

**A SYSTEMS THINKING ASSESSMENT OF PROJECT MANAGEMENT**

by

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Submitted in partial fulfilment of the requirements for the degree of

**MASTER OF COMMERCE**

in the Leadership Centre

University of Natal

Durban

**2002**

## **ABSTRACT**

Is it possible to improve project management practice by incorporating systems thinking techniques and tools in the process? This is the simple premise on which this study is based. It is a premise that is not particularly ambitious, but one which potentially may assist project management in certain environments to become more effective in practice.

Why is it that project management needs to become more effective in practice? This is owing to a growing body of knowledge that points to the difficulties encountered by the practice of project management in complex environments. In simple terms, the literature has it that since project management is a 'hard' approach to problem solving, it cannot respond adequately to change and/or unexpected phenomena thrown at it by an unsympathetic environment. The incorporation, therefore, of a 'soft' approach in project management practice, like for instance, systems thinking techniques and tools, should make project management as an approach more robust and effective in difficult and problematic environments. The testing of a hybrid project management/systems thinking model, therefore, is what is attempted in this study.

In what way does this study seek to apportion value on this hybrid model? This study makes use of meta-learning to the degree that it tests its own hypothesis in the process of its writing. The idea here is that the study itself be treated as a 'project' and that it be completed by utilising this hybrid model which incorporates both traditional project management methodologies, and systems thinking techniques and tools. This may be viewed as a curious conceit, but it is hoped that the reader will not find it untenable, and thus an invalid assessment of how this hybrid approach can function. The outcomes should speak for themselves, whether positive or negative.

Clearly, to pursue this line of questioning requires a working knowledge of both project management practice and systems thinking. These two approaches to problem solving are discussed at length in this study, with pointers to their strengths and weaknesses, and to their potential for useful interaction, and a hybrid model is mooted which, it is envisaged, should prove useful to project managers.

How does one assess the success of the new hybrid model? There are various ways that one can check the hypothesis, but ideally one would need to closely observe the life-cycle of an actual project, a project that is implemented and completed using the hybrid model mooted earlier. This kind of project is not always particularly easy to come by, nor is it a simple procedure to convince a project manager to adopt such a hybrid approach. It is for this reason, therefore, that this study is treated as a 'project' and its efficacy as a project commented on during the course of and at the conclusion of the study.

### **ACKNOWLEDGEMENTS**

I am indebted to the Leadership Centre at the University of Natal, for its support and encouragement, and to various fellow students who have provided the impetus to continue with this study, notably the late Essa al Seppe, Joy Mills-Hackmann, and Tina Gordon-Watson.

## **DECLARATION**

In accordance with a stipulation of the University of Natal, I hereby declare that, except as acknowledged and except for quotations indicated in the text, this thesis is wholly my own work.

**BRUNO FERNANDO VAN DYK**

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## **1. INTRODUCTION**

### **1.1 Introduction**

Project management is an approach that is continually evolving into an extremely useful management tool for both simple and complicated endeavours. Its utility is increasingly gaining adherents who have recognised the efficacy of this approach to manage projects within various different industries and professions. Project management, however, has been the subject of some criticism (c.f. Chapter 3.2) owing to its perceived inflexibility and inability to adapt to complexity. In addition, since a project is regarded as a 'temporary organisation', it is seen to be stripped of learnings owing to its finite time frame, and this in itself is problematic.

Given these and other criticisms that will be discussed later in this study, I will seek to establish whether it is possible to improve project management practice by incorporating systems thinking - a particular management approach - methodologically and philosophically, into project management practice. In other words rather than be unduly critical of project management (although some criticism is levelled) this study will seek to combine the best aspects of project management and systems thinking in a way will make project management more robust in the face of complexity.

### **1.2 Study Objectives**

Why is it suggested that one of the best approaches for dealing with complexity and unstable environments is systems thinking? There is a substantial body of knowledge to support this view (c.f. Chapter 4) particularly as systems thinking is considered a useful management approach in the face of turmoil and change, and brings with it many techniques and tools that can be incorporated into project management to enhance its chances of success in 'messy' environments.

It is submitted at the outset, therefore, that systems thinking techniques and tools should have a positive influence on project management, and that the incorporation of systems thinking into project management should enhance project

management practice. This, essentially, is the objective of this short study: to make a case for the incorporation of systems thinking tools and techniques into the practice of project management to enhance its efficacy.

To accomplish this objective, this study is arranged in six chapters. These chapters will seek to develop an argument relating to the objective of this study and will do so in the following sequence:

### **1.3 Chapter Outline**

**Chapter 1:** This chapter serves to introduce the purpose of the study and to offer a summary of the salient components of each chapter and of the study itself.

**Chapter 2:** Entitled 'Methodology and Technique', this chapter will begin to refer to a number of the fundamental components of project management and systems thinking insofar as they relate to this study. It will continue by revealing the methodology and technique that will be used in the completion of this study. In this regard, this study itself will be regarded a 'project', to be 'managed' using project management techniques, while at the same time incorporating a systems thinking approach at various stages. It is hoped that in this way, the benefits of meta-learning will occur, and that the synergies between the two approaches will be demonstrated. While this methodology may be considered a little eccentric, it is hoped that it will be accepted for its illustrative potential.

**Chapter 3:** Having sketched the methodology and technique that are to be adopted in this study, attention is given in this chapter to documenting the fundamental features of project management practice as revealed in the *Project Management Body of Knowledge* (2000). This will not be done uncritically. Part of the chapter will point to some of the criticisms that have been levelled at project management, with particular reference to complexity.

**Chapter 4:** As is well known, systems thinking is a way of dealing with complexity that has gained currency and utility over the years, and that has proven to be

especially useful in dealing with uncertainty and drifting environments. The purpose of this chapter is to chart the development of systems thinking as an approach from its early theoretical beginnings, to its current use as a successful management tool, and to suggest its utility in dealing with difficult contexts.

Chapter 5: In an attempt to begin to understand the ability of project management (as it is currently practised) to deal with difficult environments, this chapter will capture the salient points of a series of interviews conducted with three project management practitioners in Durban about their views on and practical utilisation of the project management approach. The intention in this chapter is to interrogate the practical use of project management as it is practised from day to day, and to identify the benefits and shortcomings of it as an approach. The questionnaire that has been used for the interviews is found in Annexure 1.

Chapter 6: Entitled 'Observations and Conclusions', this, the final chapter, will naturally point to the conclusions that can be drawn from the study, and reflect on whether there is some value in using a systems thinking approach to project management. At the same time, it will cast a critical eye on whether the combination of project management and systems thinking in the completion of this study has been successful or otherwise. This chapter will also reflect on the personal learnings that have occurred during the course of this study, particularly by reflecting on what has been gleaned regarding this process

#### **1.4 Annexure**

Finally, I have thought it useful to include (as an annexure) a paper that was prepared as an assignment for the course-work section of the Masters course of which this study is a component. This annexured paper is a collaborative venture by a team of six students of which I was one, and its appropriateness is that it makes an attempt to adapt the project management enterprise to include systems thinking techniques within the context of small- and medium-scale sugar cane growers in the uThungulu region of KwaZulu-Natal.

## **1.5 Assumption**

It bears mentioning that the fundamental philosophical frame of reference throughout the course of this study is a systems thinking perspective, as far as that is possible. This implies that reference will be made to various systems thinking tools and techniques throughout the study, and it will be assumed that most of the common approaches will be familiar to the reader. Should this not be the case, the systems thinking approach is described in detail in Chapter 4. The reasons for using systems thinking as a frame of reference for this study are two-fold: one, to demonstrate confidence in the systems thinking approach, and two, to check the hypothesis of this study, i.e. is there value in using a systems thinking approach in managing a project(s)?

## **1.6 Conclusion**

In conclusion, it will be obvious to the reader that the objectives of this short study are not particularly ambitious. It is hoped, however, that by the end of this study the reader will have a more informed idea as to whether there is some value in including systems thinking techniques and tools in the practice of project management, and that it will encourage some discussion around this topic.

## 2. METHODOLOGY AND TECHNIQUE

### 2.1 Introduction

In his seminal work, *Images of Organisation*, Morgan (1986) suggests that there are a number of metaphors that characterise different types of organisations. These metaphors represent the manner in which organisations are structured and function, and simultaneously describe the salient features of their culture. It is Morgan's contention that all organisations can be described in some way or another as a figurative construct that can be listed under the following metaphorical categories: machines, organisms, brains, cultures, political metaphors, psychic prisons, flux and transformation metaphors, and instruments of domination metaphors.

Given these various categories, it is my view that the practice of managing a project using traditional project management techniques - as stipulated in the *Project Management Body of Knowledge (PMBOK)* (2000) - reminds me of the inexorable progress of a machine. I say this because the impression that I have of project management practice as I have experienced it during the course of this study, is of the steady forward movement of a large machine, intent on its predetermined objective, and inexorable in its progress. This experience of project management practice will be discussed in more detail in Chapter 3.

Given that this is the metaphorical construct that I have of traditional project management practice, the objective of this study, therefore, is to evaluate the veracity of this view, and - if this is indeed a justified assessment of project management practice - to suggest ways in which project management can be influenced to make it far more flexible and adaptable within the context of a complex post-modern world. My approach in meeting this objective will be relatively experimental in that I will treat the completion of this study as a project in itself, while utilising systems thinking techniques in the process and testing their usefulness during the endeavour.

## 2.2 Establishing the Boundaries of the Study

Before I embark on this exercise, however, it is necessary to establish the boundaries of this study, so as to determine its 'system in focus', i.e. the subject matter of this study. This is a common systems thinking technique which will be further elaborated on in Chapter 4. As a prelude to this setting of boundary, it is useful to document briefly the origins of the concept of boundary critique and then to point to the importance of this concept to the approach dubbed 'systems thinking', and thus to this study itself.

Churchman (1970) introduced the idea that boundaries of analysis are crucial in determining where the best leverage resides during systemic intervention, and hence what actions are necessary during the course of this manner of intervention. He also argued for the broadening of the range and extent of consultation by pushing out the boundaries to make intervention more inclusive, and therefore include a wider group of stakeholders and broader consultation in the process. Ulrich (1983) contributed to this notion by suggesting that the setting of boundaries needed to be rationally justified, but that since rationality is dialogical, boundaries should be set in dialogue with all those involved and affected by the intervention. Yolles (1999) added to this view (after Midgley (2000)) by adding an ethical dimension to setting boundaries (since every decision is value-specific) and recommending that any intervention be value-specific.

In accordance with this view, the boundaries of this study will be drawn to focus on a reassessment of project management seen from a systemic point of view (the *how*, *what*, *when*, *where* of the study) but simultaneously incorporating an ethical overlay that informs the *why* of the study. (In simple terms, the value judgement inherent in this study is simply that it is pursued in an attempt to improve project management as an endeavour. This will become more apparent as the study develops.) In addition, the study will reflect on the meta-learning that occurs throughout the process of collating it, in parallel with the primary findings of the study that relate to project management *per se*. This approach, obviously therefore incorporates what is termed 'action research'.

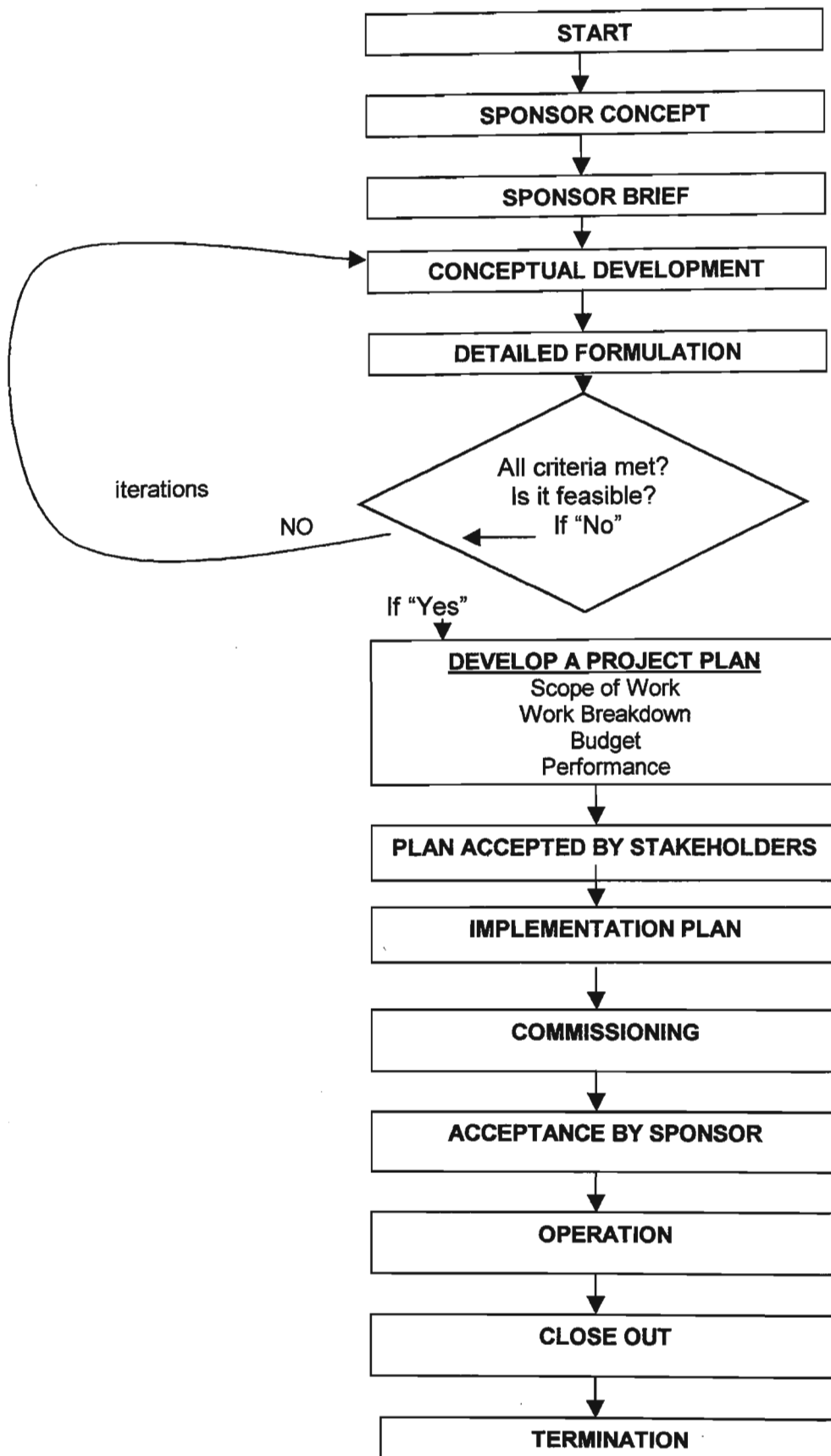
To do all of this, however, requires a research methodology that supports the research objectives. As a thesis preoccupied with systems thinking, it is indeed thought essential that a systems thinking approach be adopted in completing it. To do anything else would be incongruous, as it would demonstrate a lack of confidence in systems thinking as an approach to problem solving, and indeed to dealing with the question at hand, namely, how to improve the practice of project management.

### **2.3 Treating the Study as a 'Project'**

At the heart of this endeavour is the idea or conceit that the task of completing this study is to be regarded as a project that can be managed like any other. This approach is adopted in the belief that it may be used to demonstrate the use of project management and systemic thinking in action. The completion of this study, therefore, becomes a case study that attempts to support the conclusions of this study through practical application. In order to accomplish this, it is considered useful to demonstrate the incorporation of systems thinking in the practice of project management by using the methodological techniques and tools of both of these management approaches. This will constitute an exercise in meta-learning, or what Checkland (1990) terms 'mode-2 learning'. It is hoped that this approach is not viewed as completely eccentric by the reader.

As an initial point of departure, given that I am treating this study as a 'project', then traditionally one would need to ensure that the steps as described in a generic project management endeavour, as depicted in Figure 2.1, are followed.





**Fig. 2.1: Life-cycle of a project presented as a generic project management model**

While this sequential method of project management has been criticised in various ways (as will be described in Chapter 3) it is still the sequence that is recommended by the *PMBOK* (2000) as the correct way to undertake and manage a project. For the purpose of this initial stage of this study, therefore, this sequence is adopted uncritically, with a view to responding to the anticipated shortcomings of this procedure as they occur during the course of the study.

From the diagram shown in Figure 2.1, it is clear that most of the steps that are suggested for the project management sequence are generic to any activity, to a greater or lesser degree. At this initial stage of this study, it is, therefore, the intention to attempt to use what is essentially a 'hard' systems (project management) with a more 'soft' approach (systems thinking) and see what emerges; in other words, given that project management is goal oriented, aspects of it may be utilised to complete projects that may have started out using systems thinking methodologies, like scenario planning, gap analysis, soft systems methodology, viable systems methodology, total systems intervention, and so on. These various methodologies will be discussed in more detail in Chapter 4, and this study itself (in its 'project' mode) will utilise one of the soft systems approaches to see to its completion.

Given this approach (and the reader's acceptance of such a conceit) this study will now consider itself a project, and attempt to utilise the tools and techniques of project management, while at the same time utilising the tools and techniques of systems thinking. Taking the headings that are provided in Figure 2.1, it is obvious that many of these stages are applicable to completing this study (and indeed to any endeavour). Of special interest to this work, is that the stages leading up to the actual operational start of the project ('operation' stage, which would usually imply the physical construction of say the bridge, or the roll out of the new pharmaceutical product) is very much the domain of systems thinking methodologies. Thus if one looks at the project life cycle represented as a generic project management model (as depicted in Figure 2.1) one is able to identify the stages that lend themselves more appropriately to the use of systems thinking techniques.

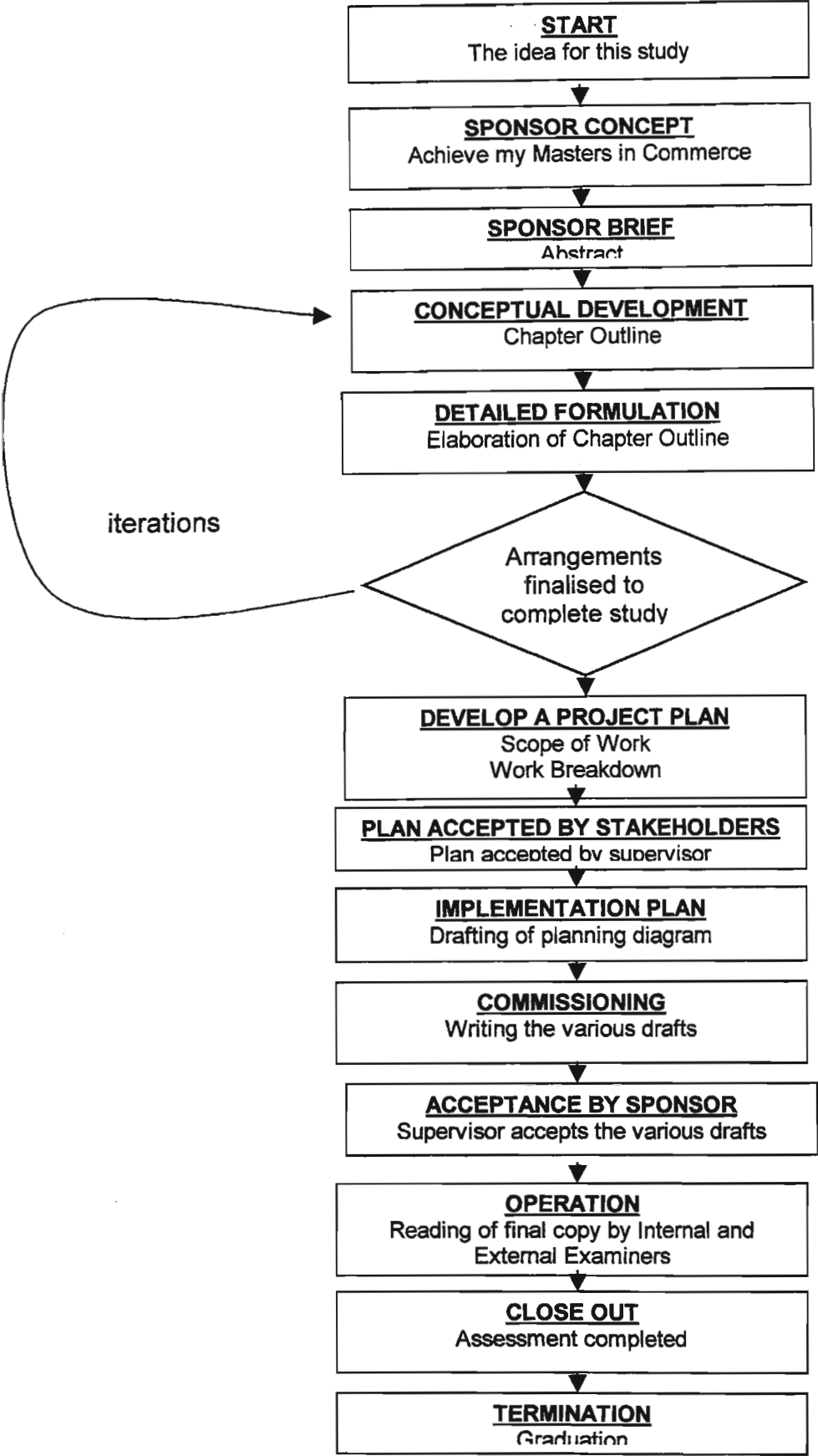


Fig. 2.2: 'Generic project management model' adapted for writing this thesis

By looking, therefore, at the sequence of activities in Figure 2.1, from 'Start' vertically down the page to 'Termination', it is obvious that much of the application of systems thinking would be appropriate prior to this project management sequence being followed. At the outset, therefore, it is thought useful to sketch the process of completing this study as a traditional project management endeavour, and then identifying where systems thinking could strengthen the exercise. Using the 'Life Cycle of a Project presented as a Generic Project Management Model' in Figure 2.1 as a point of departure, but adapting it to reflect that this study is being treated as a project, the endeavour of completing this study could be depicted diagrammatically as is depicted in Figure 2.2 above.

