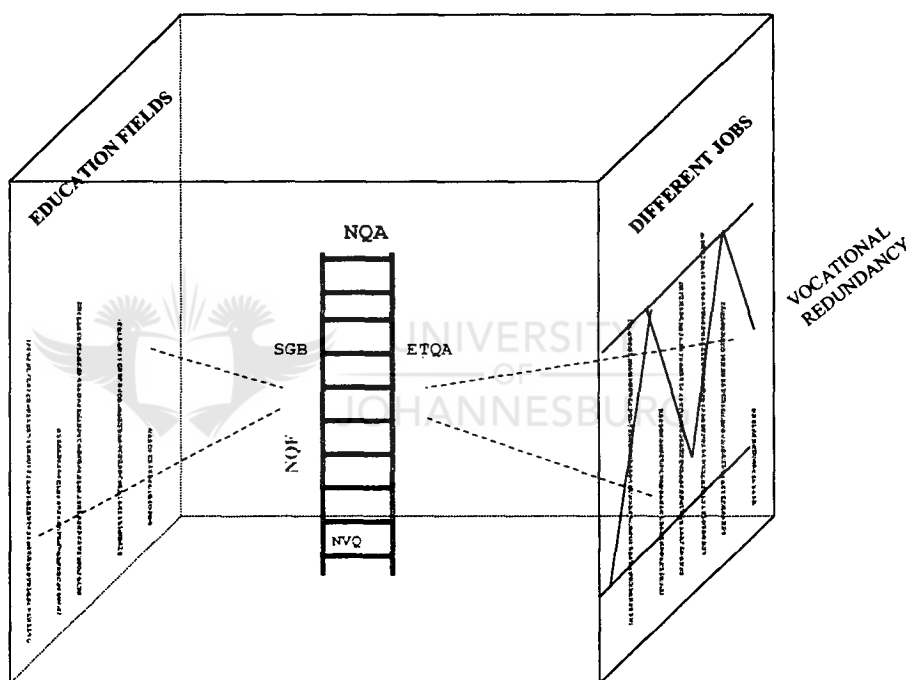
Source: Van der Merwe 1999b: 194

The 3D model **(Figure 6-2)** also shows varying skill levels as one progresses from job to job (right hand side of model), due to vocational redundancy or simply as one moves through life. Elements of education or modules (left hand side of model) can be channelled into the NQF, as can elements of different skills accumulated from previous jobs. With this understanding, it can be seen that repeatability and reuse of education and skills accelerates the competence of an individual as he moves from vocation to vocation.

6.2.2. Human resources element

The human resources function is to place the right person with the right education and skill required for the job, in the right place, at the correct level, for the appropriate compensation.

In a centralised functional bureaucracy this works well, as the correct knowledge and skill mixture (competence) can be matched to compensation with some ease (Tyson 1996:73-80). The employer employs the competence he requires and pays for it, whether he uses 5% or 200% of it. This results in the natural inefficiency of a bureaucracy, as available resources either exceed or fall short of demand.

As long as one competence is matched to one position within the organisation, the situation is under control. Problems start when a person is promoted and the new job requires a different competence, e.g. as when an accountant becomes a manager. He may be a highly competent accountant but lack skill in managing people. He therefore trains on the job to become a competent manager. Such a person would now possess two skill sets, accounting and managing. The question of compensation arises as to which of these skill sets does the organisation use and in applying both skill sets to his job which is the employee remunerated for?

Matrix structures tried to solve these difficulties and could handle two competencies in one job, but when more than three or four competencies where required it became very hard to manage. If it is considered that vocations at the present time last approximately five or six years, then most people in the job market today have more than one set of vocational competencies. If the workplace is to become truly efficient, then employees should be able to deliver in more than one skill set. Returning to **Figure 6-2** it can be seen on the right side of the cube how skills are accumulated in moving from one vocation to another, as can education on the left.

6.2.3. Project management

Project Management within Business Development makes use of cross-functional, self directing or distributed virtual teams to overcome this situation for the job, but for compensation it is still a problem.

Adding the multi-project dimension it is possible to have one person working on 25 projects at the same time in different positions. On one team he is an administrative assistant for two hours, on another a technical expert for two hours and on another the project manager for four hours, all on the same day.

A further element is that project management is used in many education fields and across many skills. This makes it difficult to describe project management as a vocation, because it is universally used across knowledge and skill, as demonstrated in **Figure 6-3**.

In **Figure 6-3** project management competence can now be measured by the height of the circle from the base.

Figure 6-3: Project management competence model
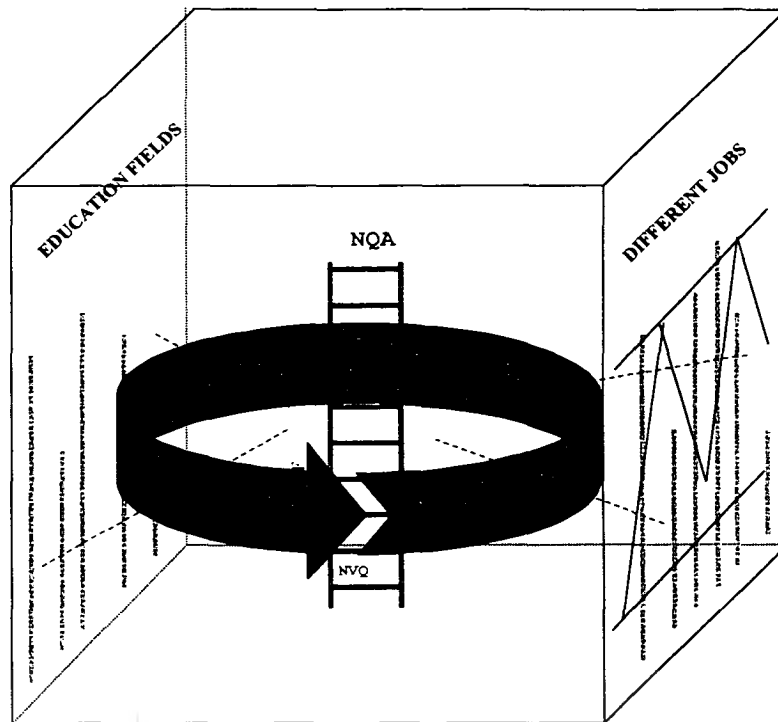
Source: Van der Merwe 1999b: 195

In using this model, project management enters the realm of a life skill, as it becomes part of all education, and all vocational skills. Here project management is a foundation package on which all knowledge and skill is built and as such **project management becomes a skill set that turns vision into results.**

6.3. Project management apprenticeship programme

6.3.1. International Project Management Association

The International Project Management Association (IPMA) is a non-profit, Swiss-registered organisation, whose vision is to be the prime promoter of project management internationally. This encompasses research, development, education, training, standards and certification. IPMA started in 1965 under its previous name INTERNET, as a forum for the exchange of experiences amongst project managers working on international projects. It hosted its first international conference in 1967 in Vienna.

Its membership consists primarily of national project management associations. Currently there are 28 member associations. These national associations serve the specific needs of project management professionals in their own country and in their own language. The IPMA member national project management associations are: Austria, China, Czech Republic, Denmark, Egypt, Finland, France, Germany, Greece, Hungary, Iceland, India, Ireland, Italy, Macedonia, Netherlands, Norway, Portugal, Russia, Slovakia, Slovenia, Spain, South Africa, Sweden, Switzerland, Ukraine, United Kingdom and Yugoslavia.

A project management research workshop is held annually at the University of Business and Economics in Vienna. Here researchers from universities as well as research oriented practitioners from industry and administration meet to present their work and discuss future research ideas and opportunities for co-operation. A research database has been completed (http://www.ipma.ch/) in the last few years, to record the findings of the group, as well as to document other work in this field, for example books, papers and theses.

IPMA has issued several publications, and, most notably, proceedings, from its conferences, which form a comprehensive record of how project management thinking

has developed over the years. IPMA publishes its own academic magazine, the International Journal of Project Management. Papers are submitted by academics and practitioners from around the world. All papers are double-blind refereed to ensure a very high standard. This magazine is issued six times per year to members. Members are also sent a newsletter every quarter, to keep them updated with the work of the Association as well as to announce workshops and conferences. IPMA also has its own Internet web site (http://www.ipma.ch/), which contains much information about its members, history and activities.

IPMA holds a world congress of project management every two years. The 14[th] world congress held in Ljubljana, Slovenia in June 1998 attracted some 400 participants internationally. In addition, every year, IPMA will sponsor one or two regional symposia in a member association's country.

IPMA has developed a four level Validated Certification Programme that will provide a harmonised standard across its member Associations. This will encompass a common technical content, or Body of Knowledge, and a common process, based on a Quality Manual, which will lead to mutual recognition of Certificated Project Managers in each country.

In recognition of their expertise, IPMA is asked to contribute to working groups on international standards. Most recently IPMA experts have contributed to ISO Technical Committee 176, working on ISO 10006 - Quality in Project Management. IPMA is also in discussion with the ISO secretariat to enter a proposal for a New Field of Activity covering the development of a standard on Minimum Requirements for Project Management.

Klaus Pannenbäcker, Hans Knoepfel and Gilles Caupin have constructed the IPMA Four Level Certification Programme. The IPMA Council confirmed in its meeting on June 14, 1998 in Ljubljana the concept of IPMA's universal system for certification of project managers. It was further decided to implement the four level certification programme in all countries by way of incremental steps. At the first Validation Panel meeting on 10th June 1998 in Ljubljana, the 31 delegates of 16 certification bodies and

national associations exchanged their views and promoted project management qualification and competence programmes.

It is intended that certification programmes should be an incentive for the project managers and members of project management teams to expand and improve their knowledge, experience and personal attitude, continue their education and improve the quality of project management.