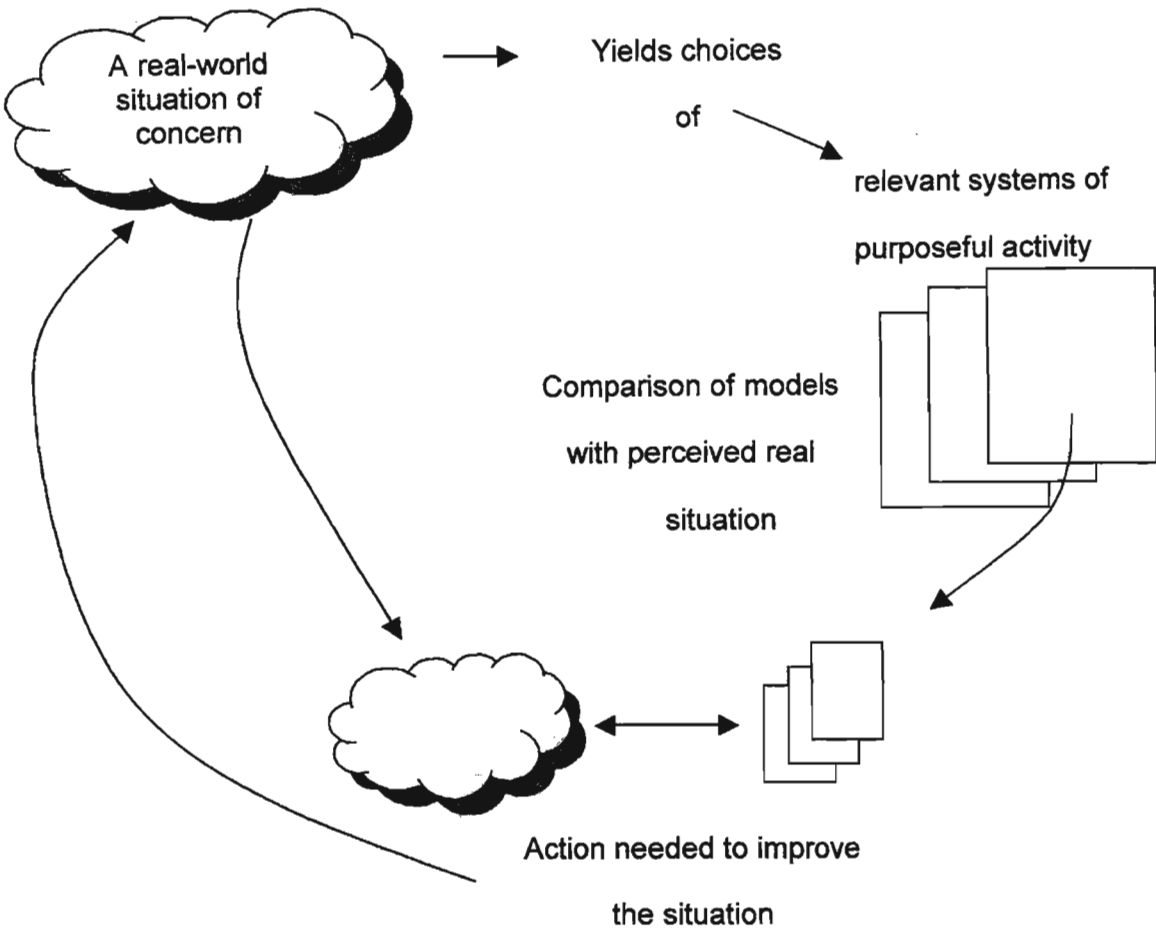
By utilising this sequence, one could be reasonably certain that one would finalise the study. But I would argue (and attempt to demonstrate) that this endeavour is able to benefit from the introduction of a systems thinking approach.

## **2.4 Utilising Soft Systems Methodology**

After considering all of the methodologies that can be categorised under the heading of 'systems thinking' (to be discussed fully in Chapter 4) it is apparent to me that the most convenient methodology to utilise alongside project management as an approach for this study is Soft Systems Methodology (SSM) developed by Checkland (c.f. 1990 for example). While this methodology will be described more fully in Chapter 4, the fundamentals of SSM will be touched on here to indicate why SSM is considered useful for the completion of this study.

As a general opening statement, SSM is located very firmly within the practice of action research, and that while SSM is an excellent systems thinking methodology for revealing the current context of a project or organisation, as well as the areas in need of intervention, it is not the best for ensuring project implementation. It is sufficient at this point to say that SSM, fundamentally, adopts a systems thinking process that provides a specific methodology for responding to problem situations. Within the context of this study, the following few pages will reveal how the use of SSM can assist in bounding and clarifying the process followed in the completion of

this study (and thus by implication, any other project). Checkland and Scholes (1990) sketch the basic process of SSM as follows:



**Fig. 2.3: The basic process of Soft Systems Methodology**

In pursuit of what is termed in this diagram the ‘action needed to improve the situation’, there are a number of steps that Checkland’s SSM requires, and they will be demonstrated here, keeping in mind that it is the business of completing this study that is the system in focus. The first stage in the SSM process is arriving at a *statement of concern*, which, in the context of this study, could be phrased as:

Project management is traditionally seen as a methodology which allows for the management of projects in a generally goal-directed manner, without due consideration being given to the effects of complexity and/or chaos, and while paying limited attention to incidental and/or accumulated learnings.

This might conveniently serve as the problem statement for this study. The next phase is to develop a *root definition* in response to this statement, with a view to identifying a possible solution to the problem situation mentioned in the statement of

concern, and in the process revealing, therefore, in this instance, the outcomes of this study. This root definition could be phrased as such:

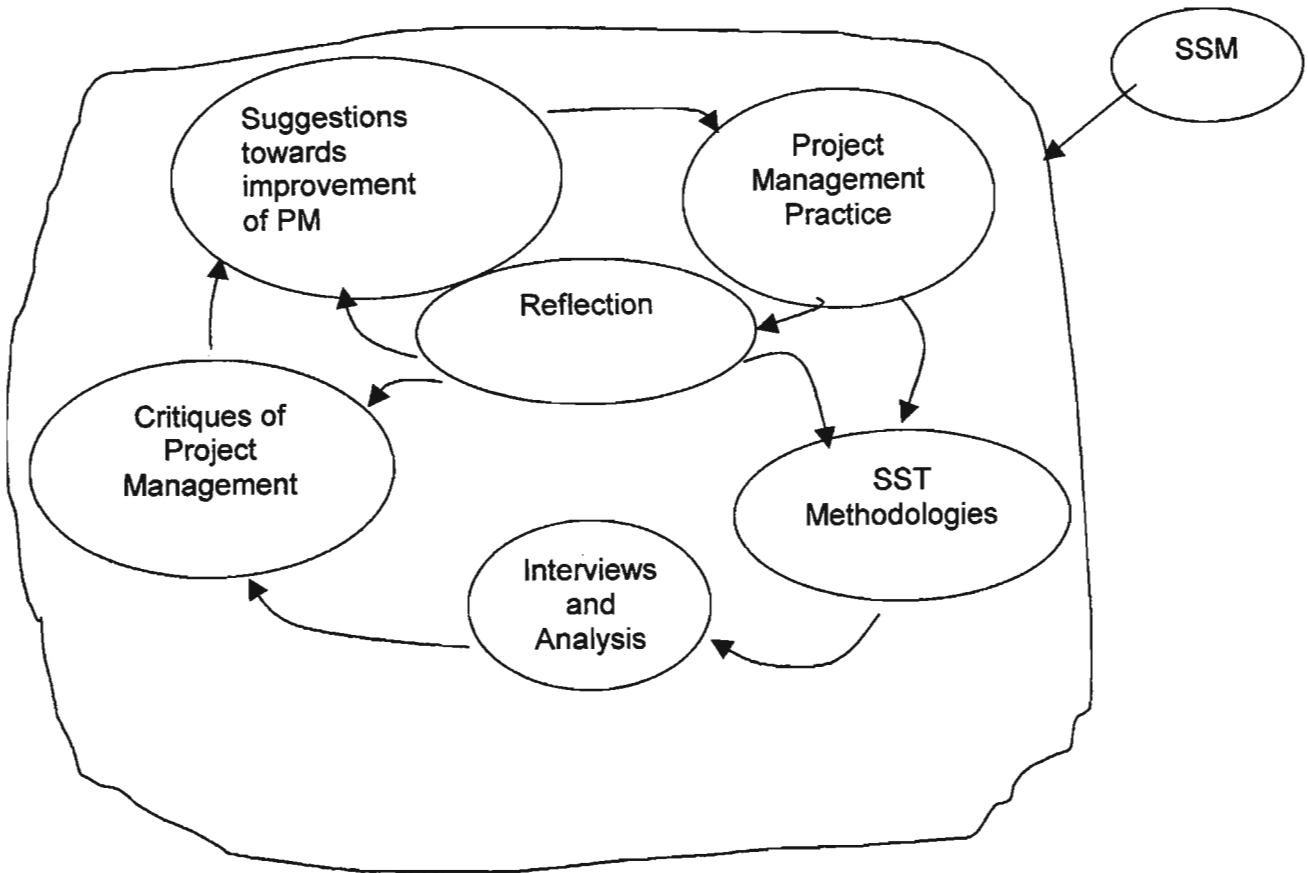
An approach to project management which incorporates soft systems thinking in order to encourage an appropriate response to complexity, and to encourage incidental and accumulated learnings along the way.

In the methodology, this root definition is then unpacked to identify the drivers and obstacles in the way of the objectives. The way that SSM suggests that this root definition be unpacked is by utilising the so-called *CATWOE* analysis, in which the letters of the acronym stand for the following: C-customers; A-actors; T-transformation process; W-worldview; O-owners; and E-environmental constraints. In the context of this study, the *CATWOE* could be articulated as such:

C	Thesis supervisor and external examiner
A	I as the writer, and the project managers interviewed for the three case studies
T	Project Management Practice → The incorporation of Systems Thinking in Project Management Practice
W	Project management is able to respond to complexity and result in meta-learning
O	The Project Management Institute, and practitioners
E	The confines and limitations of a short study of this nature

**Figure 2.4: CATWOE analysis**

If one were to depict this problem situation and its possible solution (i.e. what is called in SSM, the *conceptual model*) in the course of the writing up of this study pictorially (as the SSM requires) then one might depict it in the following manner:



**Fig. 2.5: Pictorial model of the process of completing this study**

Given this diagram, the process that is adopted in this study, in other words, will firstly be to consult a sample of the numerous works that have been written on project management (so as to identify the salient features of the practice. These features have traditionally ensured that a specified project objective is met, during the specified time, at the specified cost.) Secondly, a survey will be made of various common systems thinking methodologies with a view to identifying the characteristics of this way of seeing, and responding to, the world. Thirdly, in addition to various critiques of traditional project management practice, three case studies will be written up, specifically to investigate project management practice. This is done in order to identify what the current thinking is relating to current project management practice, and to seek out any innovations that have been introduced into traditional project management practice, so as to enhance this endeavour. Finally, this process of investigation will be reflected upon, and a number of recommendations relating to the useful interface between project management and

systems thinking suggested. During the course of this process, the findings will be reflected upon, in general systems thinking fashion, and constant reassessment of what emerges will be undertaken. It is hoped that this endeavour will result in a number of useful suggestions of how systems thinking might be incorporated into project management practice.

In summary, therefore, taking the premise that complexity is omnipresent in the business of project management, this study examines current project management practice and asks whether complexity is acknowledged and responded to adequately in the course of this practice. In sum, the approach, therefore, is to review traditional project management practice, evaluate it in the light of a systems thinking approach, and to conclude with a number of observations that might usefully be included in the practice of project management to enable it to respond adequately to complexity.

## **2.5 Project Management**

Project Management as an approach to problem solving will be dealt with in detail in Chapter 3. The purpose of this section is to give a brief outline of project management so as to indicate how it will be used in as research methodology for this study.

In project management practice, the techniques that are used to achieve the project objectives have been based, since the 1950s, on the Critical Path Method, represented by the PERT diagram or Gantt chart<sup>1</sup>. As Loch, et al (2000) have put it: "For virtually every engineer and project manager, a discussion of project management triggers two related concepts: the Critical Path Method and the PERT or Gantt chart". These tools are typically sequential techniques for dealing with the project plan roll out (as briefly referred to in section 2.1) and will be discussed in some detail in Chapter 3. A description of their use may be articulated, in most basic form, as ensuring that the project plan is achieved, while balancing the contending

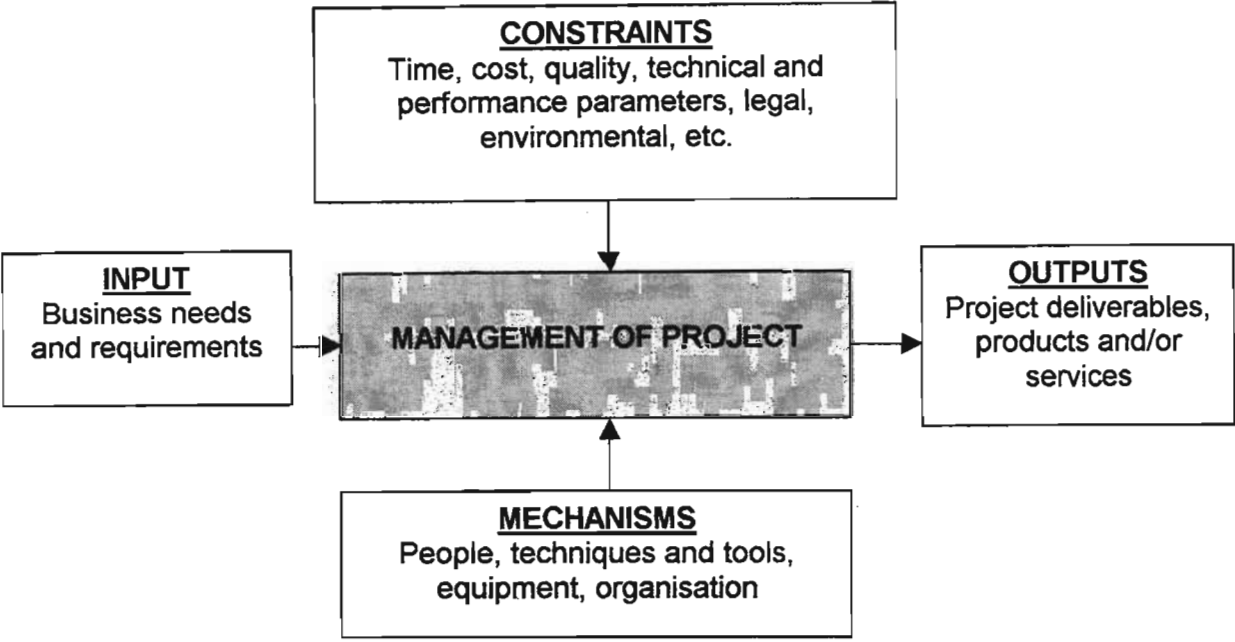
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<sup>1</sup> PERT is the acronym for Programme Evaluation and Review Technique, a planning tool for project management (c.f. p. 21); and a Gantt Chart (also called a Bar Chart) is a graphic display of schedule-related information. In a typical Gantt Chart, activities or other project elements are listed down the left hand of the chart, dates are shown across the top, and activity durations are shown as date-placed horizontal bars.



demands of time and cost, and managing any risk that might present itself. Project management practice, therefore, has been diagrammatically represented in Fig. 2.6.

This approach has recently come in for some criticism from management theorists, particularly owing to its inability to deal adequately with the complexity of post-modern society. This is a society in which change is rapid, often unpredictable, and usually counter-intuitive (to be discussed more fully in Chapter 3).



**Figure 2.6: Project management practice**

Of particular concern is that the road to project success is littered with the failures of well-intentioned managers, and management plans that failed to take account, for example, of ‘drifting environments’, and other disruptive phenomena. As a developing discipline, project management, therefore, is being challenged by management theorists to become more flexible and robust in its approach, and to include approaches like “contingency planning”, (c.f. Loch, et al (2000)) for example, in its arsenal of tools and techniques. It is believed that innovations of this sort will go some way to make the practice more resilient, especially as the effects of various phenomena like globalisation, culture and ethnicity, politics, activism, natural disasters - even chance - are felt at the project implementation site, the ‘ground zero’ of project management practice.

2.6 Systems Thinking

This section is an introduction to systems thinking, and systems thinking as an approach will be dealt with in more comprehensive manner in Chapter 4. Systems thinking is only dealt with here insofar as it offers a context within which this study is considered a project which is to be completed using systems thinking.

For initial reference, a ‘system’ can be defined as “a group of interacting, interrelated, or interdependent components that form a complex and unified whole” (Anderson, et al, 1998). Systems thinking is a philosophical construct, a way of viewing the world that “focuses on recognising the interconnections between the parts of a system and synthesizing them into a unified view of the world” (Andersen, et al, 1998). It has its origins in general systems theory and cybernetics, two approaches to problem solving that were formulated during the post-war period of the 1940s. The philosophical underpinnings of this approach was a belief that the war had changed the world irrevocably, and that reductionism and mechanistic thinking (which were the dominant cognitive paradigms at the time) were no longer adequate as a response to problem solving. While systems thinking is a way of looking at the world, it is also a practical approach for responding to and dealing with problem situations, and a number of systems thinking theorists have developed a range of techniques and tools for doing so. In general, however, there are a number of principles that support systems thinking; these are known as the ‘cybernetic principles’ (c.f. page 48-50) and these will be during the course of this study as part of the research methodology.

For instance, the process of conducting this study (using certain of these ‘cybernetic principles’, and the propensity for systems thinking to utilise diagrams) could be depicted as follows:

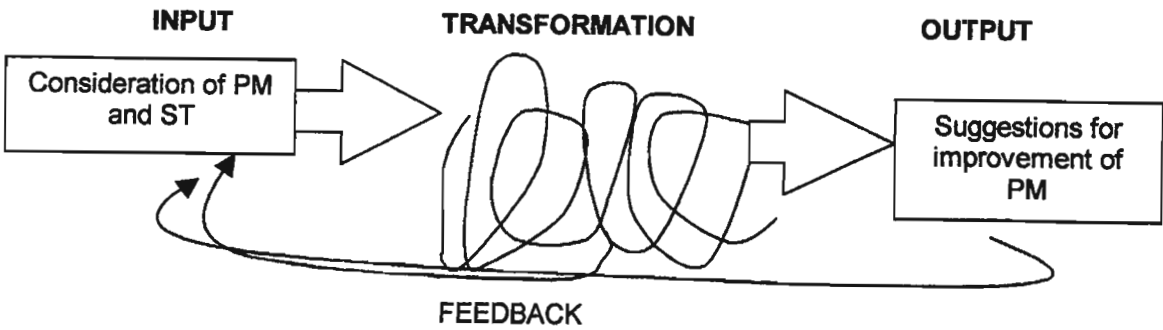
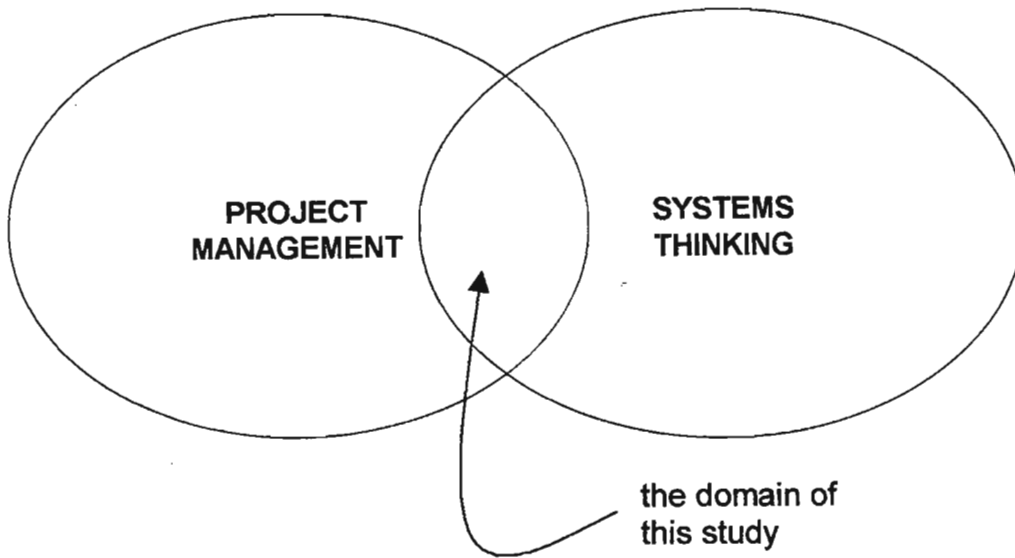


Figure 2.7: Towards the improvement of Project Management

Put another way, given that the intention of this study is to examine the interface between project management practice and systems thinking, and to reflect on the way in which systems thinking is able to enhance the practice of project management, this may be depicted as:



**Fig. 2.8: The Interface between Project Management and Systems Thinking**

The premise here is that systems thinking has an important role to play when one begins to assess project management practice, since one of the strengths of systems thinking (for project success) is its ability to deal with the complexities that problem contexts may place on project management. Put another way, the systems thinking approach has the tools to reflect on and mediate between the relationships that exist within the project management endeavour in problem situations.

Given the processes depicted in Fig. 2.7 systems thinking can assist in the investigation inherent in this study (and thus by analogy, any other endeavour) since it utilises powerful systems thinking techniques like causal loops, institutional and personal learning, 'emergence', iterations, and other 'cybernetic' principles. These will be elaborated upon in Chapter 4. It is suggested that the incorporation of these techniques in the project management process represents an appropriate improvement, one that can conceivably enhance the possibilities of project success being realised on time, and in a cost effective manner.

It is further the contention of this study that the interface between the two approaches – systems thinking and project management – has much to offer that is both vital (in terms of project delivery) and ethical (in terms of best practice). The likelihood of successful problem solving is therefore improved through the useful interplay between these two approaches that may previously have not been apparent. To use one of the common cybernetic principles to underpin this point, the whole is therefore more than just the sum of the two parts. While systems thinking may be considered more of a philosophical construct, with different practical applications - as opposed to project management that is a practical methodology - it possesses various methodologies that are able to complement project management. Besides soft systems methodology, one can refer to critical systems thinking, scenario planning, gap analysis, total systems intervention, viable systems techniques and critical systems heuristics. It is hoped that the idea of synthesizing the two approaches during the course of this study will suggest certain combinations that will be of use to project managers.

## **2.7 Project Management vs Systems Thinking**

As has been suggested, systems thinking has within its methodologies a number of ways of responding to the world, and this corpus is growing each year, as the techniques utilised in systems thinking are seen to offer a powerful way of responding adequately to the challenges of complexity. One might represent some of the current corpus of systems thinking approaches as depicted in Figure 2.9.

This study, however, believes that project management as an approach to problem solving can benefit from systems thinking and this short investigation will give a few pointers as to how this may be achieved. The intention, therefore, is to emerge at the end of this study with a situation as is depicted in diagrammatic form in Figure 2.10.

As has been mentioned, fundamental to the philosophy of viewing the world that is known as 'systems thinking', is the concept of 'cybernetics', and the various 'cybernetic principles' that provide the basic philosophical underpinnings of systems thinking. These principles will be better described in Chapter 3, but it is of some use here to state that the nature of cybernetics is based on biological processes, and thus regards each system (in

our case each 'project') as a living organism, capable of all of those functions and states which are common to all other living organisms.

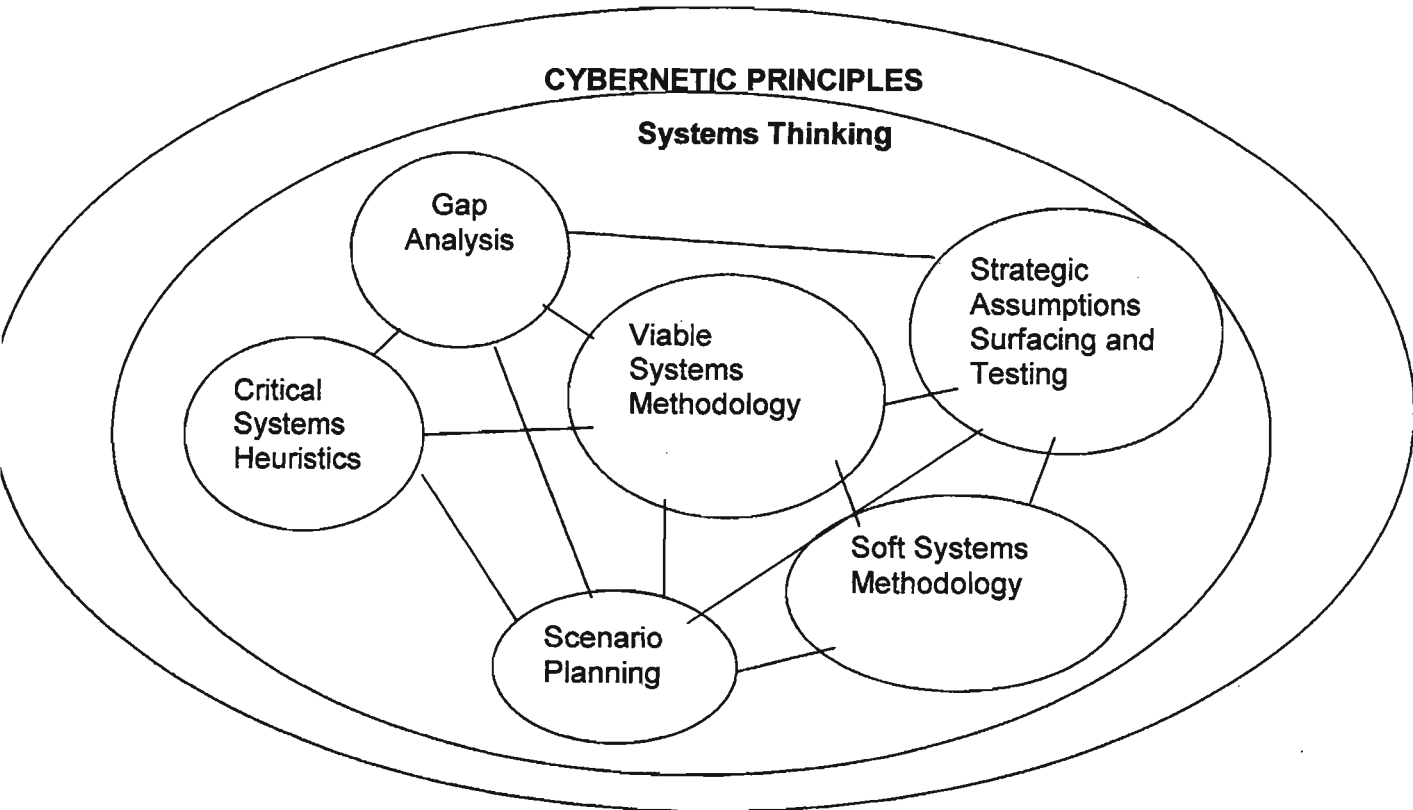


Fig. 2.9: Various common systems thinking approaches

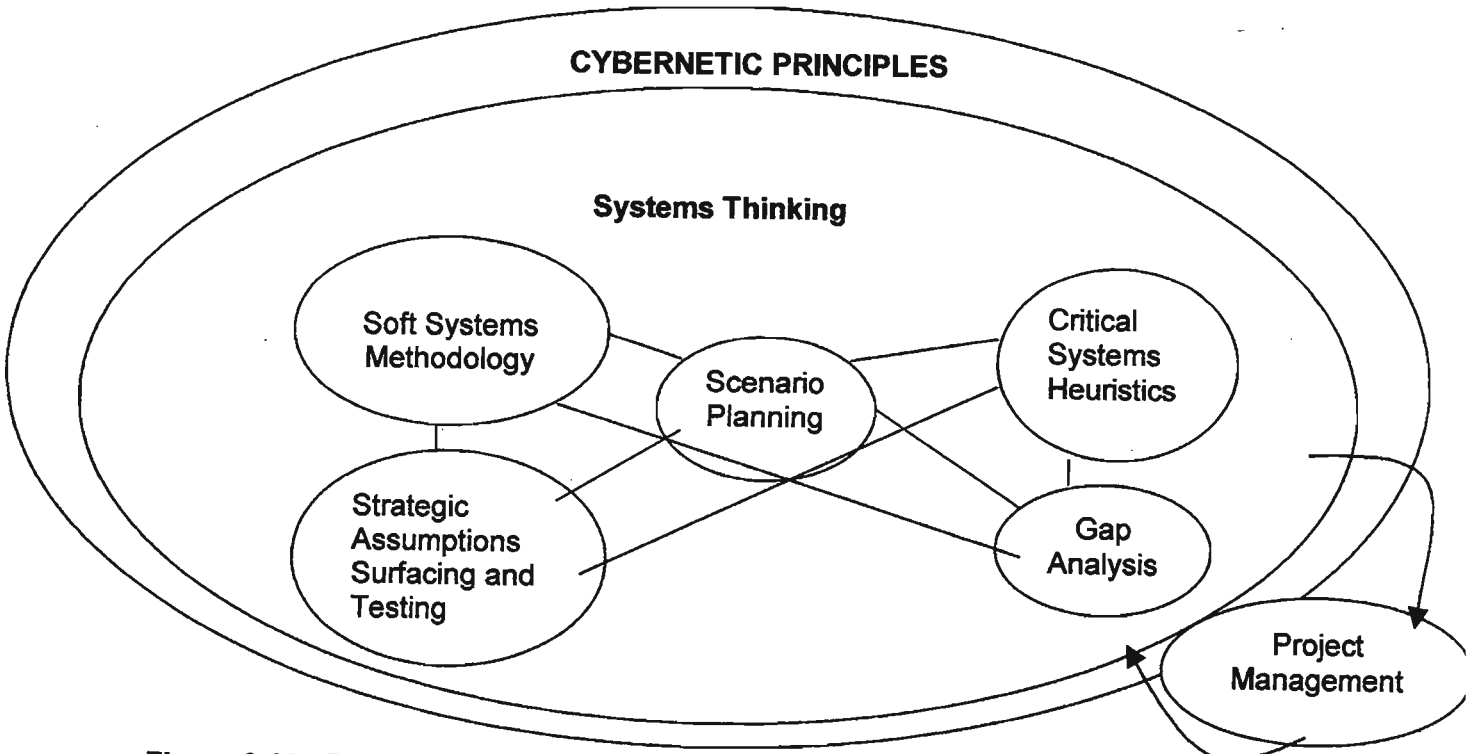


Figure 2.10: Project management utilising systems thinking tools and techniques

It is suggested then that the anticipated outcome of this study is to indicate how the situation as depicted in Fig. 2.10 is a useful adjunct to problem solving. It is intended therefore that this study demonstrate how the basic sequential approach of project management practice can be enhanced and improved by the introduction of systems thinking methodologies, cybernetic principles and other systemic techniques like mapping, the consideration of mental models, iterations, and so on.

## **2.8 Field Work**

In an attempt to embed the conclusions of the study in some empirical evidence, a questionnaire has been prepared for response by project management practitioners. This questionnaire has been prepared with a view to revealing the way in which project management is practised in the field. It is also designed to identify how deviation from the project plan is dealt with. In order to provide this empirical research with authenticity, three project managers have been interviewed, regarding their project management practice.

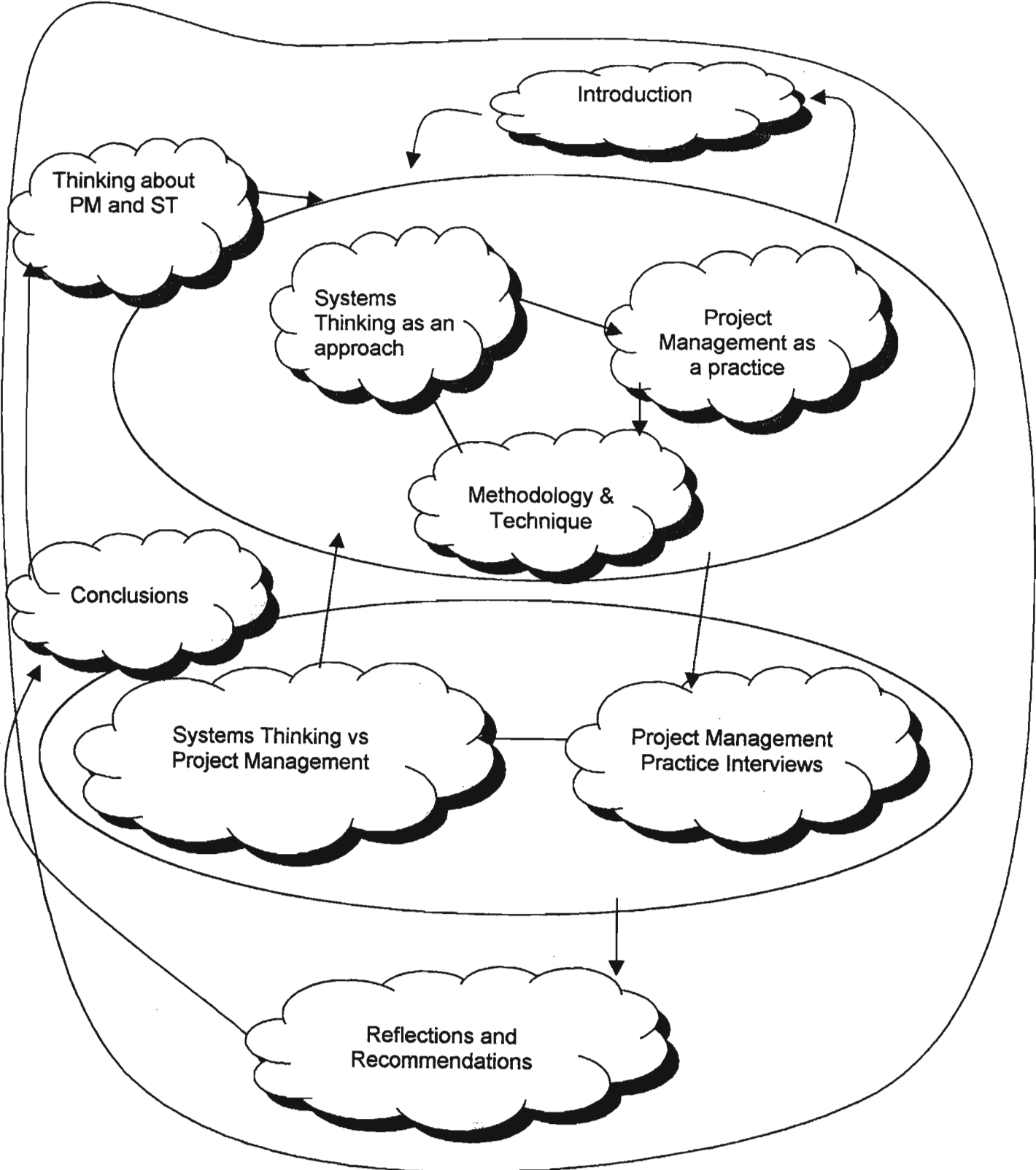
The responses to the questionnaire have not been recorded in question-and-answer format, but have rather been transcribed in narrative style to isolate some of the interesting aspects of the practice as revealed by the interviewees.

## **2.9 Conclusion**

None of the process of this study has happened as fluidly as is described in this introductory chapter, but in fact has occurred in fits and starts, and has been through many iterations, and will probably go through more before the study is finally in the form that you read it now. This in itself is a comment on the difficulties of working strictly within the confines of the project management life-cycle. The diagram, therefore, which is presented in Figure 2.2, is in itself an idealised depiction of what the process of completing this study was expected to look like. In reality, however, (and in systemic representation) the process of writing this thesis is better represented as is depicted in Figure 2.11.

This conceptual map, however, is only useful as a tool for depicting the various interacting components in dealing with a problem posed by the 'system-in-focus', in this case, how to bring this study to an end. In practical terms, however, this depiction, while true to the nature of the processes involved in the this study, does not provide a comprehensive plan for completing this study, and does not provide any assistance in

identifying the various tasks in detail according to a strict time schedule, or in a particular logical sequence.



**Fig. 2.11: The process of completing this study, as a conceptual map**

Project management becomes useful when one is looking for a plan to design and follow because it can offer handy planning tools to demonstrate the anticipated roll out of the project over time. Such a regimen for the completion of this study may be depicted as:

		JAN		FEB		MAR		APR		MAY		JUN
s											1	
s											2	
m							1	◇			3	●
t	1						2	◇			4	
w	2						3	▣	1		5	◇ ▣
t	3						4	▣	2		6	◇ ▣
f	4		1	◇	1		5	▣	3		7	◇ ▣
s	5		2	◇	2	●	6	●	4	▣	8	◇ ▣
s	6		3		3		7		5	▣	9	◇ ▣
m	7		4		4		8		6	▣	10	◇ ▣
t	8		5		5	◇ ▣	9	◇	7	▣	11	◇ ▣
w	9		6	●	6	◇ ▣	10	◇	8		12	◇ ▣
t	10		7		7	◇ ▣	11	◇	9		13	●
f	11		8		8		12	◇	10	◇	14	▣
s	12	◇	9	◇	9	▣	13		11		15	▣
s	13	◇	10	◇	10	▣	14	▣	12	◇	16	▣
m	14		11		11	▣	15	▣	13	◇	17	▣
t	15		12	◇	12	●	16	▣	14	◇ ▣	18	♣
w	16	◇	13	◇	13		17		15	▣	19	▣
t	17	◇	14		14		18		16	▣	20	▣
f	18	◇	15	●	15		19		17	●	21	▣
s	19	◇	16	☀	16	◇	20	◇	18		22	▣
s	20	◇	17		17	◇	21	◇	19		23	▣
m	21		18	◇ ▣	18	◇	22	◇	20	◇	24	▣
t	22		19	◇ ▣	19		23	◇	21	◇	25	▣



w	23	◇		20	◇ ■	20		24		22	◇	26	■
t	24	◇		21		21	■	25		23	■	27	■
f	25			22	●	22	■	26		24	■	28	■
s	26	◇		23		23	■	27	◇	25	■	29	
s	27	◇		24		24	■	28	◇	26	■	30	
m	28	■		25		25		29		27			
t	29	■		26		26		30		28			
w	30	■		27		27	♠			29			
t	31	●		28		28				30			
f						29				31			
s						30	◇						
s						31	◇						
t													

# KEY

- ◇ Research/Study
- Writing up of drafts
- ♠ Submission to Supervisor of Draft 1
- ♣ Submission to supervisor of Draft 2
- Submission to supervisor of Final Draft
- Meetings of thesis Support Group
- ☼ Registration for thesis with Leadership Centre

**Fig. 2.12: Planning diagram for the completion of this study**

The fact of the matter is, however, that the implementation of the plan did not go as smoothly as is depicted in Fig. 2.12, and there is an overrun of time which has a bearing on the final date of completion, thus influencing the risks and costs associated with this study (just as would be the case in any project management situation). The delivery of the final draft on 28 July did not eventuate, and this instead became a meeting with the supervisor during which revisions were suggested. The planning diagram, therefore, has had to be augmented to incorporate a new schedule:

		JUL		AUG		SEPT		OCT		NOV		DEC	
s						◇ ■							
s											1		
m	1										2	◇ ■	
t	2						1	◇ ■			3	◇ ■	
w	3	◇					2	◇ ■			4	◇ ■	
t	4	◇		1	◇		3	◇ ■			5	◇ ■	
f	5	●		2	◇		4	◇ ■	1	◇ ■	6	◇ ■	
s	6	◇		3			5	◇ ■	2	◇ ■	7	◇ ■	
s	7	◇		4		1	◇ ■	6	◇ ■	3	◇ ■	8	◇ ■
m	8			5	●	2	◇ ■	7	◇ ■	4	◇ ■	9	◇ ■
t	9			6		3	◇ ■	8	◇ ■	5	◇ ■	10	◇ ■
w	10			7	◇ ■	4	◇ ■	9	◇ ■	6	◇ ■	11	◇ ■
t	11			8	◇ ■	5	◇ ■	10	◇ ■	7	◇ ■	12	◇ ■
f	12			9	◇ ■	6	◇ ■	11	◇ ■	8	◇ ■	13	◇ ■
s	13	◇ ■		10	♠	7	◇ ■	12	◇ ■	9	◇ ■	14	■
s	14	◇ ■		11		8	◇ ■	13	◇ ■	10	◇ ■	15	
m	15	♠		12	●	9	◇ ■	14	◇ ■	11	◇ ■	16	
t	16			13	◇ ■	10	◇ ■	15	◇ ■	12	◇ ■	17	
w	17			14	◇ ■	11	◇ ■	16	◇ ■	13	◇ ■	18	
t	18	●		15	◇ ■	12	◇ ■	17	◇ ■	14	◇ ■	19	
f	19	◇		16	◇ ■	13	◇ ■	18	◇ ■	15	◇ ■	20	
s	20	◇		17	◇ ■	14	◇ ■	19	◇ ■	16	◇ ■	21	
s	21	◇		18	◇ ■	15	◇ ■	20	◇ ■	17	◇ ■	22	
m	22			19	♠	16	◇ ■	21	◇ ■	18	◇ ■	23	
t	23			20	◇ ■	17	◇ ■	22	◇ ■	19	◇ ■	24	
w	24	◇		21	◇ ■	18	◇ ■	23	◇ ■	20	◇ ■	25	
t	25	◇		22	◇ ■	19	◇ ■	24	◇ ■	21	◇ ■	26	
f	26			23	♠	20	◇ ■	25	◇ ■	22	◇ ■	27	
s	27	◇		24	◇ ■	21	◇ ■	26	◇ ■	23	◇ ■	28	
s	28	◇		25	◇ ■	22	◇ ■	27	◇ ■	24	◇ ■	29	

m	29	♣	26	●	23	◇	28	◇	25	◇	30	
t	30	▣	27	◇	24	◇	29	◇	26	◇	31	
w	31	▣	28	◇	25	◇	30	◇	27	◇	31	
t	31	●	29	◇	26	◇	31	◇	28	◇		
f			30	◇	27	◇			29	◇		
s			31	■	28	◇			30	◇		
s			31		29	◇						
t					30	◇						

**KEY**

- ◇ Research/Study
- ▣ Writing up of drafts
- ♣ Submission to Supervisor of individual chapters
- Submission to supervisor of Final Draft
- Meetings of thesis Support Group

**Fig. 2.13: Augmented planning diagram for the completion of this study**

It is hoped that this second plan will see to the successful completion of the study, while at the same time this study comments on the difficulties of keeping to it!