The benefits of certification programmes for project management personnel are an internationally acknowledged certificate of their qualification and competence. For the suppliers of project management services it is a demonstration of their employees' professional qualification and competence and for their clients it represents more certainty to get state-of-the-art services from project management professionals. For these purposes, a variety of qualifications and competencies concerning knowledge, experience, personal attitude, of applicants are assessed.

IPMA developed the following four-level concept, for a certification programme, of a certification body that abides by the rules of IPMA. This body is to be validated and revalidated by IPMA on a regular basis. The main requirements for each level are:

- The certificated projects director (CPD) shall have the ability to direct all projects of a company or branch or all projects of a programme

- The certificated project manager (CPM) shall be able to manage complex projects him/ herself

- The registered project management professional (PMP) can manage non complex projects him/ herself and assist the manager of a complex project in all fields of project management

- The project management Fachmann/Fachfrau/practitioner (PMF) shall have the project management knowledge and may be applying it on some fields as a specialist.

The levels are not restricted to hierarchical thinking. On each level professional work can be done for the respective range of tasks and decisions, in a local or in an international context.

Figure 6-4: IPMA four level certification

level		capabilities	certification process				title	validity
			stage 1	stage 2	stage 3			
A	Programme or Projects Director	competence = knowledge + experience + personal attitude	CPD	optio-nal	project report	inter-view	Certificated Projects Director	3-5 years
B	Project Manager		CPM -application - CV -selfassessment -references -project list	e. g. work shop or			Certificated Project Manager	
C	Project Management Professional		PMP	semi-nar	exam		Registered Project Management Professional	time limited
D	Project Management Practitioner	know-ledge	PMF		exam		Project Management Fachmann/ Professional	not time limited

Source: Caupin *et al.* 1999: 16

National associations are responsible for developing and managing their own project management qualifications and competence programmes and for establishing their certification bodies. IPMA owns and maintains its universal system for validating the national programmes to co-ordinate and harmonise the certifications regarding IPMA's general structure and principles.

The general structure is shown in IPMA's Competence Baseline (ICB) describing the fields of project management qualification and competence as well as the taxonomy for the assessment of knowledge, experience and personal attitude for project management

personnel. The ICB is provided in English, German and French. It is an elaboration of the following national baselines which where used as a guideline:

- English: The UK Body of Knowledge (APM),

- German: The Swiss Beurteilungsstruktur (VZPM) and the German PM-Kanon (PM-Zert),

- French: The French Critères d'Analyse (AFITEP).

The assessment structures are built up in terms of descriptions and taxonomies. The criteria are in the range of general abilities, project principles, project management principles, organisation competence, social competence, methods, procedures, general management and personal attitudes of the project management team. These ranges are broken down to about 40 elements, each of which is described and measured by requirements for several themes.

Each national association is responsible for establishing its own detailed national competence baseline (NCB) with reference to and in conformity with the ICB and the local cultures. The national assessment structure and taxonomy may include up to 20% new elements and may replace or reduce core elements of the ICB for taking into account national cultures and new professional developments. The NCB must reflect the global understanding as well as the national practices of project management. It includes a shortlist of literature for every level of qualification and competence that is operated according to IPMA's validation system.

The principles for an IPMA validated project management qualification and competence programme are shown in agreement between IPMA, its national association, and the European Standard EN 45013, which is subscribed to in the agreement. The following stages are compulsory elements of the qualification and certification processes:

Levels A and B

- Application, self assessment, project proposal

- Project report

- Interview.

Level C

- Application, project experience, self assessment

- Formal examination with direct questions and intellectual tasks

- Interview.

Level D

- Application

- Formal examination with direct questions and open essays.

The organisation, the procedures and the forms of the certification body must fulfil the requirements of EN 45013. They are the subjects of a quality handbook of the certification body. It is recommended that the national government institute and accredit each certification body. The accrediting body should be a member of the European Accreditation of Certification (EAC). The Council of IPMA set up the certification validation organisation shown in **Figure 6-4** below.

Figure 6-4: IPMA organisational structure
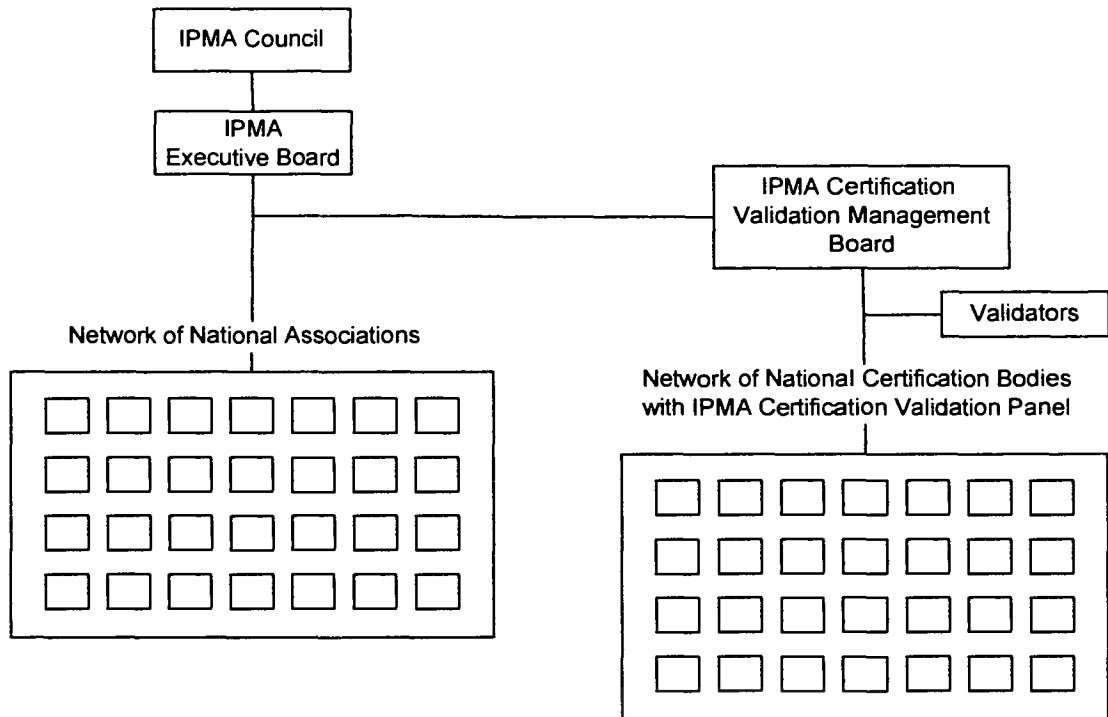
Source: Caupin *et al.* 1999 : 22

The organisational units are:

- The national certification bodies which are designated by the national associations and are responsible for the qualification and certification programme.

- The IPMA certification validation panel, consisting of the representatives of the national certification bodies and their assessors, for exchanging experiences and making recommendations for improving IPMA's certification and validation system.

- The validators who visit the national certification bodies, audit their qualification and competence programmes and recommend improvements.

- The IPMA certification validation management board, which is operating and improving IPMA's universal system for validating project management qualification and competence programmes.

- The IPMA Executive Board and the IPMA Council of Delegates who make the general decisions concerning the qualification and competence programme and appoint the management board.

IPMA maintains a register of all acknowledged certificates for individuals and organisations awarded by the certification bodies of all national associations, and makes it accessible to the public. The certification bodies administer their confidential documentation of the candidates and the personnel of the certification body, including the assessors. They process and provide the information about their qualification and competence programme and their certification.

Qualification and competence programmes have been a major point of discussion for project management associations around the world for several years. IPMA has proposed that they and the American project management institute build up partners in Asia, Australia, Africa and South America to form a federation of international project management associations (FIPMA). So far, a global forum for project management was established at the 13th world congress in Paris, France in 1996 although to date, the American institute has not joined.

Part of this proposal is to establish a South African PM Certification Programme validated by IPMA, providing the profession with a competency improvement system and with international competency recognition, in order to improve the competitiveness of the South African industry, both domestically and internationally. This is currently in progress.

It is proposed to draw on foreign expertise, using the experience of people having led the establishment of national certification programmes and their extension to other countries, to start with the certification of selected individuals at level B and C, using the established IPMA programme with experienced and recognised foreign evaluators.

The local and foreign evaluators are to establish the rules of, and to set up a South African certification programme abiding with the IPMA requirements. Once a group of local assessors has been established and integrated into the international network of IPMA assessors, they are to extend the implementation of the system to all four levels, together with the setting up of the appropriate training programmes.

It has been suggested that APM (SA) identifies for the purpose of certifying the first individuals, 10 to 12 project managers eligible for Level B certification, 15 to 20 project managers eligible for level C certification, willing to go through the German PM-Zert certification programme. These people should be experienced enough in project management not to need specific training prior to going through the certification process at the level they apply for.

Two PM-Zert Assessors will run the process, as follows:

❑   A first visit to South Africa with two Assessors from IPMA would be needed to explain the certification process to the candidates (levels C and B), to evaluate the applications with self assessment (level B), to interview level B candidates individually to help them establish the skeleton of their project report, to run a two-day workshop as preparation for examinations and interviews for level B, to run a two-day workshop and hold evaluation interviews for level C candidates (the certificate being obtained, if the candidate has passed, at the end of the interview).

❑   Coaching of the Level B candidates by telecommunication from Europe during the preparation of their project report.

❑   A second visit to South Africa to run the interviews for the Level B candidates (2 to 3 days), to finalise the certification rules, both together with the First Assessors of APM (SA).

It is recommended that APM (SA) identify within the South African PM community, two highly competent and recognised project managers, who will participate in the

evaluation sessions run by the PM-Zert Assessors. They will be considered by IPMA, as "First Assessors" who will in the later stages become key members of the South African certification committee.

This first step will be used to prove to the South African community the adequacy of the process in the local, as well as international, context and to establish a first base of certificated persons who will be participants, some of them as assessors, in the full extension of an IPMA validated South African certification process.

APM (SA) is to draw on the experience of PM-Zert to establish the rules and procedures of its own PM certification programme, abiding with the IPMA requirements in order to allow validation. In that respect, PM-Zert can provide its own set of rules in English and assist APM (SA) in its adaptation to the South African context. APM (SA) should decide at this point whether it wants to be the certification body itself (in which case, it will not be allowed by the norms to run the corresponding training programmes, (the choice made by the French project management association) or whether it prefers to set up an independent certification body (the choice made by the German project management association, GPM/PM-Zert).

Running the certification programme will require establishing a group of assessors who will evaluate the candidates. This group should consist of experienced and certificated South African project managers. Some of them should be able to participate in the international network of IPMA assessors, which means having sufficient international experience to be able to assess project managers in other countries.

As a final step, it is suggested to extend the certification programme to all four levels including level A and D. This implies the establishment of training programmes to prepare candidates for examinations. GPM/PM-Zert could assist the training organisation in the establishment of the detailed training programmes.

6.3.2. Association for project management body of knowledge

Association for Project Management (APM) is the national association for the United Kingdom and registered British member of the international project management association (IPMA). APM (UK) is a professional association, which has its membership certified NVQ Level 5 under outcomes based education regulations for Commonwealth member states.

This means that APM (UK) has access to a certification council regulated by IPMA and the British board of education, to sit in judgement of accreditation of training and education of project managers which determines the competence of project managers, according to British and international rules for certification.

Internationally APM (UK) makes a major contribution through its work with the international project management association (IPMA), assisting to plan and mount expert seminars, and bi-annual world congresses on project management. These are attended by project managers and project management specialists from over four0 countries. Recent congresses held in Glasgow (1988), Vienna (1990), Florence (1992); Oslo (1994); Paris (1996) and Slovenia (1998); have each attracted many participants. The 2000 World Congress was held in London during May.

The association is very active at national level across a diverse range of industries and market sectors in pursuit of its objectives. In particular it is involved in project management education and training, through links with colleges and training organisations, establishing professional standards for project management throughout the UK and Europe.

APM headquarters in Buckinghamshire, England, maintains a database and library of publications on project management topics, and through its network of branches and specific interest groups (SIG's), members can contact others to exchange information. All members receive the Association's business magazine "Project", with articles on subjects of interest to project managers and receive details of the association's activities

in the project network section. The International Journal of Project Management contains papers and articles in English on the latest international developments in project management and is also available to members at a preferential subscription rate. The Association has 14 branches in all regions of the UK with active programmes combining seminars and talks with social meetings.

In addition, there are a number of specific interest groups that meet regularly to publish technical papers, arrange seminars and co-ordinate the experience of members involved in specific applications of project management. The association has an interest in an associated trading company, the APM Group Limited, which provides training and consultancy.

The body of knowledge (BOK) contains the essence of what the association of project management considers to be the knowledge and experience that people involved in the formal management of projects would have, or need to have. It will be of interest to people wishing to develop their knowledge of project management, and members of the association seeking certification status.

Candidates undertaking the certification programme follow a recommended method to use the documentation:- firstly, a review of the profile of a certificated project manager is made; secondly, the self assessment matrix is scanned to get a broad understanding of all areas; and thirdly, a brief self-assessment is carried out without reference to the body of knowledge to rate one's level of experience and knowledge on the scale of 1 to 10. The scales indicate the following:-

0	no knowledge whatsoever
1-3	low level
4-6	medium level
7-9	high level
10	acknowledged industry expert

(APM-BOK 1996: 4)

The job title "Project Manager" is so commonly used, and is seen to cover such a wide spectrum of activities, that in many cases it is regarded as meaningless. The certification programme is aimed at assessing the function carried out by an individual, and not the job title. Accordingly, it is possible that some people with a wide range of job titles e.g. project manager, project controller, programme manager, section manager. might very well be eligible for certification, whereas others with the designation project manager, may not. As there are many definitions of a project and a project manager it is sensible to consider project management for the purpose of certification at the following four levels of experience:-

Level one

A Project Manager working at this level would be managing an in-house project with no responsibility (or very little) over external contractors and or suppliers. The predominant management activity at this level would be the application of project management tools and techniques to enable work to be done more effectively.

Level two

At this level a project manager may be involved in managing a number of different disciplines within a single company, with limited involvement controlling external contractors, the possible exception being in dealings with a procurement office. The project manager's activities would be associated with tools and techniques, with limited people and organisation skills while expressing an appreciation of the wider project management issues.

Level three

A Project Manager working at this level would be managing a multi-disciplinary team from a number of independent companies, where the team has been established for the purpose of the project or, be responsible for a team of people undertaking a set of projects. At level three a detailed understanding of the application of the appropriate tools and techniques as well as experience in managing people and understanding organisations together with a full

understanding of the project management issues in the widest sense, would be required.

Level four

A level four project manager would be involved with a multi-disciplinary team from a variety of companies, working in a number of different countries. Projects at this level are the exception rather than the rule (APM-UK 1996: 5).

It is expected that a project manager working on a level four or three project would certainly have the required experience to become a certificated project manager. It is also accepted that many project managers working on level two projects could have the appropriate knowledge and experience with which to attain the status of a certificated project manager. However, a project manager working on a level one project is not expected to have the wider understanding necessary to gain certification status.

A certificated project manager is expected to be able to handle different issues and people that influence the outcome of projects they are working on in a positive and constructive manner. The principal characteristics (APM-UK 1996: 6) of a certificated project manager's personality profile would include the following:

- ❑ **Attitude** - an open positive "can do" attitude, that should encourage communication, motivation, and that fosters co-operation.

- ❑ **Common sense** - a strong ability to spot sensible, effective, straightforward, least risky, least complex solutions.

- ❑ **Open mindedness** - an approach where one is always open to new ideas, practices and methods and gives equal weight to the various professional disciplines involved in the project.

- ❑ **Adaptability** - a tendency to be flexible where necessary, to avoid rigid patterns of thinking and behaviour, to adapt to the needs of the sponsors,

the requirements of the project, its environment and the people working on it and affected by the outcome of it, to ensure a successful result.

- **Inventiveness** - an ability to discover innovative strategies and solutions either from within or by encouragement of members of the project team and to identify ways of working with unequal resources to achieve the project objectives.

- **Prudent risk taker** - a willingness and ability to identify and understand risks but not to take a risky approach in an unwise or reckless fashion.

- **Fairness** - a fair and open attitude, which respects all human values.

- **Commitment** - a very strong overriding commitment to the project's success, user satisfaction and team working. A strong orientation towards goal achievement.

Development of sophisticated scheduling and control systems place emphasis on tools and techniques in managing projects. With the growth of the personal computer these have a part to play in modern project management but one must never forget that projects involve people. It is the project manager's duty to bring together the project participants and contributors and weld them into an effective project management team that will achieve the project's objectives.

Personal characteristics necessary to fulfil the function of the project manager are to be given a very high priority in assessing whether an applicant can use the designation of certificated project manager.

The forty key competencies that make up the APM-BOK (1996: 11-67) are summarised in **figure 6-5** below:

Figure 6-5: APM Certification Assessment Form

Project Management

	High				Medium			Low		
0	9	8	7	6	5	4	3	2	1

- 1.1 Systems Management
- 1.2 Programme Management
- 1.3 Project Management
- 1.4 Project Lifecycle
- 1.5 Project Environment
- 1.6 Project Strategy
- 1.7 Project Appraisal
- 1.8 Success/Failure Criteria
- 1.9 Integration
- 1.10 Systems and Procedures
- 1.11 Close Out
- 1.12 Post Project Appraisal

Overall Competence

Organisation and People

	High				Medium			Low		
0	9	8	7	6	5	4	3	2	1

- 2.1 Organisation Management
- 2.2 Control and Co-ordination
- 2.3 Communication
- 2.4 Leadership
- 2.5 Delegation
- 2.6 Team Building
- 2.7 Conflict Management
- 2.8 Negotiation
- 2.9 Management Development

Overall Competence

Techniques and Procedures

	High				Medium			Low		
0	9	8	7	6	5	4	3	2	1

- 3.1 Work Definition
- 3.2 Planning
- 3.3 Scheduling
- 3.4 Estimating
- 3.5 Cost Control
- 3.6 Performance Measurement
- 3.7 Risk Management
- 3.8 Value Management
- 3.9 Change Control
- 3.10 Mobilisation

Overall Competence

General Management

	High				Medium			Low		
0	9	8	7	6	5	4	3	2	1

- 4.1 Operational Management
- 4.2 Marketing and Sales
- 4.3 Finance
- 4.4 Information Technology
- 4.5 Law
- 4.6 Procurement
- 4.7 Quality
- 4.8 Safety
- 4.9 Industrial Relations

Overall Competence

Source: APM-UK 1996:7

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6.3.2.1. Part one - project management

6.3.2.1.1. Systems management

A system is a high level definition of the various elements, both concrete and less tangible, which comprise a viable entity. Systems management comprises the prime activities of systems analysis, systems design, engineering and systems development.

6.3.2.1.2. Programme management

A programme is a specific undertaking to achieve a number of objectives. The most common examples of programmes are development programmes or large single purpose undertakings consisting of a series of interdependent projects.

6.3.2.1.3. Project management

Project management is the planning, organisation, monitoring and control of all aspects of a project, and the motivation of all involved, to achieve the project objectives safely, and within agreed time, cost and performance constraints.

6.3.2.1.4. Project life cycle

The project life cycle is the sequence of phases through which a project will pass from its conception to its completion

6.3.2.1.5. Project environment

The project environment is the context within which the project is formulated, assessed and realised. It covers all the external influences that are brought to bear on a project.