### 3. PROJECT MANAGEMENT

#### 3.1 Introduction

In the previous chapter, *Methodology and Technique*, the practice of project management has been mentioned as part of the general approach that is utilised in this study: that of treating the completion of this study as a project that can be managed like any other. In order to be more rigorous, however, this chapter will devote dedicated space to investigating in the approach known as *project management* in more systematic fashion.

#### 3.2 Project Management Practice

In his book entitled, *Goodbye MBA* (1998) Oosthuizen makes the following observation:

What is the common denominator characterising those organisations that excel in the nineties? Acceptance of and commitment to some or all of the principles of project management (PM) – the most compelling management philosophy to have emerged during the past three decades. PM, according to latest thinking, focuses on top (strategic), middle (tactical) and lower (entry level) management within one integrated system.

While one may choose to accept or reject Oosthuizen's view, there is no doubt that project management (and management by projects<sup>2</sup>) has had a profound influence on how business is done.

What is project management then? Project management, a developing discipline<sup>3</sup>, has a thorough body of knowledge regulated by a professional association - the Project Management Institute, in the United States - that oversees the maintenance of standards within the 'profession'. These standards are codified in a (regularly updated) manual entitled *A Guide to the Project Management Body of*

---

<sup>2</sup> 'Management by projects' is the process of utilising project management principles in the management of organisations by treating all processes and events in those organisations as a project, and managing them accordingly.

<sup>3</sup> Project management is referred to in the *PMBOK* (2000) as "an emerging profession".

*Knowledge*<sup>4</sup> (*PMBOK*) that lays down the minimum requirements of project management practice. The substance of the information contained in the *PMBOK* “includes knowledge of proven traditional practices that are widely applied, as well as knowledge of innovative and advanced practices that have seen more limited use.” (*PMBOK*, 2000). The ‘Introduction’ chapter to the *PMBOK* goes on to explain:

The primary purpose of this document is to identify and describe that subset of the *PMBOK* that is generally accepted. *Generally accepted* means that the knowledge and practices described are applicable to most projects most of the time, and that there is widespread consensus about their value and usefulness. Generally accepted does not mean that the knowledge and practices described are or should be applied uniformly on all projects; the project management team is always responsible for determining what is appropriate for any given project.

(*PMBOK*, 2000) (original italics)

Given the lexicon that is contained in the *PMBOK*, one is able to construct a reasonably faithful depiction of project management practice as it currently exists. The purpose of this chapter, however, is not to reproduce what is contained in the *PMBOK*; it is rather to point generally to the salient features of project management, and in the process reveal what project management is, and is not, and highlight, at the same time, some of the criticisms which have been levelled at it.

To start with, the *PMBOK* defines project management as:

the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. Project management is accomplished through the use of processes such as: initiating, planning, executing, controlling and closing. The project team manages the work of the projects, and the work typically involves:

- Competing demands for: scope, time, cost, risk, and quality.
- Stakeholders with differing needs and expectations.
- Identified requirements.

(*PMBOK*, 2000)

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<sup>4</sup>The *PMBOK* is published by the Project Management Institute (in the United States) and is revised and updated every few years. The editions that are cited in this study are the 1996 and 2000 editions (1996 was the update previous to the 2000 edition).

Other definitions of project management tend to echo this view. Kerzner (1995) for example, suggests that successful project management can be defined “as having achieved the project activities:

- Within the allocated time period
- Within the budgeted cost
- At the proper performance or specification level with acceptance by the customer/user
- With minimum or mutually agreed upon scope changes
- Without disturbing the main workflow of the organisation
- Without changing the corporate culture.”

Taylor (unpublished monograph, n.d.) similarly, commenting on project management in the context of the construction industry mentions:

The essence, therefore, of project management practice in the construction industry is one whereby fundamental importance is attached to a clear definition of project objectives, which are substantially technical in nature. This is followed by the process of design optimisation and the organisation of efficient production, against time, quality and cost controls.

At the same time, the *PMBOK* makes a clear distinction that:

The term *project management* is sometimes used to describe an organizational approach to the management of ongoing operations. This approach, more properly called *management by projects*, treats many aspects of ongoing operations as projects to apply project management to them. Although an understanding of project management is critical to an organization that is managing by projects, a detailed discussion of the approach itself is outside the scope of [the *PMBOK*]. (original italics)

(*PMBOK*, 2000)

Classically, project management is, therefore, “an integrative endeavour” and “an action, or failure to take action, in one area will usually affect other areas” (*PMBOK*, 2000). Oosthuizen (1998) suggests that there are six principles of project management, namely:

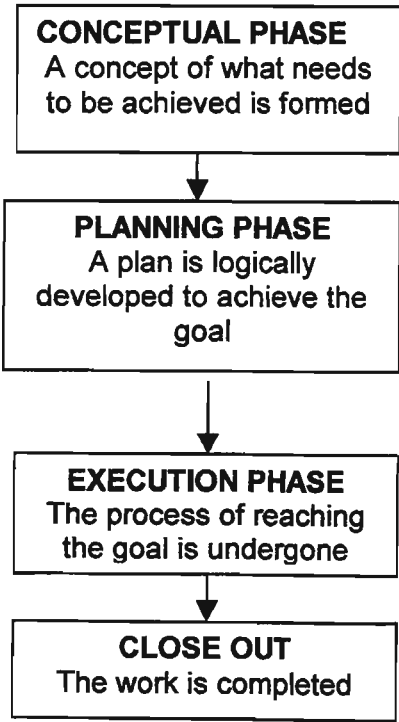
- Clearly defined scope
- Clearly defined parameters and resources

- Flat organisational structures
- Team dedication to a project from conceptual stage to project closeout
- Project managers who are generalists, and
- Effective cost control.

What is fundamental to project management, however, is the progressive nature of the methodology: “Because each project is unique, the characteristics that distinguish the product or service must be progressively elaborated. *Progressively* means ‘proceeding in steps; continuing steadily by increments,’ while *elaborated* means ‘worked out with care and detail; developed thoroughly.’” (original italics) (PMBOK, 2000). In other words, by definition, project management is relatively linear and progressive, moving inexorably from one process or phase to another. This progression might be depicted in the manner represented in Figure 3.1:

START

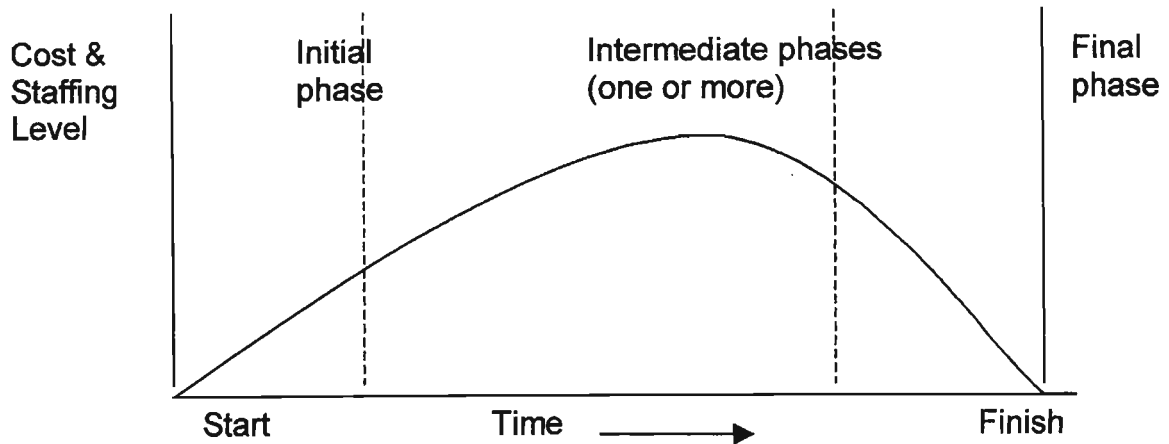
P  
R  
O  
J  
E  
C  
T  
  
L  
I  
F  
E  
  
C  
Y  
C  
L  
E



END

Fig. 3.1: The project life-cycle

This might also be represented in different form as:



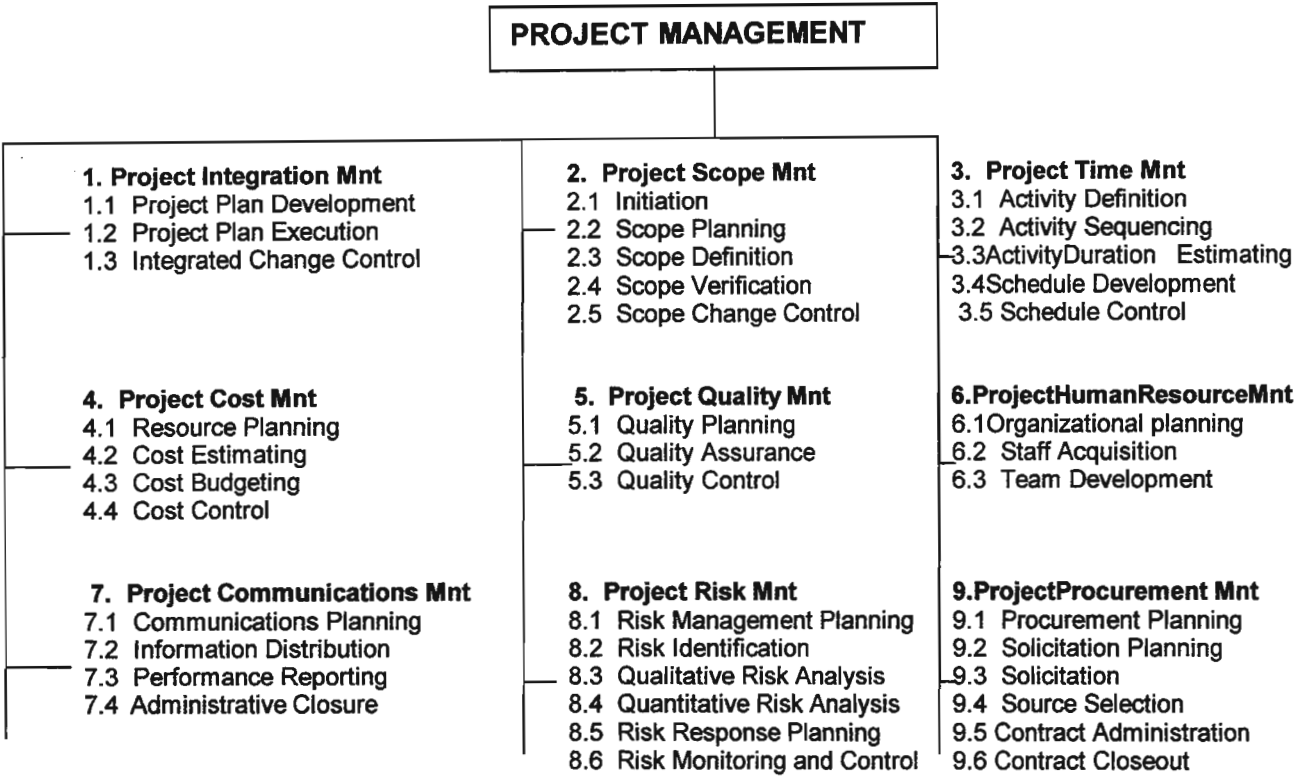
**Fig. 3.2: Sample generic life-cycle of a project (*PMBOK*, 2000)**

In addition, project management practice (as described in the *PMBOK*) has core knowledge and fundamental processes. These are depicted in Figure 3.3. These particular knowledge areas (depicted in Figure 3.3) are generally standard to all project management activities and can be found in any of the literature that seeks to describe the nature of project management practice. While the knowledge areas are clear from this diagram, what remains unclear (from this diagram) is the way in which the sequencing of activities occurs. The *PMBOK* goes on to explain, therefore, that (given these areas of knowledge) a process is followed which requires that the knowledge contained in these areas is incorporated in the following sequence of events, or what the *PMBOK* refers to as “five groups of one or more processes each:

- Initiating processes - authorizing the project or phase.
- Planning processes - defining and refining objectives and selecting the best of the alternative courses of action to attain the objectives that the project was undertaken to address.
- Executing processes - coordinating people and other resources to carry out the plan.
- Controlling processes - ensuring that project objectives are met by monitoring and measuring progress regularly to identify variances from plan so that corrective action can be taken when necessary.

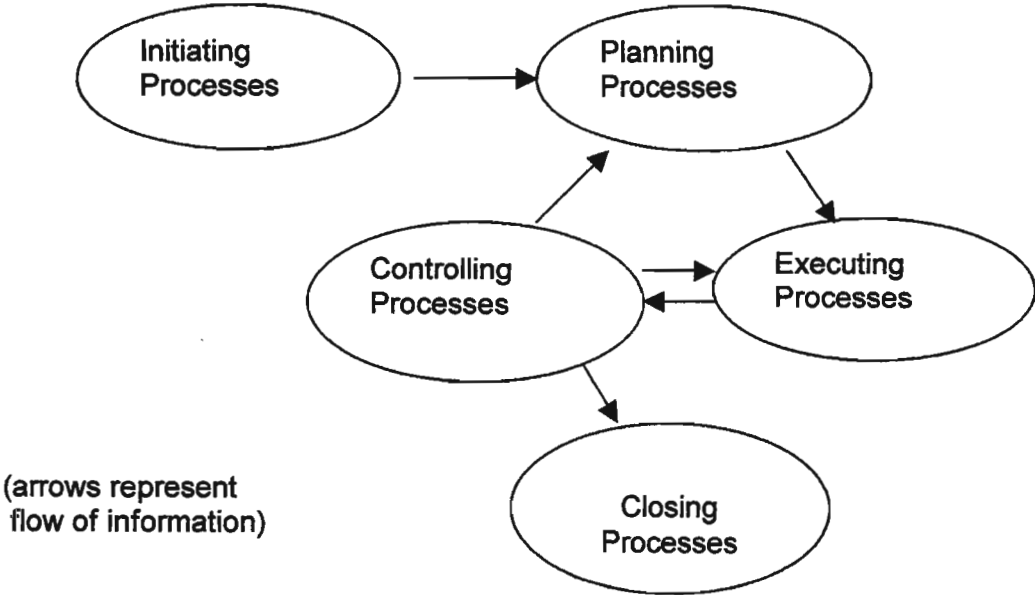


- Closing processes - formalizing acceptance of the project or phase and bringing it to an orderly end.” (PMBOK 2000)



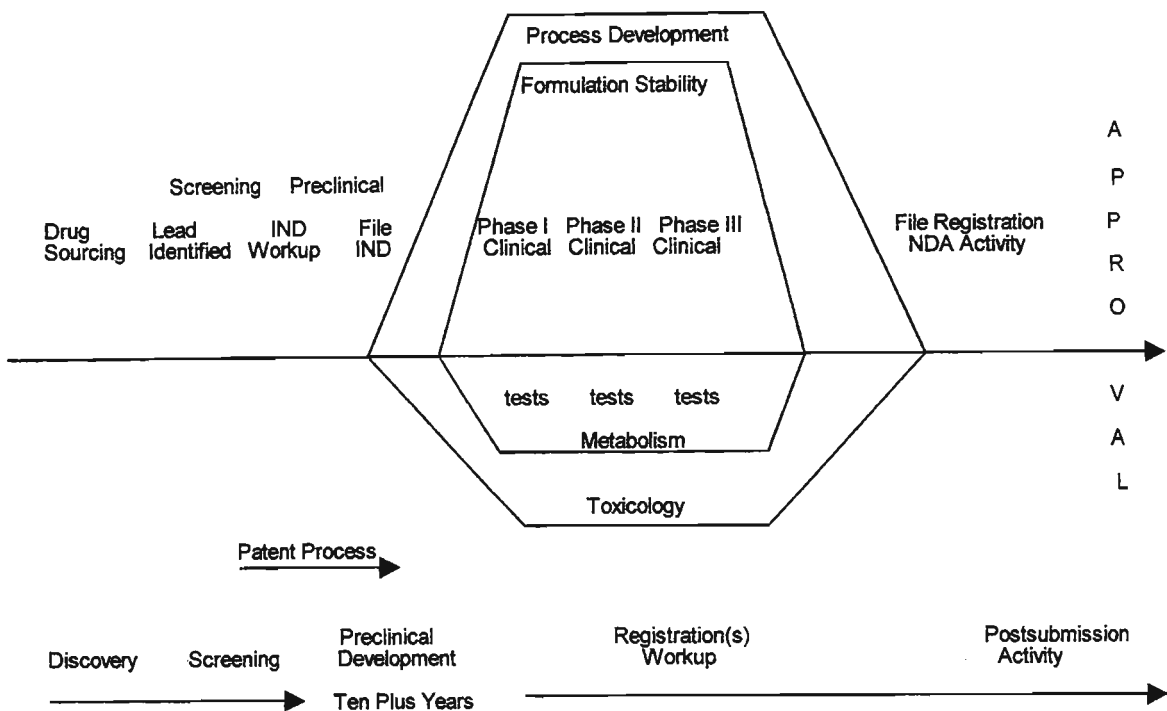
**Fig. 3.3: Overview of project management knowledge areas and project management processes (PMBOK, 2000)**

The sequence as mentioned in the previous paragraph is depicted in diagrammatic form in the PMBOK (1996) as follows:



**Fig. 3.4: Links among process groups in a project phase**

It is of interest to this study to take note of the incorporation of feedback in this process. This is inconsistent, however, with the basic sequence of events that are depicted in the illustrative project 'life cycles' that are cited in the *PMBOK*, which are mostly linear. Take for instance the “representative life cycle for a pharmaceuticals project” (*PMBOK*, 2000) as depicted in Figure 3.5.



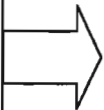
**Fig 3.5: Representative life cycle for a pharmaceuticals project**

In an attempt to demonstrate the methodology of project management (but not wanting to reproduce the *PMBOK* in its entirety) the sequential movement from “initiating processes” to “closing processes” *within* an isolated phase is described here, as an template or example of project management practice as a whole (which is artificial, used only for illustrative purposes). The most useful phase for the purposes of this study is probably the Project Scope Management phase (see Figure 3.3, item 2), since it would appear to contain within it the greatest potential for learning, complexity and adaptation. In the *PMBOK*, Project Scope Management is described as “those processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully” (*PMBOK*, 2000). The major project scope management processes include:

- Initiation - committing the organization to begin the next phase of the project.
- Scope Planning - developing a written scope statement as the basis for future project decisions.
- Scope Definition - subdividing the major project deliverables into smaller, more manageable components.
- Scope Verification - formalizing acceptance of the project scope.
- Scope Change Control - controlling changes to project scope.