6.3.2.1.6. Project strategy

Projects should have a high level comprehensive definition of the way they are to be developed and managed. This strategy should be established at the very early stages of a project, be as comprehensive as possible and cover all the major dimensions.

6.3.2.1.7. Project appraisal

Project appraisal is the discipline of calculating the viability of the project. A factor, which provides the baseline for project appraisals throughout the life of the project, is the investment appraisal. Project viability is usually defined in largely economic or financial terms. However, it is normally extended to include issues such as environmental appraisal, health and safety and certainty of performance.

6.3.2.1.8. Project success / failure criteria

Project success/failure criteria are the criteria upon which the relative success or failure of the project may be judged. Three basic sets of criteria can be identified:

1.   Those of the sponsoring organisation i.e. the owner or user.
2.   The traditional or classic project management one of 'on time, in budget, to specification.
3.   The project participants' profitability.

6.3.2.1.9. Integration

Integration is, in the opinion of most management professionals, the key distinguishing function of the project manager. Integration involves bringing people and things together to perform effectively. Integration is co-ordination and control.

6.3.2.1.10. Systems and procedures

Every project should have a set of systems and procedures detailing the standard methods, practices and processes for handling frequently occurring events within the project. These will cover management approvals, controls and technical requirements. Systems will also cover methods of handling information transfer, storage and retrieval.

6.3.2.1.11. Close out

The completion of work once the project has been implemented. This is the phase at the end of the project life cycle just before operations begin. Sometimes associated with this, is the period known as commissioning, when all of the final checks and adjustments are made, prior to start up of the facility that has been created.

6.3.2.1.12. Post project appraisal

Post project appraisal, sometimes called the post project evaluation, completes the project management process once the product is in use. It provides feedback in order to learn for the future. There are two main stages:

1. Immediately, to apply the lessons learned to the next project.

2. A longer-term review to determine what, if any, adjustments should be made to company policies and procedures.

6.3.2.2. Part two organisation and people

6.3.2.2.1. Organisation design

Organisational design is the design of the most appropriate organisational structure for a project, including definitions of roles and responsibilities of the participants. The three basic kinds of structure are functional, project and matrix.

6.3.2.2.2. Control and co-ordination

Control is the process of establishing targets and plans, measuring actual performance, comparing actual performance against planned, and taking any necessary action to correct the situation. Co-ordination is the activity of ensuring that the work being carried out in various organisations and places fit together effectively, in time, content, and cost in order to achieve the project objectives effectively.

6.3.2.2.3. Communication

Communication is the effective transmission of information so that the recipient understands clearly what the sender intends. Communication media may take several forms: oral, written, textual, numerical, graphic, body language, paper, electronic.

6.3.2.2.4. Leadership

Management is defined as the art of getting others to do what one cannot necessarily do oneself, by organising, planning, controlling and directing resources. Leadership is getting others to follow.

6.3.2.2.5. Delegation

Delegation is the practice of getting others to effectively perform work which one chooses not to do oneself due to lack of time, competence or other reasons.

6.3.2.2.6. Team building

Team building is the ability to assemble competent people to join the project team and to get everybody working together for the benefit of the project.

6.3.2.2.7. Conflict management

Conflict Management is the art of managing conflict creatively.

6.3.2.2.8. Negotiation

Negotiation is the art of achieving, to the greatest extent possible, what it is that you wish from a transaction, while leaving all parties to the negotiation sufficiently content that the relationship subsequently works well.

6.3.2.2.9. Management development

Management development covers all aspects of staff planning, recruitment, development, training and assessment.

6.3.2.3. Part three - processes and procedures

6.3.2.3.1. Work definition

The definition of project work and organisation is achieved through the use of a work breakdown structure (WBS) and an organisation breakdown structure (OBS). (The OBS may be extended to become a task responsibility matrix.)

6.3.2.3.2. Planning

Every project should have an overall plan, which will vary in size from a few pages for the simple project to a whole volume for a large multi-discipline project. The plan is owned by the project manager and should include the 'why' and 'what' (a guide to all subsequent decisions); the 'how' (the project strategy and standards) the 'when' (the key dates and bar chart/ network milestones) and the 'who' (the members of the project team, client, consultants, contractors and other stakeholders, with their terms of reference, where appropriate). The planning process will establish a baseline for the project.

6.3.2.3.3. Scheduling

Scheduling is selecting and applying the most appropriate techniques for producing a programme to meet the project key dates and objectives.

6.3.2.3.4. Estimating

An estimate is a quantified assessment of the resources required to implement part or all of a project. The estimate usually begins as a quantification, or measure, of resource units required, which can then be translated into a financial budget using rate tables or actual costs.

6.3.2.3.5. Cost control

Cost control is the discipline of reconciling planned and actual money or man-hour figures to physical parts of the project.

6.3.2.3.6. Performance measurement

Performance measurement is the concept used to represent physical progress achieved

in relation to cost and schedule performance by the means of introducing the calculation of Earned Value.

6.3.2.3.7. Risk management

Risk management is the process of identification, assessment, analysis and management of all project risks.

6.3.2.3.8. Value management

Value management in its broadest sense may be defined as a structured means of improving business effectiveness in line with broad business goals and includes the use of management techniques such as value engineering and value analysis. Value engineering is the structured application of a series of proven techniques during the concept and design (or formative stages) of a project, which has not yet been implemented. Value analysis is the application of a similar series of techniques to an existing product, process or organisation.

6.3.2.3.9. Change control

Change control is the process of registering all potential improvements and other changes, in scope, specification, cost or schedule and submitting them for analysis of the project consequences should they be approved. Change control is also referred to as variation control. The term configuration management is also associated with change control. Configuration management is an extension of change control, focusing on control of the technical configuration of the project.

6.3.2.3.10. Mobilisation

The initiation of project work typically involves bringing together project personnel and securing equipment and facilities. The term 'project start-up' is often used to cover the same period. Start-up has a broader meaning, however, essentially covering the creation

of a project team (often involving deliberate organisation behaviour techniques) built around the initial project planning.

6.3.2.4. Part four- general management

6.3.2.4.1. Operations management

Operations management is the management of the physical resources (usually labour, equipment and materials) required for design and production whether the product is a manufactured item or a service.

6.3.2.4.2. Marketing and sales

Marketing is a matching process, which brings together the abilities of a company, and the needs or requirements of its customers, to the greatest benefit of both parties. Selling, is the process of getting someone to buy the product or service being offered by the company.

6.3.2.4.3. Finance

Finance in a project context, essentially covers the process of raising funds in the most prudent and favourable way, and of ensuring that the funding is provided, disbursed and allocated efficiently. Management accounting is the discipline of allocating costs correctly, to ensure that management has a clear view of its current and forecast financial performance.

6.3.2.4.4. Information technology

Information technology (IT) is the technology, usually computer based, used to ensure that data is gathered, stored, processed, distributed and displayed in the most effective manner

6.3.2.4.5. Law

The legal duties, rights and processes which govern in a project situation. There are several different categories of law. The most important include national legal systems, such as criminal law, but particularly company and commercial law, employment law, contract law, health and safety and other regulatory requirements such as planning law, data protection, sexual and racial discrimination, building regulations.

6.3.2.4.6. Procurement

Procurement covers aspects as follows: an investment appraisal into the options available; procurement or acquisition strategy; preparation of contract documentation; acquisition, selection of suppliers; administration of contracts; and storage, inspection, expediting and handling of materials and equipment.

6.3.2.4.7. Quality

Quality is assuring that required standards of performance are attained. Three different stages of quality management are typically encountered: quality assurance (QA) defines the procedures and documentation requirements to establish a predetermined level of performance; quality control is the process of measuring that a pre-defined level of performance has indeed been achieved, Total quality management is a much broader and more ambitious process involving:

- ❑ Identifying what (standards performance, requirements) the customer really wants.
- ❑ Defining the organisation's mission.
- ❑ Involving all personnel in identifying how (1) and (2) could be better achieved.
- ❑ 'Designing in' ways in which performance could be improved.
- ❑ Measuring throughout the total production process, how well performance meets these required standards.
- ❑ Analysing continually how performance can be further improved.

6.3.2.4.8. Safety

Determining standards and methods which minimise to a level considered acceptable by the lay public, the legal system, the operators and others, and the likelihood of accident to people or damage to equipment, ensuring that these standards are respected in operation, and reviewing them to ensure their continued validity.

6.3.2.4.9. Industrial relations

Management of the workforce including, but not limited to, statutory responsibilities and duties, negotiating terms and conditions of pay and employment, union and non-union relations, and manpower planning.

6.3.3. South African Qualifications Authority

During 1995 the South African Government established the South African Qualifications Authority (SAQA) by publishing Act No. 58 of 1995: the SOUTH AFRICAN QUALIFICATIONS AUTHORITY ACT, to provide for the development and implementation of a National Qualifications Framework and for the purpose to establish the South African Qualifications Authority; and to provide for matters connected therewith.
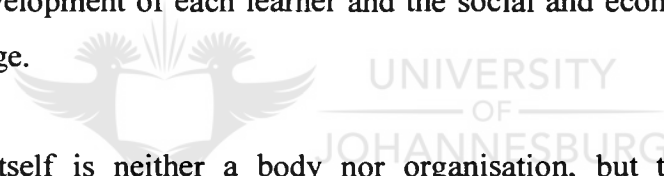
The functions of authority were set out in Act No. 58 of 1995 is to oversee the development of a national qualifications framework, to formulate and publish policies and criteria for the registration of bodies responsible for establishing education and training standards or qualifications, to provide for the accreditation of bodies responsible for monitoring and auditing achievements in terms of such standards or qualifications, to oversee the implementation of the national qualifications framework, including the registration or accreditation of bodies the registration of national standards and qualifications, to take steps to ensure compliance with provisions for accreditation;

and to take steps to ensure that standards and registered qualifications are internationally comparable.

This Act No. 58 of 1995 enables South Africa to develop its own national qualifications framework (NQF). The NQF is designed to cover all types of learning and achievement. This will be done through the setting of clear standards for all learning and the establishment of quality management systems that will ensure that standards are met. The NQF is set to transform education and training in South Africa by integrating learning into a coordinated system designed to promote life long learning.

The objectives of the NQF in Act No. 58 of 1995 include: creating an integrated national framework of learning achievement, facilitating access to, and mobility and progression within, education, training and career paths, enhancing the quality of education and training, and accelerating the redress of past unfair discrimination in education, training and employment opportunities, thereby contributing to the full personal development of each learner and the social and economic development of the nation at large.

The NQF itself is neither a body nor organisation, but the actual framework of nationally registered unit standards and qualifications. SAQA was therefore established in terms of Section 3 of the South African Qualifications Act of 1995 as the organisation responsible for overseeing the development and implementation of the NQF. SAQA has been subdivided into framework implementation and framework development, and have the functions of standards setting and quality assurance.

The standards setting function of SAQA is structured into twelve organising fields of learning. For each of these fields, SAQA has established a National Standards Body (NSB). These NSBs in terms of Section 3 of the South African Qualifications Act of 1995 are responsible for: defining and recommending to SAQA the boundaries of the relevant fields, and within this, a framework of sub-fields recognising or establishing Standards Generating Bodies (SGBs) within the framework of sub-fields, and ensuring the work of the SGBs meets SAQA requirements, recommending the registration of standards and qualifications; and overseeing the updating and reviewing of standards

and qualifications. Project management has been defined as a sub-field of NSB Field 03: Business, Commerce and Management Studies.

The quality assurance function of SAQA is largely that of accrediting the Education and Training Quality Assurance Bodies (ETQAs). These bodies will be responsible for assuring the quality of learning achievements within a specified context for registered standards or qualification through registration of assessors and accreditation of providers.

At the close of 1999 a public notice was issued by NSB 03 (business, commerce and management), to register an SGB for project management. In this public notice NSB 03 has incorporated public comments received on the previous public notice published for the application to recognise and register an SGB for project management.

The proposed brief is to:

□ Research and identify the South African requirements regarding Project Management standards and qualifications *[Regulation 24(1)(e)]*.

□ Research and identify current Project Management standards and applicable qualifications (national and international) and determine the applicability thereof to the South African requirements *[Regulation 24(1)(e)]*.

□ Determine those South African needs that are not addressed by current Project Management standards *[Regulation 24(1)(e)]*.

□ Generate generic unit standards in the areas of Project Management Frameworks; Project Integration Management; Project Scope Management; Project Time Management; Project Financial Management; Project Risk Management; Project Communication Management; Project Human Resources Management; Project Procurement Management and Project Quality Management, and any other area that may arise from 1 to 3 above

[Regulation 24(1)(a)], and combine them into qualifications in accordance with the Authority requirements at NQF Level 4, 5, 6 and 7.

- ❑ Recommend the standards and qualifications generated under 4, above, to the NSB *[Regulation 24(1)(c)].*
- ❑ Recommend criteria for the registration of assessors and moderators or moderating bodies *[Regulation 24(1)(d)].*

- ❑ Update and review standards *[Regulation 24(1)(b)].*

Point 4 above is an almost verbatim repetition of the American Project Management Institutes Body of Knowledge page 37. This effectively closes the door on knowledge areas considered by IPMA and APM-UK. Further, Curling (1998) makes an interesting case for certification as he states that:

"National project management certifications are driven by cultural and legal frameworks. For example, the Australian approach is to certify Qualified Project Practitioners (QPP), Registered Project Manager (RPM) and Master Project Director (MPD). To receive a Registered Project Manager one is required to pass a knowledge examination and an on the job evaluation of competency."

The International Project Management Association (IPMA) "Certificated Project Manager" (CPM) accreditation is reached through a competency based process. One is required to have extensive hands on experience in the management of projects. A 5000 to 8000 word Project Report, in the style of an European Master's dissertation, is the next milestone. If the Project Report satisfies an Evaluation Board then there is a personal appearance and interrogation by an accrediting Evaluation Board. The International Project Management Association (IPMA) has a career profile of four levels including certification of project managers. Certification of project managers has two senior levels, dependent on experience and competency; that of Certificated Project Manager, and Certificated International Project Manager.

APM entrance certification of practice is an Associate Project Management Professional (APMP). "Work on devising a mid-level ward, between APMP and CPM continues" according to Heath (1998: 27).

In Canada "professional" certification is a provincial legal matter. Canadian project management practitioners are moving to a realisation of the very strict legal and social requirements for a "Canadian Project Management Professional" (CPMP). The recent dramatic changes in the PMI®PMP® Certification process allows for the accreditation of more than one level of project management practice. The imperative for this is the intense pressure from American Industry and Government. The reorientation of the certification examination to the project life cycle recognises one of the flaws in the current PMP® learning.

To quote David Curling (1998: 1-2): "the reengineering of the PMI®PMP® program, is seen as a move towards accreditation of project management career levels. However worthwhile the PMI® Project Management Professional Certification, and its international marketing success' does not meet the needs of national professional accreditation (legal) bodies. Bill Duncan, the PMI® Director of Standards, writes in a thread in the PMI® Internet mailing list, "Is the PMP® really a certification? Of course it is, but it is certification as a project management professional, not as a project manager. Certification as a PMP® should not be used to imply or warrant that your PM's actually know what they are doing". He goes on to say PMP® Certification can be used to "demonstrate commitment to the profession and evidence of a certain level of knowledge" (Curling 1998:1-2). This effectively disqualifies the 1996 edition of the PMI-BOK as a standard on which the competence of a Project Manager can be assessed.

6.3.4. Apprenticeship programme

From Adam Smith's *An inquiry into the nature and wealth of nations* (published 1776) to Tom Peters' *Liberation Management* (published 1992) the central question in management has always been whether to manage people or the work they perform.

What makes Edgar Schein's (1988a: 18) concept of process consultation so intriguing is that his research determines **that it is neither one nor the other, but both**. In Psychiatry it is common knowledge that the family becomes dysfunctional when both parents are not present. Schein proves that for the team to function both parents need to be present, that is there should be a task (technical) leader and a process (social emotional) leader and one person cannot be both.

The building block of the economy and the business is the individual person as found by Adam Smith in his research on work specialisation. In fact, capital growth is directly linked to the competence of the worker. Competence consists of knowledge, skill and attitude (Tyson 1996: 73). Although interest in the task being performed plays a role in efficiency it does not seem to be researched at all. Projects, where the project team consisted of highly competent people but who had no interest in the outcome of the project, have been known to fail.

Education systems for the past 100 years have focused exclusively on knowledge, with the consequence that in the year 2000 rapid change in the workplace has resulted in a demand for more skilled people. The fact is that the educational system of the year 2000 cannot deliver skills - only knowledge. Reading, writing and arithmetic may be fine for primary education but does nothing to deliver a skilled employee.

During the closing plenary session of the Global Symposium on Project Management held in Moscow in December 1999, a question was asked as to how future project managers would be educated? This prompted a further question as to whether project management is knowledge based or skill based? The participants concurred that development was not based on what people knew but on what they did. Therefore, project management should be seen in relation to problem solving, as the product that the project delivers, **MUST HAVE** delivered and implemented a working solution, or else the project would have no benefit. That is to say that project management is skills based. Further, there is one skill that ranks supreme above all others in project management, which is *rhetoric* and unfortunately is not part of the management sciences educational system.

Rhetoric, in its broadest sense, is the theory and practice of eloquence, whether spoken or written. Spoken rhetoric is oratory. Rhetoric defines the rules that should govern all prose composition or speech designed to influence the judgement or the feelings of people. In a narrower sense, rhetoric is concerned with a consideration of the fundamental principles according to which oratorical discourses are composed: invention, arrangement, style, memory, and delivery.

It was the eloquence with which Nestor, Odysseus, and Achilles display in the *Iliad* by the Greek poet Homer that led many Greeks to look upon Homer as the father of oratory. The establishment of democratic institutions in Athens in 510 BC imposed on all citizens the necessity of public service, making skill in oratory essential ability. Hence, a group of teachers arose known as Sophists, who endeavoured to make men better speakers by rules of art.

Protagoras, the first of the Sophists, made a study of language and taught his pupils how to make the weaker cause, in a speech or discussion, appear the stronger argument. The actual founder of rhetoric as a science is said to be Corax of Syracuse, who in the 5th century BC defined rhetoric as the "artificer of persuasion" and composed the first handbook on the art of rhetoric (Duckworth 1997: CD-ROM). The Greek philosopher Plato satirised the more technical approach to rhetoric, with its emphasis on persuasion rather than truth, in his work the *Gorgias,* and in the *Phaedrus* he discussed the principles constituting the essence of the rhetorical art. The Greek philosopher Aristotle, in his work *Rhetoric,* defined the function of rhetoric as being not that of persuasion, but rather that of "discovering all the available means of persuasion," thereby emphasising the winning of an argument by persuasive marshalling of truth, rather than the swaying of an audience by an appeal to their emotions. He regarded rhetoric as the counterpart, or sister art, of logic (Duckworth 1997: CD-ROM).

During the Renaissance (14th century to 17th century), the study of rhetoric was again based on the works of such writers of classical antiquity as Aristotle, Cicero, and Quintilian. A number of contemporary dissertations were produced, including *The Arte or Crafte of Rhethoryke* (1530) by the English schoolmaster Leonard Cox, *The Arte of Rhetorique* (1553) by the English statesman and writer Thomas Wilson, and treatises by

the 16th-century French rhetoricians Pierre de Courcelles, and André de Tonquelin. Rhetoric was a prescribed subject in colleges and universities, with public disputations and competitive exercises helping to keep the practice alive (Duckworth 1997: CD-ROM).