‘Initiation’ (the first bullet of the list above) refers to “the process of formally recognizing that a new project exists or that an existing project should continue into its next phase.” (PMBOK, 2000). The basic method which is followed during the ‘Initiation’ phase is similar in design to all of the other phases, and is as follows:

Inputs	Tools & Techniques	Outputs
1. Product description 2. Strategic Plan 3. Project selection criteria 4. Historical information	1. Project selection methods 2. Expert judgements	1. Project charter 2. Project manager identified/ assigned 3. Constraints 4. Assumptions

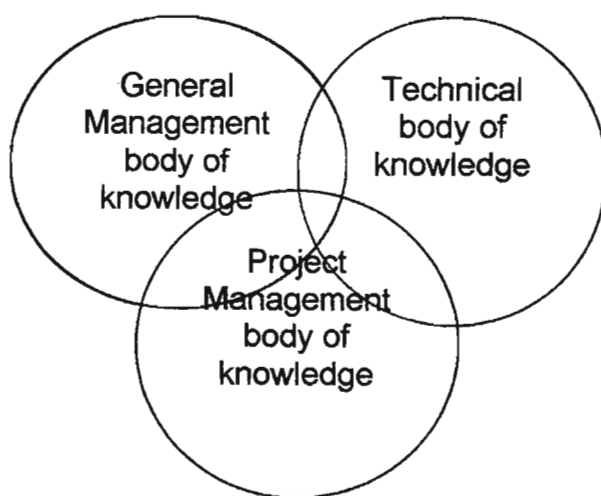


**Fig. 3.6: Steps in the ‘Initiation’ phase (PMBOK, 2000)**

In the *PMBOK*, each of these sub-items (i.e. ‘product description’, ‘strategic plan’ and so on) is then explained in more detail. So, for example, the item ‘strategic plan’ is referred to in the following fashion: “All projects should be supportive of the performing organization’s strategic goals - the strategic plan of the performing organization should be considered as a factor in project selection decisions.” (*PMBOK*, 2000). This method of description by incremental detail is carried through each of the items in the thorough way

mentioned earlier, leading to the sequential categories mentioned in Figure 2.1 until the project is completed.

It is an important consideration, incidentally that while project management is seen as a distinct practice within organisations, the *PMBOK* indicates that it has much in common with the practice of 'general management', noting that: "The *PMBOK* overlaps or modifies general management in many areas - organizational behaviour, financial forecasting, and planning techniques, to name just a few". (*PMBOK*, 2000) It might further be mentioned that project management also interacts with the technical or industry body of knowledge that characterises a particular industry or business. This relationship might be illustrated in the following manner:



**Fig. 3.7: Relationships in project management practice**

If all of these aspects of project management are taken together, then one is presented with a comprehensive technique or approach to conceptualising, developing and completing a project. All of these aspects put together could be usefully depicted in diagrammatic form as suggested in Figure 2.4, or as a variation, in the following manner:

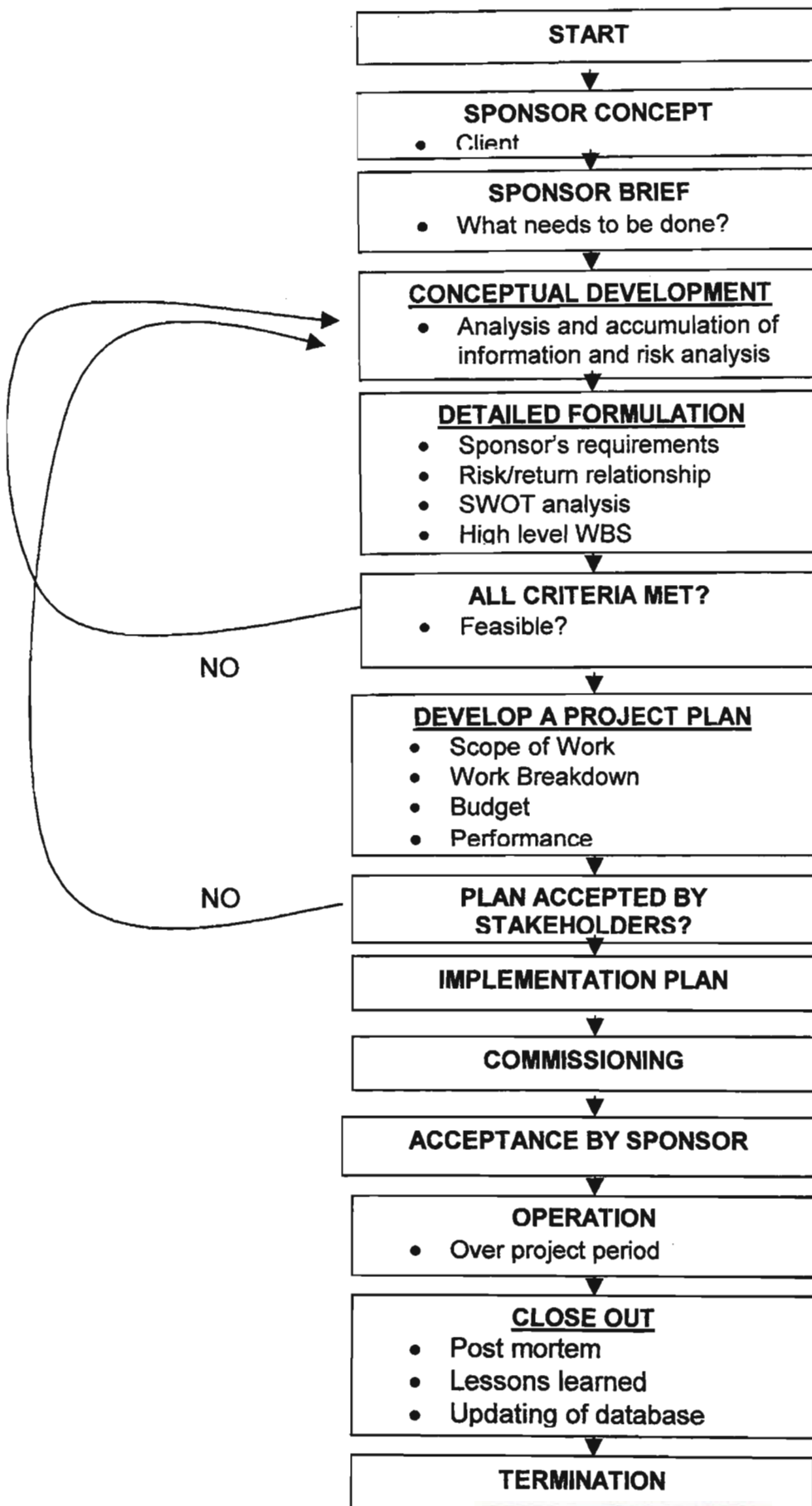
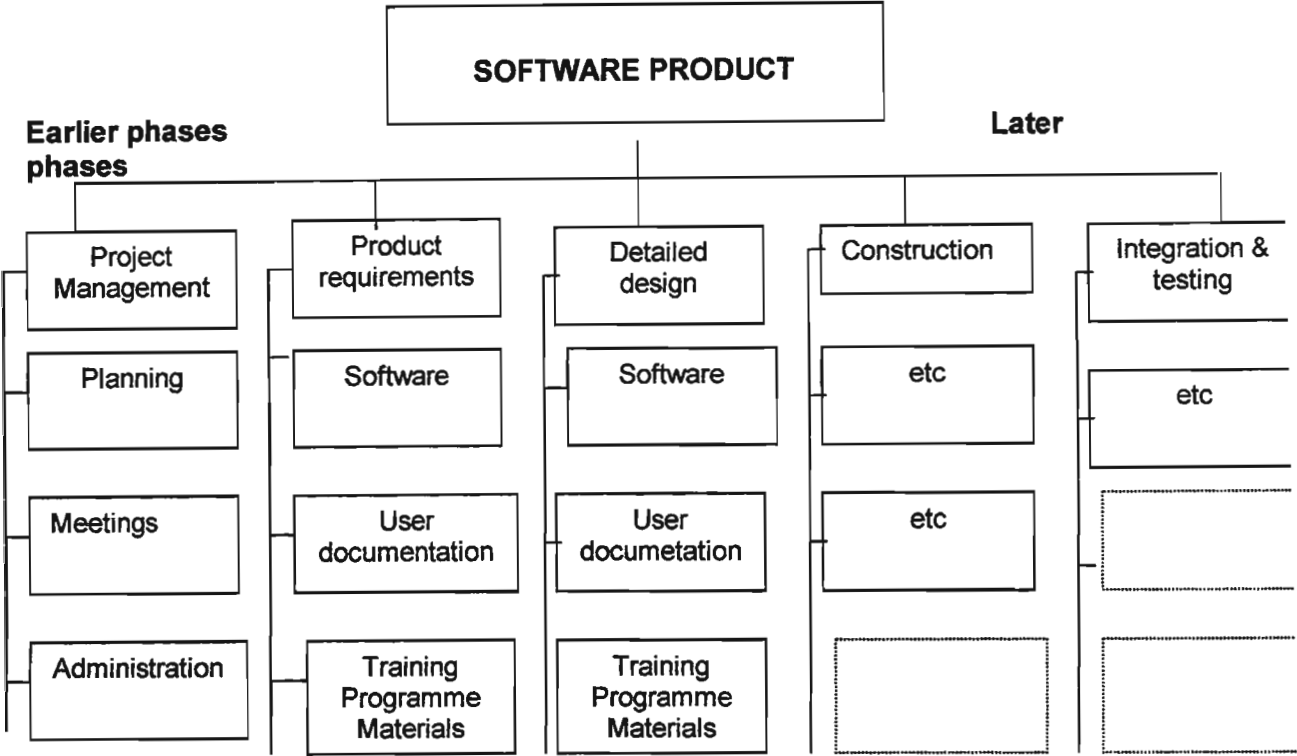


Fig. 3.8: Generic project management model (adapted from Köster, 1998)

Two concepts that are particular to project management practice, the “work breakdown schedule” (WBS), and the “statement of work” (SOW), perhaps need some explanation since they form an integral part of the terminology used during project management, but might not necessarily have general currency. The work breakdown schedule (WBS) is utilised mainly at the scope definition phase during which a WBS template is drafted. So for example, if one were developing a software product, the WBS template (according to the *PMBOK*, 2000) would conceivably look like this:



**Fig. 3.9: Work Breakdown Schedule for a software product (*PMBOK*, 2000)**

The statement(s) of work describe the products or services that are to be provided during the project period, and particularly at the termination of the project period. It is a narrative description of these products or services, and should be as “clear, complete, and concise as possible”. (*PMBOK*, 2000)

Finally, of particular interest for this study is the way in which project management treats those elements or influences that cause “variance” to the initial project plan. An example of this can be found under the “Scope Change Control” phase (see last step in the project scope management sequence). In relation to this, it is mentioned that: “An important part of scope change control is to determine what is causing the variance and to decide if the variance

requires corrective action”, where “corrective action” is defined as “anything done to bring expected future project performance in line with the project plan.” (*PMBOK*, 2000). This notion of ‘corrective action’ is mentioned as one of the corner stones of project management in the list reproduced on page 32 under the heading “Controlling processes” which are described as those processes that ensure “that project objectives are met by monitoring and measuring progress regularly to identify variances from plan so that *corrective action can be taken when necessary.*” (my italics) (*PMBOK*, 2000).

### 3.3 Selective Critique of Project Management

The previous paragraph, of course, contains in it one of the fundamental criticisms of project management as it is practised today, and that is the importance, above all else, of ensuring that the project objectives or outcomes remain subordinate to process (thus my reason for italicising this phrase). This conformity is ensured by introducing corrective action to ensure that the original objectives are met. This might be, however, at the expense of the various dynamic elements that could (and normally do) exist *in situ*. This particular criticism will be dealt with in more detail during the course of this study, suffice to say at this point that, in general terms, the practice of project management stands to increase its efficacy and application if it were to incorporate a methodological approach like systems thinking into its body of knowledge for various reasons.

At the outset, and in general support of this view, it is possible to identify a number of inherent features that form part of project management practice. These features include, for example, a) the linear nature of the processes which are involved in project management; b) the activity referred to as ‘corrective action’ within the *PMBOK*, the primary impulse of which is to coerce the errant project back in line with the initial plan; c) the limited value afforded learning and the significance of immediate feedback during project management; and d) the lack of significant interface between the technologies and the humanities (which Checkland (1981) refers to as “the total systems suboptimisation which is implicit in the use of the techniques of operational research.”).

To be fair, the *PMBOK* displays some awareness of the importance of learning (referred to under the title of 'lessons learned') but this learning seems to be useful (according to the *PMBOK* and Kerzner<sup>5</sup>) after the conclusion of the project. The value of the lessons learned, moreover, is described in this manner: "The causes of the variances, the reasoning behind the corrective action chosen, and other types of lessons learned should be documented so that *they become part of the historical database* for both this project and other projects of the performing organisation." (my italics) (*PMBOK*, 1996). Similarly, there is some acknowledgement of the importance of the wider environment in the project management process in the *PMBOK*: "Projects and project management operate in an environment broader than that of the project itself. The project management team must understand this broader context - managing the day-to-day activities of the project is necessary for success but not sufficient." (*PMBOK*, 2000). There is, however, (as far as I could ascertain) no elaboration of this point in the *PMBOK*.

Moreover, there is some acceptance of the fact that project management involves a 'degree of uncertainty' with the solution that "Organisations performing projects will usually divide each project into several *project phases* to provide better management control and appropriate links to the ongoing operations of the performing organization." (original italics). (*PMBOK*, 2000). The suggestion, therefore, for dealing with the complexity (implied in the words 'degree of uncertainty') is "divide each project into several project phases", which would appear to be a rather limited response to what is undoubtedly an intricate challenge, often beyond the scope of simple linear progression.

In response to this challenge, various commentators have pointed to particular areas of concern with the practice of project management. First a criticism by omission: Minzberg (1994) in his reassessment of strategic planning, does not at any time in the course of his extensive discussion of planning, mention the words 'project management', even though much of what he deals with is in fact many of the processes involved in project

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<sup>5</sup>Kerzner (1995) observes: "Lessons learned should be documented so future project managers can learn from past mistakes."



management. He describes, for example, the nature of his reassessment of strategic planning as follows:

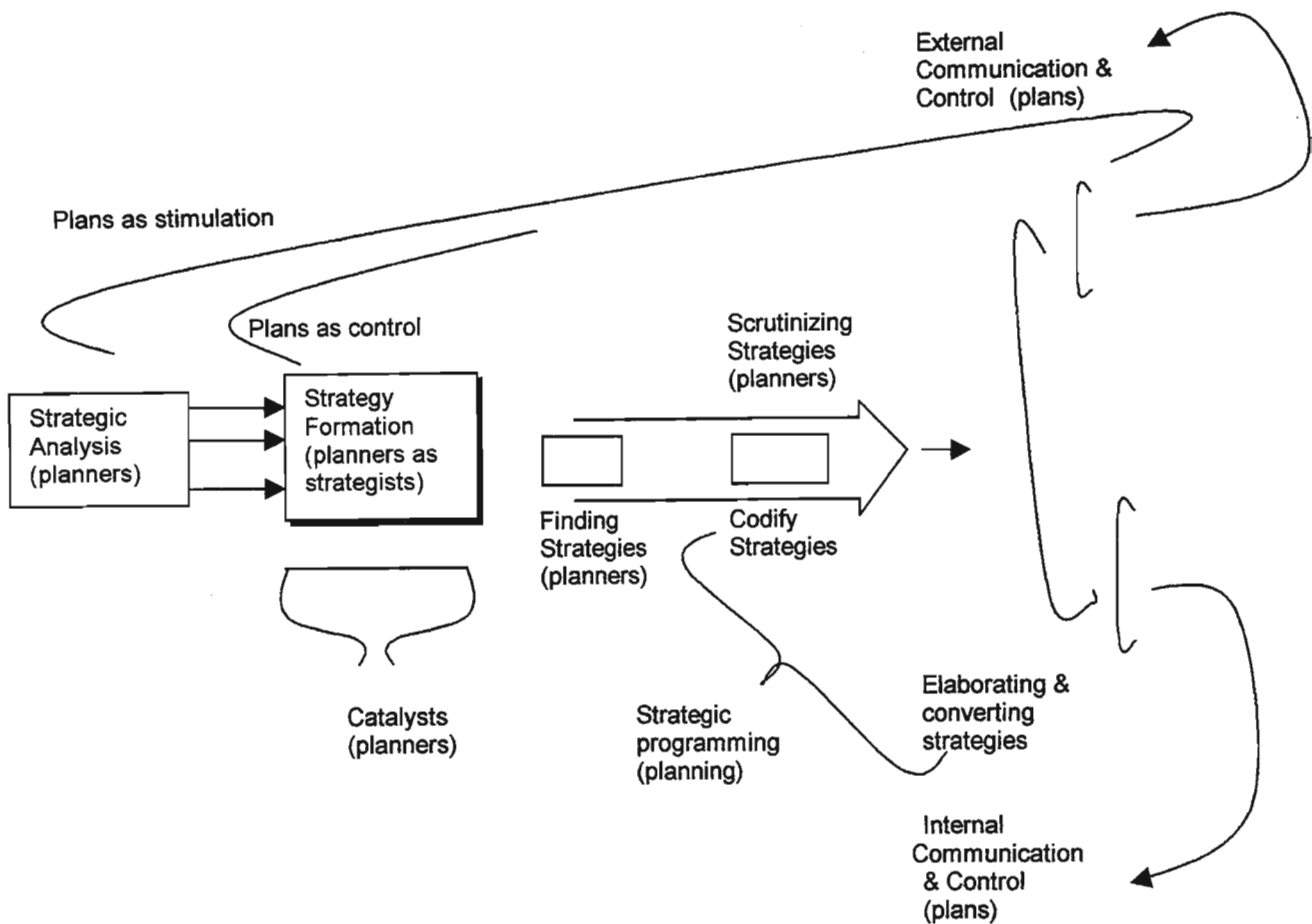
Thus our answer to the question of why organizations engage in planning with respect to strategy is (1) to program strategies, that is to operationalize them in their behaviours. And they programme strategies in this way (2) for purposes of communication and (3) for purposes of control (as well as coordination), which are the roles of plans. As to why organizations engage planners with respect to strategy, aside from their role in carrying out the above, the reasons are (4) to help find strategies (as logics in action), (5) to feed data and analyses into the strategy formation process, (6) to scrutinize the strategies that come out of it, and (7) to stimulate others to think strategically and be more knowledgeable about the strategic formation process in general.

(Minzberg, 1994)

To illustrate this position, Minzberg devises a model of what he terms *A framework for planning, plans, planners*, which is represented in diagrammatic form in Figure 3.10.

What Minzberg is pointing to in this diagram is the importance of the *learning* that could usefully be included in the planning and execution stages or phases of a project's life-cycle - a fundamental feature of most process-orientated strategies - and thus devises a project management-like approach which includes a systems thinking foundation.

It is a systems approach, furthermore, that is suggested by the title of a book by Kerzner (*Project Management: A Systems Approach to Planning, Scheduling and Controlling*, 1995). This title, however, proves to be misleading. Kerzner (1995) contends early in his book that "project management is an outgrowth of systems management", and although he mentions von Bertalanffy and the philosophical approach inherent in general systems theory, proceeds to use the word 'system' in the sense that it is used in 'space craft systems', and 'launch vehicle systems' and is unsuccessful in incorporating the idea of systemic thinking into his description of project management practice.



**Fig. 3.10: A framework for planning, plans, planners (Mintzberg, 1994)**

Kreiner (1995) on the other hand, whilst not providing any methodological pointers, comments on what he identifies as the inability of project management to deal with 'drifting environments'<sup>6</sup>:

The systemic complexity means that events far away from the project may ramify in their consequences, and ultimately change the very foundation on which the project and the environment originally negotiated their relationship. Monitoring drifting environments means monitoring a bewildering complexity of relationships not necessarily centred around the project itself.

Kreiner's contention is that unless the phenomenon of "drifting environments" is taken into consideration, the project is in danger of its "relevance becoming

<sup>6</sup> Kreiner (1995) describes the notion of a 'drifting environment': "From the project's point of view an environment is said to drift when it somehow diverges from the projected course that formed the premise for the design of the project".

eroded" (Kreiner, 1995) and he concludes by acknowledging the importance of adhering to the fundamental aspects of project management practice, while urging the incorporation of process-oriented components:

That is, there must be fixed points for the performance [of project management practice] in the form of continuously updated operational goals, specific tasks, action plans, etc.; there must also be social bonds with the environment providing the impetus for responding to changing relevance criteria.

(Kreiner, 1995)

Taylor (unpublished monograph n.d.) commenting on the practice of project management in the engineering field, with special reference to the developing world, suggests that:

"Hard" skills [including the disciplines of engineering, planning, law and finance] represent the set of inputs which would conventionally form part of project management. Uniqueness of application of these skills in a developing context derives from the requirement that design, documentation and evaluation should recognise developmental imperatives, such as those implied by the description of "soft" skills [including skills associated with facilitation, organisational development, training and motivation].

Taylor (unpublished monograph, n.d.) continues by suggesting a process-based model for project management that encapsulates the "interface between the technologies and the humanities".