In the early 18th century, rhetoric declined in importance, although more on its theoretical than on its practical side, since the political arena and the debating platform continued to furnish numerous opportunities for effective oratory. For the next half-century, the art of rhetoric had increasingly fewer exponents. Today it is practically unheard of outside academic or legal circles, but one might ask: if Einstein did not have the ability to explain his theories and concepts to his peers then what would be know of him today? Very little, one would think. In fact Einstein had much to say about the inability of language to explain things. When reviewing project management literature to find success or failure criteria a question frequently asked is if the issues discussed are technical in nature or of a human nature? More and more one finds that the personal or human related issues are those contributing to the success or failure of the project.

At the 14th world congress on project management the Young Project Managers Forum stated that communication was their greatest difficulty. Yet when asked what was done to rectify the situation, there was silence from the audience. This has prompted the author to research conversation and rhetoric as an interpersonal communication medium and its importance in project management, only to discover just how little man is acquainted with the subject in modern times.

In the project environment it has been found in practice that a large portion of conversation revolves around the exchange of information. This research therefore concentrates on a model relating to this exchange. It has been stated in information technology circles, that the first basic law of information is that, in order for information to exist there must be a sender and a receiver. It is known from communication theory that a discrepancy exists between the information sent and that received and the reason for this is referred to as noise. Noise is caused by, amongst other things, culture, geography, politics, dress code, temperature and time of day. In fact anything that can cause a distraction, change in meaning or understanding, can be referred to as noise.

This roughly relates to the following graffiti on conversation:

> People hear half of what is said
> Listen to half of what is heard
> Understand half of what they listened to
> Believe half of what they understand
> Remember half of what they believe
>
> **That is only 3% of what was originally said.**

In project management people are being managed so that they can manage their work. If the project manager and champion do not have the ability to effectively and efficiently communicate to the team members the information on what they should be doing, and on how they are progressing, the team will soon lose interest in their work. This situation, if left to continue, will lead to the failure of the project. Research conducted into success and failure of projects (Baker 1997: 25-28), (Black 1996: 21-24), (Gioia 1996: 16-19), (Pinto 1997: 29-31) and (Shenhar *et al.* 1997: 5-13) concludes that projects rarely fail technically. They fail as a result of poor human relations and poor communication skills.

If the project is to deliver and implement a working solution, then problem solving by way of critical thinking must be part of the education. Critical thinking asks to evaluate arguments. An argument is a group of statements or assertions, one of which, the conclusion, is supposed to follow from the others, the premises.

> For example: All men are mortal. Socrates is a man. Therefore, Socrates is mortal.

The third statement is the conclusion of the argument, and the first two statements are its premises. The movement of thought that joins the conclusion to the premises is called the inference. The argument above is called a *deductive argument*, and it is the kind of reasoning associated with logic courses. The most striking feature of a deductive argument is that the conclusion follows from the premises "automatically." Most of the

arguments used on a daily basis, however, have a different form.

> For example: My car will not start; the fuel gauge reads "empty." Therefore, the
> car is (probably) out of fuel.

Here the conclusion does not follow with certainty; it is not guaranteed. It is possible, for example, that the fuel gauge is broken and that the car will not start for any number of other reasons (the battery is dead, the distributor cap is wet, someone stole the engine). This kind of argument is called an *inductive argument*. In evaluating an argument, one needs to be concerned with the interrelationship of all three parts: the conclusion, the premises, and the inference.

To find solutions people should think in terms of solutions and communicate solutions. Pareto's 80/20 principle demonstrates the efficiency of solutions in that 80% of the work can be completed in 20% of the time. The problem is people spend 80% of the time on 20% of the work because people are naturally inclined to deal with problems.

A third fundamental part of project management education is the use of information. People are taught to read. People sometimes understand what is read, although rarely do people apply what was read. Applying information to implement solutions is the most fundamental part of an information overloaded 21^{st} century. With the INTERNET presenting unlimited access to information, "finding information" is removed from the educational equation. "Applying information" to a problem situation to gain the results of a solution is what the 21^{st} century demands.

The following analogy explains:

> A person driving a car at night on a disused road realises that one of the wheels
> has developed a puncture. Never having been confronted with this situation
> before, the person take the car's **manual** and reads the **process** for changing the
> wheel thus gaining **knowledge**. If this **knowledge** inserted into the brain through
> the eyes does not become **skill** exerted through the fingers the wheel will remain
> flat. The person must physically get out of the car and **perform** the steps in the

sequence of the **procedure** applying some measure of **skill** based on **knowledge** to overcome the **problem**. Knowledge and skill are required to achieve the benefit of an implemented solution in overcoming a problem.

If project management was pure knowledge then it could be effectively taught in the classroom. But, just as a sculptor needs to use tools skilfully to make statues, project managers must apply the tools of **rhetoric, critical thinking and application of information.** Project management cannot be taught by knowledge alone, as it requires both knowledge and skill. Project Management needs simulation in a workshop to create the real environment in which learning takes place.

By using the 40 knowledge areas contained in the APM-BOK (APM-UK. 1996: 11-72). in conjunction with the four levels of certification proposed by IPMA (Caupin *et al.* 1999: 16) and adding to this the three fundamental requirements of rhetoric, critical thinking and application of information, an apprenticeship programme can be formulated with supervision by a mentor.

Firstly, project management must become a formal profession based on the IPMA four levels. *Secondly,* project management should have formal educational status preferably in primary, secondary and tertiary education. The word **project** is already well established in all levels of education: it only needs to be formalised. *Thirdly,* project management can never become a closed discipline. Team members are technically skilled from many different disciplines. Project management must be dealt with as an additional skill. A correlation can be made between IPMA's four levels and formal education in the following way: A level = Doctorate, B level = Masters, C level = Bachelors and D level = Secondary education.

Primary education can focus on appropriate areas such as: project lifecycles, planning, scheduling, personal time management and information technology (already a popular subject). *Secondary education* can focus on appropriate areas such as: project management, success and failure criteria, communication, work definition, cost control and industrial relations. *Tertiary education* can focus on appropriate areas such as: systems management, programme management, project environment, project appraisal

integration, systems and processes, close out and post project appraisal. *Post graduate* education can focus on appropriate areas such as project strategy, the whole area of organisation and people, as well as performance measurement, risk management, value management change control and mobilisation. Finally *Doctoral studies* can focus on the whole area of general management.

Having age restrictions for entry to levels A, B and C with mandatory employment periods can ensure skill as follows:

- Level C requires a Bachelors Degree plus three years relevant experience and a minimum age of 25.

- Level B requires a Masters Degree plus 8 years relevant experience and a minimum age of 35.

- Level A requires a Doctoral Degree plus 15 years relevant experience and a minimum age of 45.

Many of these measures are generally accepted at present and it is intended that where relevant subjects exist in faculties of other disciplines, they may be incorporated into the study programme of project management. This will require the faculty of project management to teach those areas within project management as well as those within techniques and processes not taught elsewhere.

Project Management is about getting a team of knowledgeable and skilled people together to effectively implement a solution to a problem. Nowhere should this be more effectively displayed than at the place of education.

6.4. Conclusion

Project management as a vocation (Objective 5) expands on the project management process by going from theory to practice to education. Competence was debated in the application of knowledge and skill. Education of project managers and team members was analysed in an outcomes based environment to deliver people equipped to do things to achieve in reality the visions of social development. The international debate on standards for education for project management was researched, whereby knowledge, skill and interest are utilised in an atmosphere of nurturing mentorship to evolve people into competent project managers.

As the pace of technological development increases, the speed at which vocations become redundant, increases. The ability to have and hold a job has become more dependent on the skill of the employee and less dependent on the knowledge. Formal education must find a way to stay relevant to the skills that employers demand of their employees. Outcomes based education must endeavour to put such a system in place.

On the other hand, human resource management finds difficulty in dealing with multi-vocations in a centralised functional bureaucracy but as organisations evolve into distributed virtual teams, project management provides a solution.

Project management as a life skill cuts across all knowledge and skill and becomes that ability to turn dreams into reality.

The international project management association (IPMA) maintains a register of all acknowledged certificates for individuals and organisations awarded by the national bodies for certification of all national associations and makes it accessible to the public. The certification bodies administer their confidential documentation of the candidates and the personnel of the certification body including the assessors. They process and provide the information about their qualification and competence programme and their certification.

Qualification and competence programmes are a major point in the discussion of the project management associations globally. Too much emphasis is placed on tools and techniques in managing projects, and with the growing use of personal computers 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 cement them into an effective project management team, that will achieve the project's objectives.**

Personal characteristics necessary to fulfil the function of the project manager should be given high priority in assessing whether a member of the Association of Project Managers can use the designation of Certificated Project Manager.

Many of these measures are generally accepted at present and it is intended that where relevant subjects exist in faculties of other disciplines, they be incorporated into a study programme for project managers. This will require a faculty of project management to teach only those areas within project management, techniques and processes not taught elsewhere.

Project management is about getting a team of knowledgeable, skilled and interested people together to effectively implement a solution to a problem. Nowhere should this be more effectively displayed than at the place of education.

Business Development:

A Project Management Approach

Chapter 7

Conclusion and further developments

Chapter 7

Conclusion and further developments

Synopsis

The development of economies, businesses or people should be interpreted in a co-ordinated holistic manner where improved efficiency means more work for people, not less. The goal is to get workers involved in writing process theory for project management, which results in incremental improvement.

Project management needs to become the point of departure for management theory, wherein people are managed, so that they can manage their work. If the business is to develop then the successful outcome of any change in the organisation can only be achieved when business processes, and human behavioural processes converge in the person of the project manager.