In addition to these various critiques, Loch, et al (2000) commenting on the challenge experienced by projects undertaken in complex environments, state: "In our research [conducted by examining 20 projects, in industries as diverse as Internet software, real estate construction, speciality chemicals and pharmaceuticals, aerospace, computers, and telecommunications] we have found it useful to classify projects based on five types of uncertainty that can be present in a project: complexity, variation, risk, ambiguity, chaos". They are particularly critical of the typical project management technique called the Critical Path Method, and suggest that:

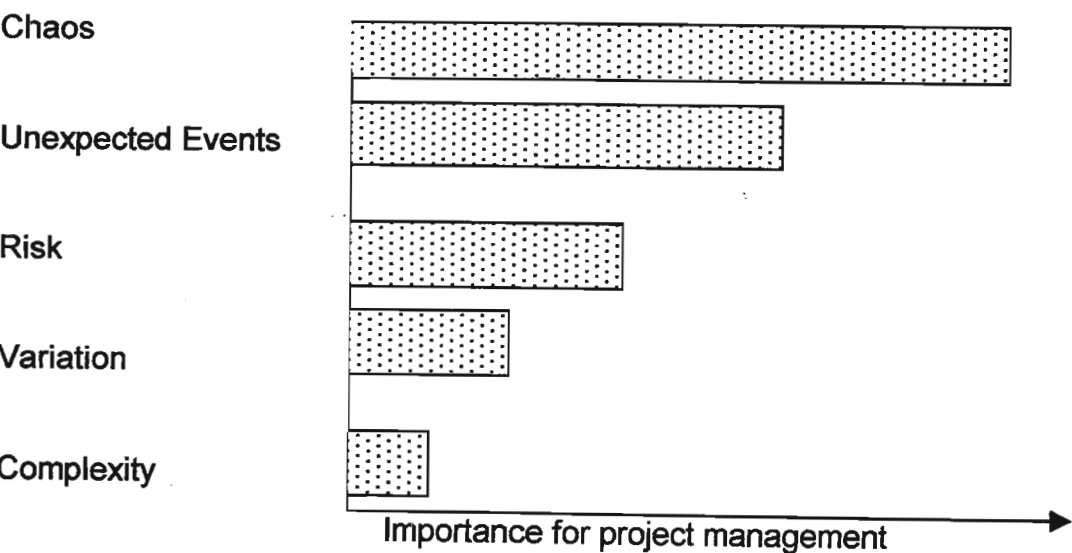
Using critical path thinking, project managers spend all of their time ‘fire fighting’ – that is, reacting to unforeseen events by doing whatever is necessary to get critical activities back on target so that fixed project objectives can be reached in the allotted time.

(Loch, et al, 2000)

Their contention is that all projects typically exhibit ‘uncertainty profiles’ that allow the project manager to gauge an *a-priori* estimate of where to focus attention in terms of risk management. An example of an ‘uncertainty profile’ for a ‘Hi-tech start-up with an unknown market’ is depicted in Figure 3.11.

Given the existence of this ‘uncertainty profile’, Loch, et al encourage the use of ‘contingency thinking’ which allows the project manager to build in the appropriate level of flexibility.

*Enterprise Project Management* (1999) while contemplating the project vs process debate concludes that “Projects are dependent on processes; processes depend on projects. Because of this inbred dependence between process and project management, as processes proliferate, so does the need to manage projects related to those processes”. What also becomes apparent is that since projects are deliberate acts of intervention intended to bring about change, the effects can be felt throughout the sub- and supra-systems.



**Fig. 3.11: Uncertainty profile for hi-tech start-up with unknown market (Loch, et al, 2000)**

Taylor (unpublished monograph, n.d. (a)) gives the following as an example:

We build a new regional shopping complex. In the process we change people movements; we impact neighbouring businesses; we act as a magnet away from the CBD; we impact traffic; we make visible change, etc. Projects bring change. Project managers cannot abdicate responsibility for this. There is an ethical issue here.

### **3.4 Conclusion**

This limited survey of the criticism of project management practice, particularly relating to the paucity of process-oriented approaches to project management practice, indicate that there is sufficient concern with the practice of project management to encourage continued scrutiny and commentary. The following chapter will conduct a review of common systems thinking methodologies and consider various soft-systems methodologies and approaches with a view to suggesting possible incorporation of these methodologies in project management practice.

## 4. SYSTEMS THINKING

### 4.1 Introduction

There would be no rigour to this study if there were no explanation of the theory, the historical antecedents, and, at the very least, a reference to the main characteristics, of the body of knowledge and methodological perspective which is known as 'systems thinking' or sometimes 'systems science'. It is for this reason, therefore, that this chapter will endeavour to describe the development of systems thinking from its early philosophical beginnings in 'cybernetics' and 'general systems theory', to its current practical form as demonstrated in approaches like 'Soft Systems Methodology', 'Critical Systems Heuristics' and 'Total Systems Intervention'. It needs to be stated up front, however, that this description of the development of systems thinking as a body of knowledge will be selective and will only refer to the dominant methodological progression of ideas that go to make up the approach.

As a generic definition of what constitutes a 'system', Andersen, et al (1997) submit that "A system is a group of interacting, interrelated, or interdependent components that form a complex and unified whole". Bawden (1998) illustrates this in a diagram that he entitles 'a system of systems':

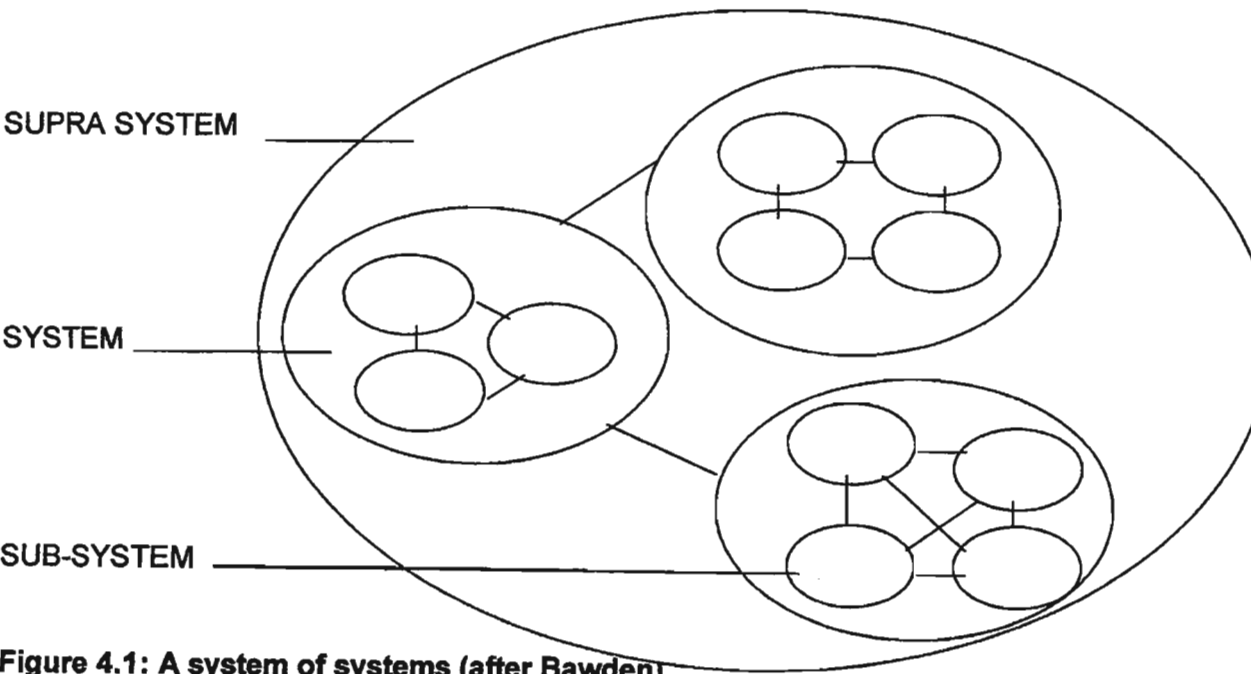


Figure 4.1: A system of systems (after Bawden)

As a definition of 'systems thinking', Andersen, et al (1997) propose the following: "A school of thought that focuses on recognising the interconnections between the parts of a system and synthesizing them into a unified view of the whole". In addition, they suggest that systems thinking "not only offers a set of tools but also a framework for looking at issues as systemic wholes". (Andersen,et al, 1997)

Now while these definitions are no doubt adequate explanations, they may not be sufficient, and as Flood and Carson, in their book explaining 'the theory and application of systems science', caution:

When asked to explain "what systems science is all about," a systems expert is confronted with a rather daunting task. ... As far as we are aware, there is not a single consolidated text on the nature and content of systems science that is both (1) an introduction to the systems concepts that provide the structural components that make up the systems framework of thought, and yet (2) broad enough in its outlook to provide an insight into the breadth of application achievable with such a framework. (Flood and Carson, 1992)

The point is that the domain is huge, and only a skip over the surface of systems thinking is provided in this survey.

## **4.2 Genesis and Basic Tenets of Systems Thinking**

In tracing the development of systems thinking over the past 60 years or so, it is necessary to refer to some of the seminal thinkers in the field, and to describe the contexts which led to the development of the approach as we know it today. It might be useful, as a point of departure, to position ourselves 30 or so years after the genesis of systems thinking, and so capture some of the general features of systems thinking, before attempting a survey of the terrain. In seeking to capture the essence of what he termed the 'new science', De Rosnay (1975) coined the term 'the macroscope' to describe a 'new way of seeing, understanding and acting'. He more fully describes this instrument:

The macroscope is unlike other tools. It is a symbolic instrument made up of methods and techniques borrowed from very different disciplines. It would be useless to search for it in laboratories and research centres, yet countless people use it today in the most varied fields. The macroscope can be considered the symbol of a new way of seeing, understanding and acting.

(De Rosnay, 1975)

In writing these words, de Rosnay has had the benefit of 30 years of systems thinking, and he continues in his book by distilling the components of the 'science' as it had developed, into what he terms 'The "Ten Commandments" of the Systemic Approach'. De Rosnay's 'commandments' are recorded here in italics, while the words in parenthesis are my own paraphrase of de Rosnay's explanation of that 'commandment':

1. *Preserve variety.* (To preserve stability, preserve variety; avoid excessive centralisation, which stifles interaction between individuals.)
2. *Do not "open" regulatory loops.* (It is not possible to bring about organised change by dealing with part of the system; change must embrace the system as a whole.)
3. *Look for points of amplification.* (By utilising a systemic approach, one is able to reveal sensitive points in a system, which can then be acted upon to encourage controlled change).
4. *Reestablish equilibriums through decentralisation.* (By decentralising control, equilibrium is achieved much faster than through centralised control.)
5. *Know how to maintain constraints.* (Wayward behaviour upsets systems through perturbations. Liberty can only be achieved through the free choice and application of accepted constraints.)
6. *Differentiate to integrate better.* (Union though diversity is creative and stabilising.)
7. *To evolve, allow aggression.* (There is no real change without criticism and risk.)
8. *Prefer objectives to detailed programming.* (Setting outcomes allows for the utilisation of feedback.)
9. *Know how to use operating energy.* (Disseminate information in an amplified manner, allowing for diffusion throughout the system, with feedback loops to decision centres.)
10. *Respect response time.* (A 'sense of timing' is extremely important in systems thinking, i.e. knowing the precise time when the system is ready to be acted upon will be far more productive than acting without timing.)

(De Rosnay, 1975)



The value of these 'commandments' are not to be under-estimated since they form the backbone of systems thinking, and any intervention that fails to take account of them, is liable to fail as a systems intervention. In essence, what de Rosnay does in his book is to begin to highlight some of the essential features and characteristics of systems thinking as it was developing. These 'essential features and characteristics' will reveal themselves in this survey to a greater or lesser degree as we proceed to the present.

In all of the literature documenting the development of systems thinking which has been consulted in this survey, it is acknowledged that the beginnings can be ascribed to the failure of the dominant philosophical paradigms of reductionism and determinism (popularised by Newton and Descartes) to deal with 'modern' phenomena and issues which became common in the post-war era. These phenomena and issues were unusually complex in a way that had not been experienced before, causing theorists and philosophers to seek out new ways of dealing with a new world-order.

Seminal to this new way of seeing and thinking were the ideas of Wiener (1954) whose introduction of what he termed 'Cybernetics' (Wiener's upper-case) and the various conventions associated with 'cybernetics' - like entropy, feedback and homeostasis - were to prove central to systems thinking as it was to develop, and as it continues to be used as an approach to dealing with problem solving. Wiener was to simplify his definition of 'cybernetics' as 'the theory of messages' (1954). Beer (1979) would later augment Wiener's definition by stating that 'cybernetics is the science of effective organisation', which he would incorporate in his system of control and communication that he termed the Viable Systems Method. Clemson (in 1984) would codify what he terms the 'Laws, Principles, Theorems' of cybernetics from the previous writings of systems thinkers into a list of 22, all of which continue to be fundamental to the understanding of systems thinking today:

1. *System Holism Principle:* A system has holistic properties possessed by none of its parts. Each of the system parts has properties not possessed by the system as a whole.

2. *Darkness Principle:* No system can be known completely.
3. *Eighty-Twenty Principle:* In any large, complex system, eighty percent of the output will be produced by only twenty percent of the system.
4. *Complementarity Law:* Any two different perspectives (or models) about a system will reveal truths about that system that are neither entirely independent nor entirely compatible.
5. *Hierarchy Principle:* Complex natural phenomena are organized in hierarchies with each level made up of several integral systems.
6. *Godel's Incompleteness Theorem:* All consistent axiomatic foundations of number theory include undecidable propositions.
7. *Entropy: The Second Law Of Thermodynamics:* In any closed system the differences in energy can only stay the same or decrease over time; or, in any closed system, the amount of order (or organisation) can never increase and must eventually decrease.
8. *Redundancy Of Information Theorem:* Errors in information transmission can be protected against (to any level of confidence required) by increasing the redundancy in the messages.
9. *Redundancy Of Resources Principle:* Maintenance of stability under conditions of disturbance requires redundancy of critical resources.
10. *Redundancy Of Potential Command Principle:* In any complex decision network, the potential to act effectively is conferred by an adequate concatenation of information.
11. *Relaxation Time Principle:* System stability is possible only if a system's relaxation time is shorter than the mean time between disturbances.
12. *Circular Causality Principle One:* Given positive feedback (i.e., a two-part system in which each stimulates any initial change in the other), radically different end states are possible from the same initial conditions.
13. *Circular Causality Principle Two:* Given negative feedback (i.e., a two-part system in which each part tends to offset any change in the other), the equilibrated state is invariant over a wide range of initial conditions.

14. *Feedback Dominance Theorem*: For higher gain amplifiers, the feedback dominates the output over wide variations in input.
15. *Homeostasis Principle*: A system survives only so long as all essential variables are maintained within their physiological limits.
16. *Steady State Principle*: If a system is in a state of equilibrium (a steady state), then all sub-systems must be in equilibrium. If all sub-systems are in a state of equilibrium, then the system must be in equilibrium.
17. *Requisite Variety Law*: The control achievable by a regulatory sub-system over a given system is limited by 1) the variety of the regulator, and 2) the channel capacity between the regulator and the system.
18. *Conant-Ashby Theorem*: Every good regulator of a system must be a model of that system.
19. *Self Organizing Systems Principle*: Complex systems organise themselves; the characteristic structural and behavioural patterns in a complex system are primarily a result of the interactions among the system parts.
20. *Basins Of Stability Principle*: Complex systems have basins of stability separated by thresholds of instability. A system 'parked' on a ridge will 'roll downhill'.
21. *Viability Principle*: Viability is a function of the balance maintained along two dimensions: 1) autonomy of sub-systems versus integration of the system as a whole, 2) stability versus adaptation.
22. *Recursive System Theorem*: If a viable system contains a viable system, then the organizational structure must be recursive, or, in a recursive organizational structure, any viable system contains, and is contained in, a viable system.

(Clemson, 1984)

While many contributed to the development of the general features of systems thinking<sup>7</sup> as mentioned by de Rosnay in *The Macroscopic*, and in the laws, principles and theorems identified by Clemson, it is generally acknowledged that von Bertalanffy was instrumental in introducing the

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<sup>7</sup> See Roger Evered ("Consequences of and Prospects for Systems Thinking in Organisational Change") in Cummings (1980) who mentions the range of contributors to systems thinking, from gestaltists, to psychologists, to biologists, and philosophers.

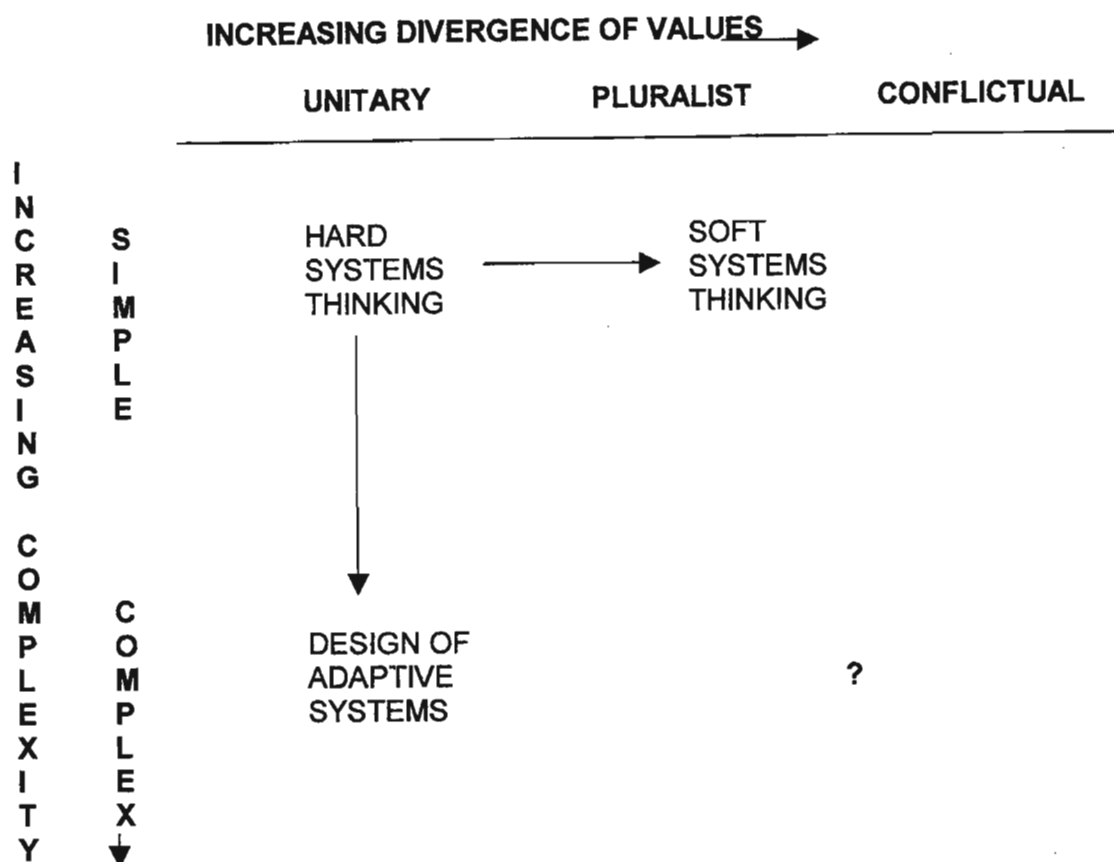
'general systems theory' viewpoint which is seen as the beginnings of a science with which to utilise the general features and principles that were being developed. This was the precursor of the many methodologies that have been developed within the discipline of systems thinking. It is mentioned by Evered (in Cummings 1980) that von Bertalanffy managed to make this breakthrough since he "appreciated more than most the limitations of traditional science *and* saw the need to generate a revised science. He described general systems theory as the science concerned with complexly organised wholes" (Evered's italics). 'General systems theory', however, proved to be just that - general - and the search for a more exacting science led systems practitioners and researchers to develop two main strands: hard systems methodologies, and soft systems methodologies.

#### **4.3 The Hard Systems/Soft Systems Split**

One of the early manifestations of hard systems thinking was in the development of 'operations research' which sought to engage with issues via rational problem solving, based on the assumption that there is 'one best way' to solve problems (Rosenhead, 1989). This approach was soon seen as problematic to a certain school of theorists, and, according to Jackson (1995):

In the 1980s came a general understanding of the usefulness of the [soft systems] approaches for more complex problem situations, and in problem contexts which are pluralist and/or conflictual. Operations Research departments started being moved down then out of organizations as their work was seen to be less relevant and significant.

The realisation that 'operations research' (and hard systems thinking in general) was unable to deal with distinctly human problems, particularly complex conflictual problems, led to the development of soft systems thinking, and onwards into what is known today as 'critical systems thinking'. Jackson (1995) has developed a useful grid (Figure 4.2) that highlights this evolution of systems thinking.