Project life cycles form the cornerstone of project understanding where work breakdown structures and responsibility charts take on the command and control aspect of delivering envisioned benefits. In this age of technology where everything moves faster one is reminded that Adam Smith, 'who stood at the dawn of the industrial age' warned that improvements in efficiency has its own natural demise (Smith 1976: 376-380).

Consumption of human capital in parallel with financial capital should be managed to evolve knowledge and skill. Only then can man cease to be wasteful in his expenditure.

Business Development:

A Project Management Approach

Conclusion and further developments

7.1. Introduction

In this final chapter on business development, virtual organisations that have no offices or building from which business is conducted, and no formal functional structure for the employees to be organised into, is considered. In virtual organisations, employees who have no common organisational commitment, deal with the work required to deliver a product. Virtual organisations are made up of virtual teams employing resources on a temporary basis to produce a product. This results not only in management by projects formulating the command and control structure of virtual organisations, but also in project management forming a perfect fit to the management of virtual teams.

Administering projects, when seen in the light of a virtual structure within a functional structure, has presented the problem of keeping control over project progress. Where organisations manage few individual projects, and where each project has its own project office, overall control is not an issue. Where people, machines and money are shared between many projects, scheduling these resources between different projects, as well as controlling them, becomes an indisputable challenge. Only when the project office selects and uses one administration system can it become efficient in controlling project progress and expenditure. If actual expenditure can be shown on projects to which the resources were actually assigned, against a forecasted rate of invoicing, stakeholders will hold the parent organisation in high regard.

Use of project management software to develop activity schedules as part of time management and reporting, has attracted a large following. Flexibility built into the software to assist with customer demand actually detracts from accurately forming a

foundation for project reporting. Necessary rigidity for auditing purposes is absent, rendering the software useless as a control tool. Project software has difficulty in coping with distributed, multicultural, multilingual and multi-skilled teams, as everyone does not understand everything in the same way.

By means of the comparison of industrial, business and social development to 1st, 2nd and 3rd world economies on the basis of a model strategic level work breakdown structure of a project, research was conducted amongst project management practitioners and academics to find out in which way the application of project management changes for different developmental sectors. It is hoped that by constructing a database to record success and failure factors of social development projects, knowledge can be extracted with which to educate future project managers.

In order for any future development to be successful, it is imperative that project management be recognised as a profession. This should result in the boundaries of the subject being scientifically described and the natural laws established. To achieve this, the consumption of human capital in parallel with financial capital, need to be managed to evolve knowledge and skill. Only then can organisations cease to be wasteful in the use of people, and perpetuate the result of increasing wealth creation from which all living things can ultimately benefit.

Education in skills that employers need, and a full understanding of project-orientated financial systems should be the focus for businesses and any social development in the 21st century.

7.2. Virtual organisations and projects

Virtual organisations have no offices or building where employees gather, and from which business is conducted, and no formal functional structure into which the employees can be organised. Use is made of information technology and systems to communicate with each other while working on short duration objectives in structurally flat teams. Virtual organisations are those in which employees who have no common organisational commitment deal with the work required for a finished product.

In the new "virtual project" environment, team members seldom share a common workplace, may rarely see each other, may never have worked together and may never work together again after the project is completed. For an ever increasing number of organisations, the world is represented by an environment of rapid technological advancement, particularly in the field of communications. Complex organisational structures are needed to deal with global competition and dynamic markets that demand short production runs of unique products. Downsizing, outsourcing, and employee empowerment have become facts in this climate, while job security is rapidly becoming outdated. The survival of organisations depends on their ability to rapidly change structure, culture and products to match changing demands of consumers (Adams & Adams 1997: 37).

Distributed teams or virtual teams are used to concentrate effort on delivering the product required of them. Often, by having these teams distributed through sequential time zones, work can continue unabated for 24 hours a day. A further advantage is the interim nature of their employment. Team members are only employed for the time actually spent working on the product.

Functional organisations are imperfect consumers of resources. Time and money is spent on required resources that are used for 2% or for 200%. Virtual organisations on the other hand become perfect consumers of resources, as employment of man and machine is based on time and duration of use only. The reciprocal advantage of this

approach is that a higher level of expertise can be employed for short durations, facilitating successful development while leaving the individual team members with time available to spend with other teams.

Project management, or the functioning of the project team, has always been conducted in a virtual organisational atmosphere within the functional organisation. Employees, contractors, consultants, advisors, client and stakeholders all make up membership of the project team, accepting responsibility for and completing tasks, according to available time and competence. A basic knowledge of team building is essential to the effective management of any project. With the advent of virtual projects, however, the methods and techniques required for the project team building process, have changed. Face to face communications are desirable but may no longer be possible because of time and cost constraints. Fortunately, the same technology that made virtual teams possible, also provides methods for developing effective teams on dispersed project participants. Virtual project managers must be knowledgeable and creative in using modern communication technology to enhance team cohesion (Adams & Adams 1997: 41).

As an example, industry experts currently employed by other organisations can work for several days doing quality assurance assessment for ongoing projects. The "outsider" brings a powerful combination of fresh perspective and breadth of experience. Often, "insiders" find it difficult to be self-critical and to intermix their local-based knowledge with external "best practice." These temporary project members often act as a catalyst for change (Yeack 1996: 30).

Virtual organisations are therefore none other than virtual teams employing resources on an interim basis to produce a product. This results not only in management by projects formulating the command and control structure of virtual organisations, but also in project management becoming a perfect fit to the management of virtual teams.

7.3. Project office

Administering projects, especially those seen in the light of a virtual structure within a functional structure, has raised the problem of keeping control over project progress. Whereas organisations manage projects, each with its own dedicated team, in a singular fashion, many individual projects are managed with their own project office. Where people, machines and money are shared between many projects, scheduling these resources between multi-projects becomes a real challenge.

In many organisations the capital life cycle of projects is poorly understood and budgets are not based on the full requirements of actual expenditure, but rather on wish lists. Here tendering procedure and contract law can devastate a three month implementation project into a 12 month long piece of red tape.

Consider the fact that that the feasibility and viability studies for the proposal stage of the project life cycle can take a few months, at the very least, from the point in time that the concept is first registered to finding a sponsor. Assembling the project team and performing the design and specification tasks against available suppliers, can add another few months before tendering is permitted. The tendering, source selection and contract adjudication process in most organisations cannot be completed in less than three months. Once contracts are in place, implementation can get under way. Given that it will take three months to complete, a further two months are required to close out the project.

Current expenditure is demanded from projects that have been completed but not placed into the asset register by way of interest payments and change requests. Progress payments of projects currently being implemented but started in the last budgeting period, or roll over projects, should be catered for. Projects budgeted for and having started implementation for the current budget period make up the current year's expected expenditure. Projects currently in the planning stage of the project life cycle are also catered for in the current year's budget, as are those having completed their

feasibility studies, and also projects accepted for viability studies but which will only be spending resources in a future budget.

Current year budgets are under pressure from over-expenditure by projects not yet completed and from under-expenditure from projects not yet started. Given that there are no project management procedures in place, the organisation find itself at the mercy of a myriad of processes, procedures, standards, systems, methodologies, tools, techniques and proprietary approaches used by individual project managers. In this seemingly chaotic situation it is almost impossible to gain control over forecasted rates of invoicing.

In order for the business to survive, a standard approach or procedure to project management, which can be used by all project managers, becomes essential for coordinated control of expenditure. No sense can be made of project progress when the project office is confronted by hundreds of different approaches to managing projects.

To gain control, it is vital to know in which stage of the life cycle the project is, as those projects registering concepts for study make up the five year plan, those seeking sponsorship the three year plan, those projects seeking to go out on tender are the following year's plan and those projects having placed contracts for delivery and implementation constitute this year's planned expenditure.

When the project office uses one administration system it becomes efficient in acquiring funds for future projects. When actual expenditure can be shown on the projects to which the resources were actually assigned, against a forecasted rate of invoicing, the parent organisation will be held in high regard by stakeholders.

7.4. Project management software

Use of project management software to develop activity schedules as part of time management and reporting, has attracted a large following. "Project management software is widely used to assist with schedule development. These products automate the calculation of mathematical analysis and resource levelling and thus allows for rapid considerations of many scheduled alternatives. They are also used to print and display the outputs of schedule developments" (PMBOK 1996: 68).

As a tool to finding shorter durations of activities and networks they are invaluable, but when it comes to actually managing a project they are actually contributing to failure. "While a software solution is often a necessary component to the solution, the software itself will not manage the programme (multi-project)" (Gioia 1996: 19)

One downfall of software is that calculations are based on activity duration entered by the user. This is called time "demanded" by the activity to be completed. The problem is that time "available" by the person or persons who have to perform task is less than the time demanded (Van der Merwe 1998: 22-27). This leads to activities taking longer to complete. A second common error is in the choice of a calendar (Riess 1996: 161) where a calendar containing an eight hour five-day week is selected. This is correct for a dedicated team but for a distributed team, work is not completed in eight sequential hours. Less work is actually completed so every day the plan falls a little more behind schedule.

To correct this the individual team member accepts responsibility to perform a certain task. He determines the duration for completion based on his available time and submits a target finish time and date. This is how a responsibility chart functions, however, when this information is entered into software, the programme calculates overall project duration using predecessor and successor links. By adding targets one can get the situation where the late dates for activity completion can be earlier than the early dates.

Software also promotes the concept of one best way to complete the project and allows the user to create plans in far to much detail and far to rigidly. Practical experience has shown that there is a limit to how much information can be dealt with in a given time frame. When too much detail is managed the project team spends more time working on the report than actually completing tasks until the situation is reached where it took a project team that was researched 39 days to compile a month end report (Van der Merwe 1997: 230).

Flexibility built into the software to assist with customer demand actually detracts from accurately forming a basis for project reporting. Necessary rigidity for auditing purposes is absent, rendering the software useless as a control tool. Building in the required rigidity limits the team to "one person, one skill, one project" which is simply not true in multi-project business development environments.

Project software has difficulty in coping with distributed, multi-cultured, multi-lingual and multi-skilled teams, as everyone does not understand everything in the same way. Adding different time zones into the mix is perhaps too much to ask for at the present time.

What is required is for each person working on a project to match his individual time available to that of the task demanded time he has accepted responsibility for performing. In this approach, a three-hour task may be started on Monday and be completed on Friday but only consumed 3 man-hours. If a 40 hour workweek is used this does not mean that 37 hours were wasted but that they were deployed amongst different projects.

Research done on a company employing 50 employees working on 150 projects found that if time demanded by all project activities where calculated and compared to the sum of available man hours, demand exceeded supply by 60%. It is needless to say that this company constantly under performed on project delivery by the same amount.

7.5. Industrial, business and social development

In chapter 2, figure 2-1, a matrix is shown comparing industrial, business and social development to 1^{st}, 2^{nd} and 3^{rd} world economies. It is accepted in chapter 3 that there is one basic model for a strategic level work breakdown structure of a project. Research was conducted amongst project management practitioners and academics listed in the references to find in what way the application of project management changes in different developmental sectors, using the base model from chapter three.

Industrial development projects can be seen as having key descriptions such as chemical plant, power station, bridge, dam, engineering and production as part of the title.

These projects use resources in different ways such as people are established in dedicated centralised teams working full-time on one project at a time. Mostly contractors are used to perform the work of the project, never own staff. Time taken to peruse the project from inception to conclusion is measured in years. Money required for all project costs are of a capital nature and are seen as an investment, which has a payback period.

Most management effort is spent in the implementation stage. Management of change to the original plan is a key activity.

Project risk, once commitment to the project is gained, does not feature. *Product risk* is managed in the planning stage, where impact affects quality, time and cost in the implementation stage.

Formal design is completed by an in-house design team. Contracts based on specification preparation, tender evaluation and contract negotiation, are always a part of these projects.

A contractor always completes *implementation* with the client present onsite administering the contract. Industrial development projects have durations that are typically measured in years, where the implementation team is made up of skilled and educated technical workers forming a dedicated group for the duration.

Project close is seen as a commercial operation and is not normally seen as part of the project. Many formal tools and techniques exist which concentrate on the completion of the task.

Business development projects have key descriptions such as business processes, strategy implementation, change management, restructuring and software development in their titles.

The use of resources in these projects is established by using people in distributed cross-functional teams, lateral teams or virtual teams working on many projects concurrently, predominantly own staff used, with assistance from some consultants. Time taken for project completion is measured in hours or days. Money is rarely spent on equipment; often there is no capital spent at all. A distinguishing factor in these projects is that the only costs incurred are in labour hours.

Most management effort is spent in the planning stage. Due to very short implementation periods, changes to the original plan result in almost automatic failure. Managing people is the key activity, as staff, who have other functional work to do make up the project team leading to an issue regarding loyalty as to which master is best served which could result in potential difficulty in performing the tasks of the project.

Project risk requires alignment with the company's strategic direction while the marketing window of opportunity remains a constant threat to the project. *Product risk* is managed in the planning stage as part of design, and normally does not feature during implementation due to the extremely short duration of this stage.

Formal design is completed by an in-house design team, including some consultants. Contracts between departments for the supply of labour is a further feature of these projects.

Implementation is completed by the same in-house team who did the proposal and design. The duration of implementation is measured in days or weeks utilising highly educated and skilled labour often involving the use of sophisticated technology.

Project close uses formal approaches but due to work pressure the team members rapidly deploy back to their functional position or move on to other projects. Thus, project closure is not often formally completed.

Commercial operation life cycle entertains ongoing modification and changes to project deliverables, often obscuring the end of the project.

Few formal tools and techniques exist, concentrating on the management of the individual team member.

Social development projects have key descriptions containing words such as rural, poverty, education, healthcare, transport, sanitation, housing, policing, etc. as part of the title.

Resources required for social projects use local residents managed by consultants to perform the work. Time consumed for project duration is measured in weeks or months. Money consumed is made up of grant aid, donations and/or government finance, and spent mostly as administration overheads, with very little of the money going towards paying the workers or completing the project.

Project managers spend most of their effort in the proposal stage communicating with stakeholders to gain commitment from the community at large, as without this support no effort spent in planning or implementation will meet with success. As the local

community supplies labour, education and skills development are key activities during the planning stage to assemble a workforce for implementation.

Project risk originates in and impacts on the proposal stage, while *product risk* is managed in the planning stage and impact effects quality, time and cost in the implementation stage.

Consultants complete *formal design*. Contract management including specification prepare, tender evaluation and contract negotiation is always a part of these projects, including contracts within the community for the supply of labour.

Implementation of the project is completed by the community with very little help from outsiders. The duration of these projects rarely exceed six months, but may require changing the implementation team, as the project rolls out from village to village or from community to community, often requiring sensitivity to political and religious orientation of the project team to the community being served.

Project close is a major event with formal handing over of the project deliverables to the community, done with much fanfare to score political points.

Commercial operation of the project is not part of the project and almost no formal tools and techniques exist that concentrate on the involvement of the local community, which are not necessarily skilled or educated.

7.6. Further development

In order for any further development to take place, it is imperative that project management be recognised as a profession. This should result in the boundaries of the subject being scientifically described and the natural laws established. Management science needs to recognise the divergence and convergences of the individual person and the individual task being performed. If only machines do the work required, many people will be unemployed. Economic development can only succeed if the base is widened. One sector progressing at the expense of the other is not progress - it is re-distributing wealth.

Business development is a producer and social development a consumer. The only way to make real progress is for business development to produce the wealth to finance social development. Social development is bound to this equation through the effective and efficient delivery of projects placing solutions to the ills of humanity in a perfect position. Creating databases of projects, sponsors, managers and champions to analyse what works and what does not, could result in bringing people, money and solutions together to embrace things that work and avoid those that do not. Best practices that are solution orientated with built in repeatability and incremental improvement, result in processes leading to success.

To achieve this the consumption of human capital in parallel with financial capital needs to be managed to evolve knowledge and skill. Only then can man cease to be wasteful in the expenditure of all capital, resulting in an increasing rate of wealth creation from which all living things can benefit. Education in the skills which employers need, as well as a full understanding of project-orientated financial systems, should be the focus for businesses and social development of the 21^{st} century.

7.7. Conclusion

Seen in its most basic form, economics consists of people's wants and needs, which gives rise to things being done. When one person performs all the tasks to deliver goods or a service, a manner of inefficiency exists. People are combined in the delivery of goods and services by way of specialisation to improve efficiency, as one person does not have to perform all tasks requiring expertise in everything that must be done, but can specialise in those tasks in which they excel.

Efficiency improves only through knowledge of the manufacturing process and the skill of craftsmen. This implies that two separate systems are at work, one dealing with the person and one dealing with the task. It has been the dilemma of developmental research since man has started responding to wants and needs, as to which one to manage.

Early business development theory concentrated on developing efficiencies to manage the work being done, but lately more effort has been put into theories to develop the people who are doing the work. This research has shown that machines prove to be more efficient workers than people, resulting in technological development causing vocational redundancy. The more technology is deployed, the less people have work, unless they are working on developing technology.

Economies grow when more is paid for consumption than for production, which creates wealth. Applying the Pareto principle to global economy it is suggested that 20% of the earth's population consumes 80% of what is produced. The converse of this is that 80% of the worlds population survives on 20% of what is produced. Research has found the richest 20% of the world's population was increasing consumption fivefold, while the poorest 20% of the world's population showed a small increase in consumption.

Of major concern is the cost of 1st world consumption, which negatively impacts on environmental factors in the 3rd world, raising the cost of production in the poorest countries.

The Industrial Revolution is thought to have brought about an increased rate in the economic process. Technological developments resulted in increased productivity, increased production led to increased employment, which led to increased personal wealth and capital formation. This led to more funds being available for training labour, giving rise to both a market in which to sell goods as well as a labour force to produce increasing output.

Business development seeks to bring people together to produce products and services in an efficient and effective manner. Business development research establishes theory on how business brings people together and functions in a command and control structure. The business creates profit when people satisfying their wants and needs, buy products and services at a price higher than the cost of production. Both products and services are delivered by a series of processes that concentrate effort of both man and machine to be able to manufacture at below demand price.

Business processes and human behavioural processes in knowledge and skill of employees to produce competent workers needed to continuously improve manufacturing minimising the cost of production to maximise profit. To date business has not been involved in knowledge development of employees and has relied on social development to cover the subjects of education, healthcare, housing law and order. The fact is that social development is a consumer of, and not a producer of wealth. Another fact is that business development, which is a producer of wealth, is reluctant to spend this wealth on social development.

If society is to develop it requires people to do things in exchange for money. It requires people to find solutions and implement them. It requires people to turn vision into reality. The educational system of the past has been based on knowledge, and not on skill. Now that the Internet has made knowledge freely available to anyone at any time, employers have woken up to find that it is skill they require, and not knowledge.

Central to the whole issue of getting things done is the ability to manage a project, as it is the project that implements a solution and combines knowledge and skill to deliver a developing industry, business and society. Project management that has been ignored as a profession, and that has no formal basis in education.

This research has attempted to formulate a base model by which projects may be managed to customer expectations, within time, cost and quality. Repeatability and incremental improvement have been built into the model to lay the foundation on which a best practice may be developed. In project management there can never be one best way as each project is novel and unique. Any model must therefore contain a framework flexible enough to be applied to the implementation of many different solutions.

This research concludes that in order of society to develop it is required that project management be included as a formal part of all education. Further, that project management should be establishment of as a profession to be used to create project managers sufficiently competent to manage business processes and human behavioural processes in such a way to aid ordinary people to turn their visions into reality.

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