**Fig. 4.2: The development of systems thinking (after Jackson, 1995)**

While it is acknowledged by Jackson that the purpose of the grid is to show the evolution of systems thinking in schematic form (and is not necessarily applicable for all situations) it is nevertheless useful as an illustrative model. What the grid serves to illustrate, in simple terms, is that hard systems thinking 'looks at the surface' and fails to take into account the social environment, and the wider sociological elements that are involved in any particular problem-context. What Jackson suggests in the top right-hand quadrant of the grid is that soft systems thinking is interpretivist, and is characterised by the 'giving up of expert knowledge' (as in Ackoff's method of 'interactive planning', and Checkland's 'soft systems methodology', for example). According to Jackson, the adaptive systems theories (which are to be found in the bottom left-hand quadrant) 'dig beneath the surface' to discover the structuralist aspects of problems (as, for instance, in Beer's methodology called the 'viable systems diagnosis').

It is useful for this survey that Jackson identifies two broad approaches in his grid, namely, 1) soft systems thinking, and 2) the design of adaptive

systems. The question mark in the bottom right-hand quadrant of the grid represents Jackson's contention that soft systems thinking approaches need to be developed further to facilitate intervention in 'complex-conflictual or complex-coercive' problem contexts. Some thinking has already occurred in this regard (see the reference to 'critical systems thinking' later in this chapter).

Before launching into a discussion of these various methodologies, it would seem of some importance to indicate at this point that the particular approaches which are discussed here purposefully exclude the so-called 'management fads', which Bawden (1998) refers (disparagingly) to as 'MBO, JIT, TQM, servant leadership, re-engineering, imagineering, downsizing, rightsizing, envisioning, empowering, corporate planning, scenario planning, strategic planning, strategic alignment, customer focusing, core competency development, and organisational learning ... effective leadership, and functional leadership'.

#### **4.4 Soft Systems Thinking**

In charting the development of soft systems thinking, this sub-section will look specifically (but briefly) at the methodologies of Churchman ('social systems design'); Ackoff ('interactive planning'); Mitroff and Mason ('strategic assumption surfacing and testing'); and Checkland ('soft systems methodology'). It is not the intention to provide a detailed history of the origins and growth of soft systems thinking from the work of Singer through to Ulrich and others; this has been done most competently elsewhere (see Britton and McCallion, 1994, and Andersen and Johnson, 1997). Rather, the intention here is to provide some contextual and theoretical foundation for the conclusions to this study, by allowing the reflections of others to speak to the current enquiry. As Churchman (1974) elegantly puts it:

[T]he systems approach means enabling every man to appreciate as fully as possible his own view of social reality by listening seriously to other views. This is where our explorations should begin.

Since this discussion must necessarily be brief, it is useful to turn to the writings of various authors who have scrutinized the systems approach, and to distil their respective ideas. Britton and McCallion are instructive in this regard. In reviewing the Singer/Churchman/Ackoff 'School of Thought', they are able to conclude (1994):

Churchman and Ackoff formalised Singer's philosophy so that ideals and their pursuit could be scientifically studied. For them the 'basic presupposition of the study of mankind's progress [towards the ideal] is that the process is "dialectical"'. They view progress in terms of conflict. If there is no conflict between means and/or ends, then there is no need for a person to change behaviour and hence no progress.

To paraphrase these ideas, all soft systems thinking is about conflict and change in various configurations, and it is the dynamic which is set up between these two states (i.e. means and ends) which can either lead to destruction, or if well-managed, to development and progress. Perhaps for the purposes of this sub-section, Churchman's seminal exposition of three types of planning - Goal Planning, Objective Planning and Ideal Planning - and his encouragement of Ideal Planning (see Churchman, 1979) feeds usefully into the methodology of 'interactive planning' that Ackoff popularised. Moreover, Churchman's ethical focus also informs Ackoff's methodology and provides an overall matrix against which the practice of planning (at least for these two theorists) was to develop. In designating value-currency to his 'interactive planning,' Ackoff (1981) reveals that "Interactivists engage in normative planning ... not only do ideals play an important role in such planning, but they play the *key role*" (Ackoff's italics).

For Mitroff and Mason, the primary requirement for the application of their 'strategic assumption surfacing and testing' is a situation of disagreement and potential conflict which threatens to divide an organisation irreparably. As part of the 'strategic assumption surfacing and testing' process, two groups at odds are separated so as to "maximize convergence of viewpoints within groups and to maximise divergence of perspective between groups" (Jackson, 1991). The object of the exercise is to surface the assumptions which separate the two groups with a view to achieving "synthesis ... a compromise

on assumptions from which a new, higher level of strategy or solution can be derived" (Jackson, 1991).

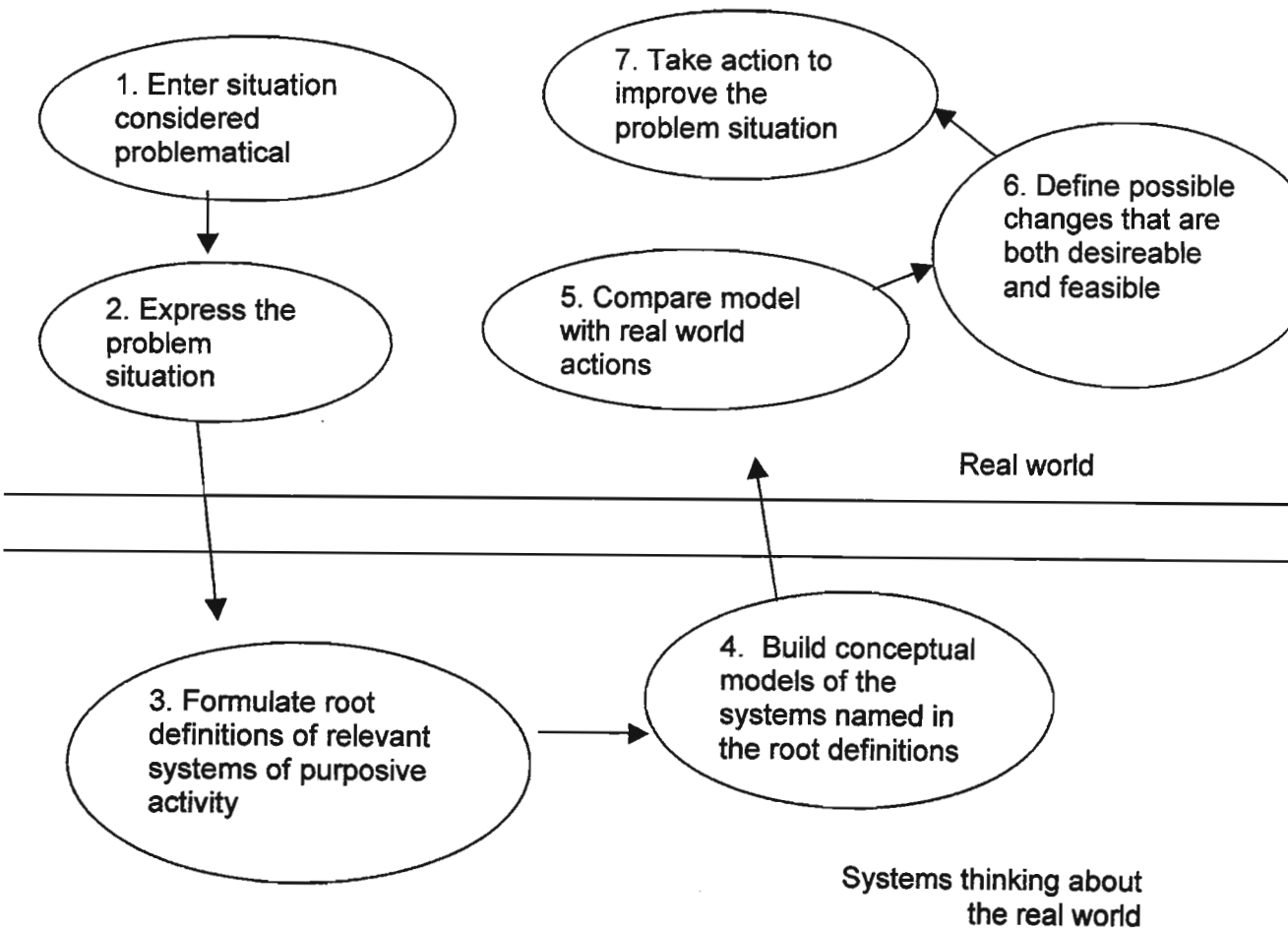
Checkland (in Flood and Jackson, 1994) maintains that his "soft systems methodology" ... "can be seen as an orchestration of the operation of an appreciative system in a human situation perceived as problematic." As such, Checkland follows a fairly lengthy process (outlined by Checkland, in Flood and Jackson, 1994) that is cyclical, and in principle, never-ending. "It is an epistemology which extends - or subverts - that of the 'hard' paradigm of goal seeking, with its time-bound language of 'goals' which are 'achieved' and 'problems' which are 'solved' out of existence." (1994) There are instances within Checkland's work that demonstrate similarities with Ackoff's work (and further back, Churchman and Singer), a simple example being the comparison of models and reality (but not idealising). Checkland (in Checkland and Scholes, 1990) himself mentions that "...SSM not only develops and changes but also gets used in different ways by different users in different circumstances".

Checkland's procedure in his 'soft systems methodology' is well documented and is familiar to anyone involved in soft systems thinking, owing to its popularity as a methodology. The movement from the creation of 'rich pictures', through to the CATWOE, the drafting of the root definition, and the drawing of the concept model (as a prelude to action) has found its way into many interventions (or 'interactions' as Checkland prefers to call them) - including this study, c.f. Chapter 1 - and especially in the area of organisational change and regeneration. In Figure 4.3, Checkland's 'soft systems methodology' is presented in concept-model format, although its apparent simplicity belies the complexity and time that is required in the process.

It bears mentioning that it is fundamental to both Checkland and Ackoff that any process utilising soft systems thinking in a problem situation should not end with the formal step-by-step application of the methodology, Checkland calling for what he terms 'Mode 2' application (i.e. internalisation of the methodology as an on-going learning instrument) - he (in Rosenhead, 1989) talks of "giving away" the "soft systems methodology" approach, of "handing it over to the people in the problem situation" and Ackoff indicating

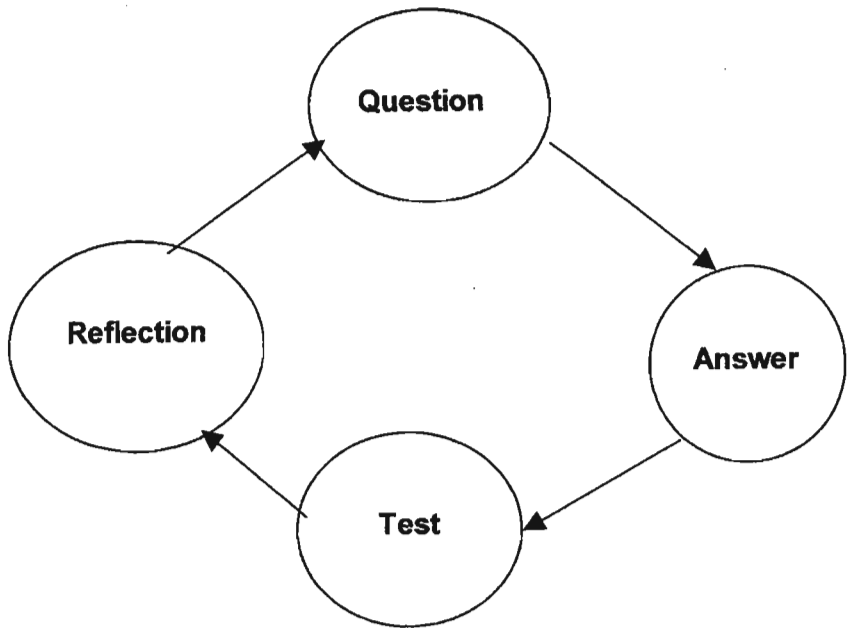


that he requires a number of iterations to come up with the ‘idealised design’; (Ackoff (1981a) mentions, in fact, that “None of [the phases of ‘interactive planning’], like the process as a whole, should ever be completed, and they may be started in any order.” This concept-model presented in Figure 4.3, therefore should not be seen to stop at point 7., but should be seen as a continual learning cycle.



**Fig. 4.3: The learning cycle of soft systems methodology (after Checkland, 1994)**

Before going on to look briefly at Ackoff’s contribution to systems thinking, it is perhaps apposite to pause at this point to consider the centrality of learning as a continuing cyclical process for the science of systems thinking. From Handy’s ‘Learning Cycle’:



**Fig. 4.4: Handy’s learning cycle**

to Kolb’s ‘Learning Cycle’, to Senge’s ‘Wheel of Learning’, to Argyris and Schon’s ‘Double Loop Learning’, to Bawden’s ‘learning lemniscate’, the models of learning have reached levels of increasing sophistication which accommodate increasingly complex notions of interaction and feedback, all of which are essential to any understanding of systems thinking. It needs to be mentioned, moreover, that the models mentioned here are by no means exhaustive, and that they should serve only to point to what has become an inescapable part of systems thinking. Having acknowledged the centrality of learning as a fundamental characteristic of systems thinking, let me now go on to consider the methodology of another of the seminal thinkers in soft systems methodology.

It would not be unfair to Ackoff to situate the starting premise of his ‘interactive planning’ within the words: “Plan or be planned for” (see Ackoff, 1981a). Simply put, it is his contention that the only way to deal with the ‘mess’ which characterises most organisations in a complex and changing world is for them to take part in an ‘interactive planning’ exercise since the participation of all the stakeholders in the process will have the effect of cementing the decisions which are reached. It is Ackoff’s contention that ‘interactive planning’ is the only way to achieve lasting organisational development (as opposed to ‘growth’) since all other types of planning

(referred to as 'reactive, preactive, inactive' - see Ackoff, 1981a) end up being devoid of real interaction and co-operative decision-making, and thus buy-in (see Ackoff, 1981a). Ackoff (1981) mentions, moreover, that "interactive planning" is optimally used when "...the principal organisational objective is *development* rather than growth or survival..." (Ackoff's italics). Ackoff's 'interactive planning' involves a concept of planning as a structured process that has five phases, namely, 1) formulating the mess, 2) ends planning, 3) means planning, 4) resource planning, and 5) design of implementation and control. Ackoff mentions that the process itself is as important as the outcome, and all stakeholders are involved in the process as a result; as Ackoff (in Flood and Jackson, 1991) suggests: "...the process of planning is more important than the plan itself".

Ackoff's notion of 'co-ordination' and 'integration' within and between the discussion groups that participate in an 'interactive planning' exercise, is also extremely important, "where 'co-ordination' refers to interactions between different units at the same level and 'integration' as interaction of units at different levels" (Ackoff, 1981a). It is important in Ackoff's methodology to include stakeholders from the system-in-focus and the supra- and sub-systems in the planning exercise.<sup>8</sup>

The main criticism of Ackoff's 'interactive planning' has to do with its failure to recognise the coercive ideological factors that might come into play during the 'interactive planning' exercise; Ackoff (cited in Flood and Jackson, 1991) suggests, however, that even were this coercion to be present, it can be "...resolved at a higher level of desirability when people contemplate the desirable future they share in common."

Having considered hard and soft systems thinking, let's now turn to methodologies that deal with coercive problem-contexts (which normally involve the culture and politics of organisations, or systems in general).

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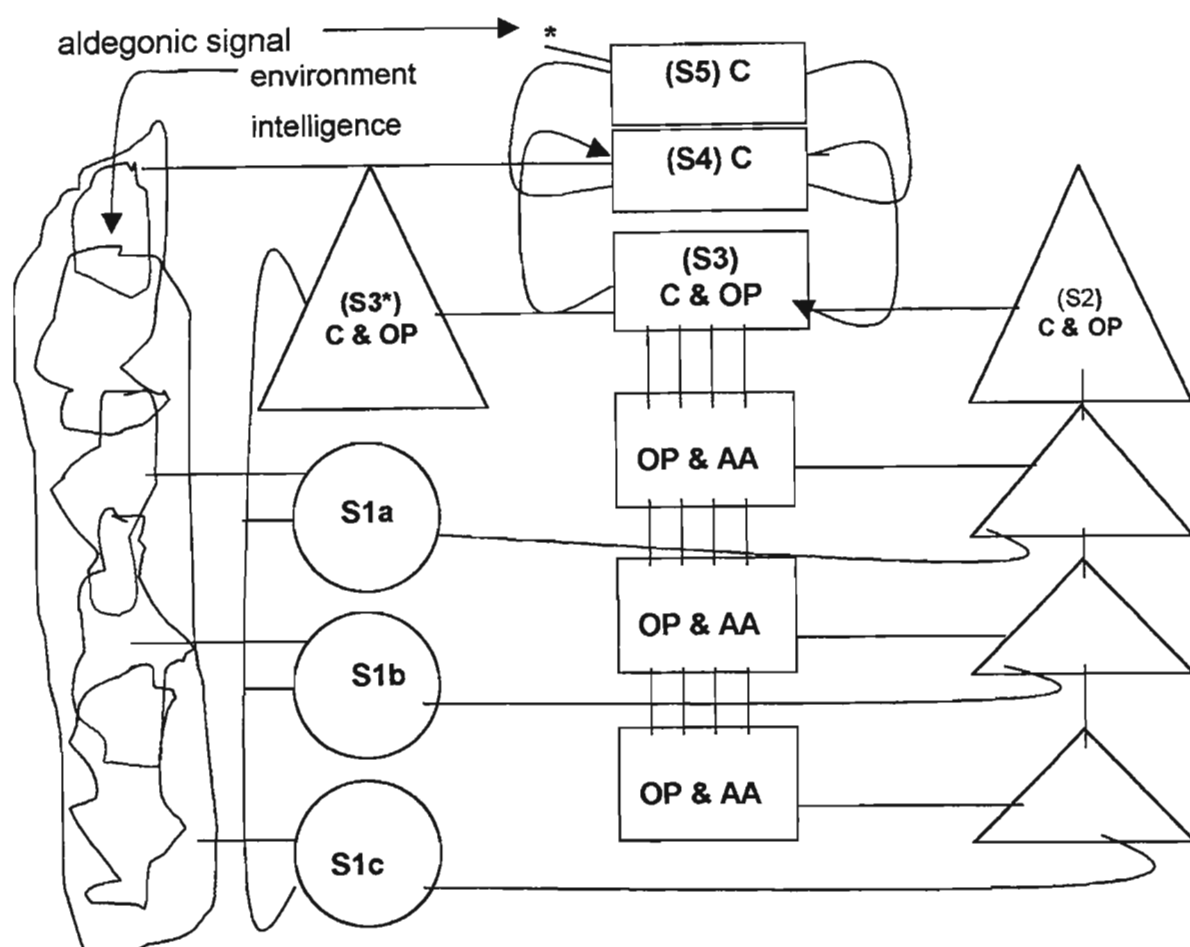
<sup>8</sup> Central to systems thinking is the notion of the system-in-focus, the supra-system and the sub-system, and how to 'bound' an intervention to bring about the required change. Part of the utility of 'critical systems heuristics' is that part of its methodology that describes the process of going through a sophisticated 'boundary critique', more of which is described later in this chapter.

## 4.5 Adaptive Systems

An example of a methodology (within systems thinking) that endeavours to deal with coercive problem contexts is Beer's 'viable systems method' (1979). The 'viable systems method' is closely associated with the theorems, laws and principles of 'cybernetics' codified by Clemson (1984), since the systems diagnosis of any organisation (within Beer's 'viable systems method') draws on cybernetic theorems, laws and principles to ensure that an organisation's 'fitness' is enhanced. As Schwaninger (in Espejo et al, 1993) suggests:

From the point of view of cybernetics, corporate development processes are not the outcome of chance. They are corporation-wide processes obeying an evolutionary logic. As such, they can - within limits - be influenced in the sense of a 'planned evolution'. In this process ... the catalytic reinforcement of dynamic forces in the system plays a crucial part.

The methodology used in the 'viable systems method', therefore, tends to look at an organisation through a 'cybernetic lens', and endeavours to introduce five fundamental levels (systems) to any organisation in the course of the intervention - (here described by Schwaninger, in Espejo et al, (1993) - my simplification in italics): system 5: policy (*the normative level*); system 4: intelligence (*the strategic level*); system 3: control (and audit); system 2: co-ordination (*support functions*); and system 1: implementation (*the operational level*). The 'aldegonic signal' is an 'instrument' which is meant to detect system stress before serious problems occur. The methodology that is followed in Beer's exposition creates, on the one hand, a viable system to ensure 'organisational fitness', while on the other hand, recommending adherence to cybernetic principles to ensure the viability of the organisation. Jackson (1995) indicates that methodologies like the "viable systems method" ... "have more clearly and explicitly sought to produce models that try to help with the design of complex adaptive systems. They aim to show what features you have to design into systems to make them viable and effective over time". An example of systems design utilising Beer's methodology is depicted in Figure 4.5 that is the organisational design suggested for a medium-enterprise maritime firm (which I investigated in 2000).



**Key: C = client; OP = operations person; AA = administrative assistant; S1a = current business; S1b = expanded general trawler business; S1c = general cargo business (as examples of diversification and expansion).**

**Figure 4.5: A Viable Systems Model for Mercantile Marine**

Having sketched briefly the systems thinking methodologies to be found in the two main quadrants that Jackson has identified in his grid in Figure 3.2, it is useful to end off this brief survey by turning to the quadrant in which Jackson has placed a question-mark. This is owing to the fact that it is in relation to this quadrant that most new systems methodologies are currently being developed, for it is in this quadrant that problems posed by complex-conflictual and complex-coercive problem-contexts reside. In seeking to give an indication of the variety of methodologies that are currently being developed to deal with these kinds of problem-contexts, a brief description will

be made of two methodologies, namely, 'critical systems heuristics', and 'total systems intervention'.

#### 4.6 Current Trends in Systems Thinking

Jackson (unpublished monograph, 1996) mentions that "critical systems thinking" is "the most theoretically sophisticated strand of the modern systems approach". He mentions that at the time of writing the article (1996) there were two versions of 'critical systems thinking' that he was aware of. The first is Ulrich's 'critical systems heuristics' (1983, 1996) and the other is what Jackson describes as:

a purely U.K. development [that] embraced the specific criticisms aimed at particular systems approaches, the explicit call for a systems approach that recognised 'coercive contexts', the attempt to reconstruct systems thinking upon complementarist foundations, and the preliminary operationalising of critical systems ideas in a meta-methodology (Total Systems Intervention) by Flood and Jackson (1991).  
(Jackson, 1996)

A brief discussion of the method of Ulrich's 'critical systems heuristics', and of Flood and Jackson's 'total systems intervention' follows, with a final word on the utility and theoretical rigour of systems thinking as an approach.

Ulrich's 'critical systems heuristics' has its origins in his *Critical Heuristics of Social Planning* (1983). A revised version of Ulrich's 'critical systems heuristics' (1996) points to the potential which it has to deal with complex-conflictual and complex-coercive problem contexts. In essence, 'critical systems heuristics' is

a democratic approach to planning which endeavours: a) to develop a *critical consciousness* in people regarding the conditioned nature of any kind of 'improvement', and thereby to 'subvert' people's technocratic notion of planning; and b) to give ordinary people the minimum *critical competence* (self-reflective and argumentative skills) which they need to translate such critical consciousness into meaningful and effective participation in planning processes.  
(Ulrich, 1996) (*Ulrich's italics*)

Ulrich bases his methodology on the belief that rational enquiry must be critical and systemic: critical in the sense that assumptions must be surfaced and challenged, and systemic in that rational enquiry must be conducted within boundaries and those boundaries should be determined critically. In determining these boundaries for diagnosis and intervention, Ulrich devises twelve questions which need to be posed in the process of identifying the current system, and speculating on a future (improved) system, and then working on minimising the gap (which is similar to 'narrowing the gap' in Ackoff's 'interactive planning'). Ulrich's method is also meant to be 'iterative' in its application so as to allow for general participation, and wind tunnelling, which he suggests allows for an ethical approach to planning. While 'critical systems heuristics' does not have the benefit of widespread usage, Jackson (1995) sees it as a "quite sophisticated systems approach which allows you to ask who benefits from proposed changes or new systems designs in conflictual situations or where there is coercion. Ulrich also offers a means of empowering those who are affected by management decisions but not involved in them."

'Total systems intervention', in line with the model favoured by 'critical systems thinking' as an approach, has three phases: "complementarism", "sociological awareness" and "the promotion of human well-being and emancipation" (Flood and Jackson, 1991). It seeks to intervene in problems that are complex and coercive by 1) foregrounding 'creativity' (i.e. what is the most creative way to uncover the problem context?); 2) 'choice' (i.e. which is the best systems thinking methodology, or methodologies to apply in the intervention?) 3) and 'implementation' (i.e. making palpable change occur in relation to the problem-context).

Underpinning these three 'phases' are seven 'principles':

- organisations are too complicated to understand using one management 'model' and their problems too complex to tackle with the 'quick fix';
- organisations, their strategies and the difficulties they face should be investigated using a range of systems metaphors;
- systems metaphors, which seem appropriate for highlighting organisational strategies and problems, can be linked to appropriate systems methodologies to guide intervention;

- different systems metaphors and methodologies can be used in a complementary way to address different aspects of organisations and the difficulties they confront;
- it is possible to appreciate the strengths and weaknesses of different systems methodologies and to relate each to organisational and business concerns;
- TSI sets out a systemic cycle of enquiry with iteration back and forth between the three phases;
- facilitators, clients and others are engaged at all stages of the TSI process.

(Flood and Jackson, 1991)

While 'total systems intervention' has been part of the evolution of systems thinking, the jury is still out on its utility, with Jackson (1996) stating: "As an attempt to capture the 'spirit' of critical systems thinking ['total systems intervention'] was possibly successful, but as an effort at systematising critical systems ideas, to make them more useable, it was a failure."

When one looks to the future of systems thinking, what does one see? Jackson (2000) in the update to his 1996 edition of *Systems Methodology for the Management Sciences* (which he re-titles *Systems Approaches to Management*) devotes more space to considering critical systems thinking, and suggests that critical systems thinking makes what he dubs three 'commitments':

- critical awareness – critiquing theoretical underpinnings of systems methodologies;
- emancipation and improvement – critical systems thinking encourages human improvement/individuals to realise potential;
- pluralism – use of different methodologies, methods, models and techniques in combination (which has become hotly discussed in applied disciplines).

(Jackson, 2000)

He continues by providing a list of "constitutive rules for guiding and identifying critical systems practice" that he states as the following:

1. A critical systems meta-methodology is a structured way of thinking which understands and respects the uniqueness of the functionalist, interpretative, emancipatory and postmodern theoretical rationales, and draws upon them to improve real world problem situations.



2. A critical systems meta-methodology makes use of a variety of creativity enhancing methods and techniques to examine the problem situation while ensuring minimally, that it is viewed from the functionalist, interpretative, emancipatory and postmodern perspectives.
3. A critical systems meta-methodology uses generic systems methodologies, which can be clearly related back to the four theoretical rationales, as is the basis for its intervention strategy – often employing the tactic of naming one methodological approach as dominant and others as dependent, with the possibility of this relationship changing during the course of the intervention.
4. The claim to be using a generic systems methodology, according to the particular theoretical rationale it is designed to serve, must be justified according to the principles and guidelines established for the use of each generic systems methodology.
5. The generic systems methodologies called for use in critical systems practice will themselves frequently employ methods, models, tools and techniques which also draw upon systems ideas.
6. The choice of generic systems methodologies and of systems methods, models, tools and techniques will, in part, rest upon an appreciation of their different strengths and weaknesses as discovered during action research.
7. In order to ensure responsiveness to the complexity and heterogeneity of the problem situation addressed, attention must be paid to ensuring a pluralism of 'clients', theoretical and methodological pluralism, pluralism in the modes of representation employed, and pluralism in the facilitation process.
8. Since a critical systems meta-methodology, and the generic systems methodologies it employs, can be used in different ways in different situations, and interpreted differently by different users, each use should exhibit conscious thought about how to adapt to the particular circumstances.
9. Each use of a critical systems meta-methodology, and the generic systems methodologies it employs, should yield research findings as well as improving the real-world problem situation. These research findings may relate to the relationship between different theoretical rationales, to the theoretical rationales underlying any generic systems methodology used, to the generic systems methodologies themselves and how to use them, to the methods, models, tools and techniques employed, to the real-world problem situation investigated or to all of these.

(Jackson, 2000)

## 4.7 Conclusion

This chapter has endeavoured to highlight the major trends within systems thinking over the last 60 years or so, while at the same time giving an indication of the rigour that needs to accompany the application of the approach and methodologies that are mentioned. The debate relating to the rigour of the application of these methodologies and approaches, however, rages on, and Capra (1996) responding to this criticism, points to the fundamental differences which exist between the two world-views of reductionism and holism:

In the Cartesian paradigm scientific descriptions are believed to be objective - that is, independent of the human observer and the process of knowing. The new paradigm implies that epistemology - understanding of the process of knowing - has to be included explicitly in the description of natural phenomena.

Having considered the two approaches of project management and systems thinking, the challenge for this study, therefore, is to identify a way to introduce the generally reductionist paradigm of project management to the generally divergent approach of systems thinking in a way which will enhance project management practice. Before drawing some conclusions and making some general observations regarding a 'new model' for project management, the next chapter will consider the results of interviews conducted with three project managers, so as to consider current project management in practice.

## 5. THE PRACTICE OF PROJECT MANAGEMENT

### 5.1 Introduction

Project management practice can only be that, i.e. 'practice', if it is translated from the *PMBOK* into action in the management and successful completion of a project. During the course of completing this study, the practical application of project management has been attempted, as a way of measuring the efficacy of the approach. Clearly, however, this study cannot be considered as a complex project, in the way that major construction, sophisticated pharmaceutical development, or complicated information technology projects can be considered 'complex'.

While this study has been approached as a 'project' that has been 'managed', there have, for example, been no complicating factors (excepting for the missing of certain deadlines) and certainly no significant financial risks that have been encountered. The progress of the plan is generally straight forward and manageable. These risks, however, (of time and cost for example) would form part of the normal project management endeavour as a matter of course.

In order to have a glimpse of what project management is in practice, therefore, it is thought useful to interview three project management professionals who regularly manage projects. The objective here is to provide a glimpse of project management in its practical application, particularly with an eye on ascertaining how project management practice is approached and responds to complexity. To affect this, three organisations involved in project management practice were selected, namely:

- Andrew & Boule (Pty) Ltd, Development and Project Managers;
- Bennett Hood Fendt & Kelly, Property Development Consultancy; and
- BCP Engineers, Consulting Engineers.

In each of these organisations, a senior partner has been interviewed using a questionnaire with questions based on Ulrich's 'ought' and 'is'

categories, which set the boundaries for the information that I was seeking to reveal<sup>9</sup>.

## **5.2 Andrew & Boulle (Pty) Ltd**

### **5.2.1 Introduction**

Andrew & Boulle, Development and Project Managers, was established in 1986 to serve the development and project management needs of the southern African property and construction industries. As such, it has been in the development management and project management enterprise for 25 years. My discussion was with Rod Andrew, senior partner and founding member of Andrew & Boulle. It was mentioned in the interview that Andrew & Boulle has seen project management grow as an endeavour to the extent that it is now a respected component of construction management. Andrew acknowledges, however, that project management is still an evolving practice that is not particularly well understood, even in the construction industry.

Andrew is originally self-taught in project management, but has subsequently completed a project management course through the University of South Africa on the principles of project management. He also acknowledges the value of referring to the *PMBOK* as a primary text. Andrew & Boulle has been instrumental in the project management of the International Convention Centre (ICC) in Durban, a hugely successful endeavour. Of interest for this study is that Andrew stressed that the process leading up to the building of the ICC took over one hundred consultative meetings, mostly initiated by Andrew & Boulle. This reinforces the importance of prior planning and stakeholder consultation as absolutely essential to the project management process. The ICC cost R270m to build and has generated R2,5 billion in revenue, besides the knock-on effect for local commerce and tourism. The interview focussed on the general experience that Andrew & Boulle had in the area of project management.

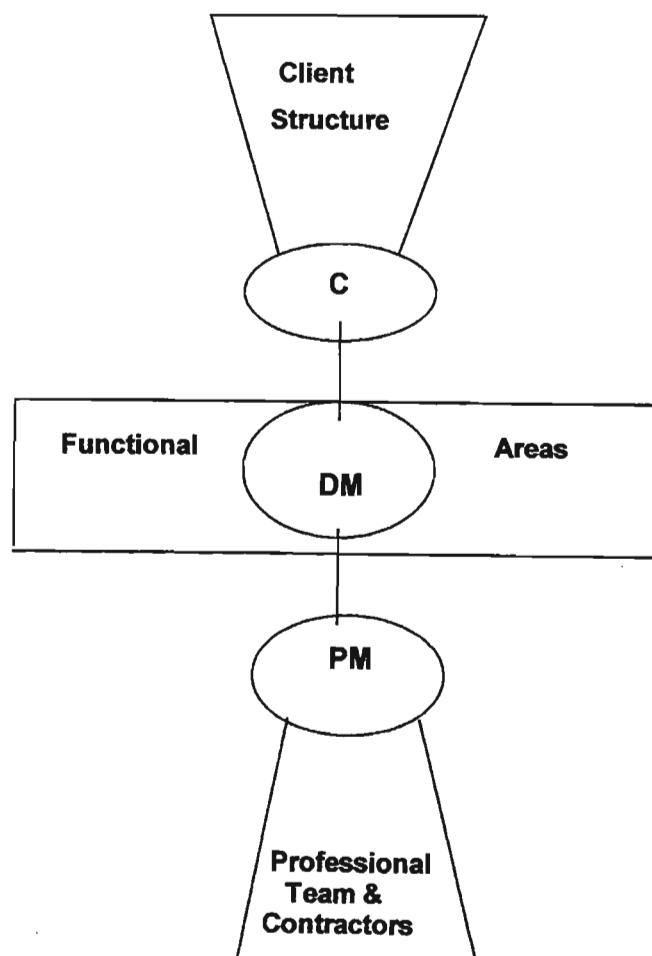
### **5.2.2 Development Management vs. Project Management**

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<sup>9</sup> The answers to the questionnaire were not written up as statements, but have rather been recorded in narrative format.

At the outset, Andrew described the two facets that characterise the business in which Andrew & Boule is involved: development management and project management. He suggested that development management is critical to any complex project, and the development manager is the equivalent of the major project manager for any complex project. The development manager is responsible for all of the functional areas, or phrased differently, all of the sub-projects within the project itself. In other words, the need for a development manager is predicated on complex projects being sub-divided into various sub-projects that are controlled and managed by the development manager. The role of the project manager, therefore, is generally to look after the discrete projects within the main project that are sub-divided (as is described in the previous paragraph.)

This can perhaps best be represented in diagrammatical form as:



**Fig. 5.1: Relationship between the development manager (DM), the project manager (PM), and the client (C)**

According to Andrew, a project needs a development manager when its budget is in excess of R200m; between R50m and R200m, it is possible for the project to be managed by a single project manager; and for a project of under R50m, the architect to the project is able to act as the project manager.

It was mentioned by Andrew, however, that project management by architects was often not the ideal option, especially since architects were generally 'artists' who had the aesthetic qualities of the building in mind, rather than the business of the building, and the business that the building was designed to generate<sup>10</sup>. In general, it was mentioned that architects seldom saw the 'big picture' e.g. how the construction would impact upon the greater environment, or how access to the building would impact upon the surroundings, or the business itself. Clearly, this omission would be of serious consideration if one were to take a systems thinking view of the endeavour, since it would be of fundamental interest to keep the impact beyond the immediate system in mind.

### **5.2.3 Ingredients of Successful Project Management**

As a rough guide, Andrew suggested that the essential ingredients for successful project management were the following:

- Clear definition of the project objective;
- Clear and universally understood organisational and control structures within the ambit of the project;
- Simple operational diagrams and charts;
- Healthy relationships with and between all contractors;
- Careful consideration given to risks associated with time, cost, quality and social impact;
- Effective communication, and control within the project; and

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<sup>10</sup> A similar point was mentioned by Greg Fendt during the course of the interview recorded in section 5.3.

- Strict professional attitude towards project management practice, which translates as the project manager leading by example and not coercion.

It is obvious that these bullet-points are all aspects that have to do as much with planning, as they have to do with the process in the *PMBOK*. To ignore these aspects therefore is to court disaster.

The analogy that was used by Andrew to describe project management was that of analysing an elephant. By this he meant that project management required the careful consideration of each component, while at the same time understanding the larger nature of the task at hand, in other words, a systems thinking approach. In a sense, Andrew seemed to confirm his awareness of a systems thinking approach when he remarked that project management was like bringing order to entropy, and project management should be viewed (in his particular case) as the orderly, organised and disciplined management of a construction project.

What became clear during the course of the interview, however, was that the project management process did not only refer to the management of the technical aspects of the endeavour, but also included (especially in the South African environment) the wider social environment. This would include aspects like regular and detailed meetings with various stakeholders, like consultant teams, local community leaders, environmental assessment experts, and so on.

#### **5.2.4 Organisational Structure**

Andrew was particular in emphasising the importance of organisational structure to project success. He proposed that organisational structure in project management should be configured specifically to:

- Define the client and other decision-making bodies;
- Identify clear lines of communication between contributing parties;
- Co-ordinate and control all functional areas;

- Integrate the project process across the functional areas; and
- Apply efficient use of resources and information flow through the defined lines of communication.

Andrew went on to stress that successful project management can only be as good as those individuals and teams assigned within each functional area. Through the careful building, therefore, of appropriate organisational structures, characterised by clear delineation of authority and responsibilities, a development environment conducive to effective, controlled and directed delivery would be generated.

### **5.2.5 Project Management and Soft Systems**

In closing, Andrew acknowledged that for certain aspects of the project management endeavour, a soft systems approach was essential. Gentle encouragement of trust and respect between the various stakeholders was paramount in getting the various components to gel, and teams to work together. He was of the opinion that the higher the demand on skills and time for any particular project, the warmer the relationship between stakeholders in a project needed to be.

This would suggest that while the technical aspects of any project can be generally finalised as per the project specifications, it is the relationships within the project team (and within the wider environment) that ensure that risks associated with aspects like quality, cost, and time are minimised. It is clear therefore from Andrew's testimony that adaptability and flexibility in any project plan have to be accommodated, and that one cannot be totally technician about project management practice.

## **5.3 Bennett, Hood, Fendt & Kelly**

### **5.3.1 Introduction**

Bennett, Hood, Fendt & Kelly is a property development consultancy offering a range of professional services to clients in the construction and property



development industries. They have developed a client-orientated approach to professional services with the objective of merging the client's needs and wants with their skills in management, administration, negotiation, construction economics, quantification and documentation, analysis and appraisal. It is mentioned in their publicity material that the success of all projects is the result of a team effort and that the participation if BHFK, whether as a project leader or otherwise, is very much that of a team player. Greg Fendt, one of the partners in the consultancy, availed of himself to discuss his experience of project management.

### **5.3.2 Project Milestones**

In seeking to explain the nature of project management in its simplest form, Fendt described the milestones that would characterise a project for BHFK. As a generic procedure, he suggested the following is typical:

- Initial general meeting with client(s) regarding the client's fundamental requirements. This meeting may also include architects, surveyors and other professionals, depending of the scope of the project;
- The project brief is formulated, describing the aims and objectives of the project;
- The brief is then provided to an architect, and with the client in attendance, the brief is finalised;
- Architect's drawings are then drafted and submitted to the local authority where a set process is followed in parallel with the other bullet points mentioned below;<sup>11</sup>
- A pre-tender document is made public, and typically five contractors are short-listed. From these, a main contractor is appointed for the project;<sup>12</sup>

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<sup>11</sup> The plans would normally be scrutinised by the following departments in the local authority: Town Planning; Civil Engineering; Waste Water Management; Fire; and Health.

<sup>12</sup> Selection of the main contractor is based on elements like the organisation's financial position, the organisation's resource base, the number of projects successfully completed, and the testimony of other professionals.

- The project team is then assembled, including other professionals;
- Budgeting is recorded to the end of the project period;
- A procurement process is drafted and initiated;
- If the plans and project have been accepted by the local authority, then it is started and subsequently managed until the end of the project period;
- Once the project has been completed, it ends with the handover of the project to the client, i.e. the commissioning<sup>13</sup>; and
- This is followed by a post-mortem, and termination of the project period.

Again it is clear that equal importance is placed on the planning process as in placed on the implementation process.

### **5.3.3 Complexity and Risk Management**

On the topic of 'risks', Fendt remarked that any risks that may be anticipated or assumed need to be taken seriously, and one way of dealing with them is by embarking on contingency planning. If, during the initial project meetings, the anticipated risks are perceived to be too great, then it is not unusual for the project plan to be scrapped and entirely rewritten.

It is recommended by Fendt, therefore, that all risks (insofar as this is practical) be eliminated at the outset by careful contingency planning, and risk analysis. He cautioned that at mid-project even minor changes can be costly in terms of time and, therefore, budget. In essence, thus, it was emphasised that careful planning before-hand can assist in eliminating complexity, but once the project is up and running, complexity can cause serious disruption and even destruction, and is extremely difficult to manage, and eliminate. This is an important consideration for the outcomes of this study.

According to Fendt, risk is monitored constantly by parallel processes that are critical to project success, including critical path

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<sup>13</sup> At 'Commissioning' all electrical plugs, appliances, equipment, and so on, must be fully functional. Training in the use of certain sophisticated machinery may also be provided at 'Commissioning'.

analysis, risk analysis, stakeholder analysis, cost analysis, procurement management, and people management (of the professional team, the contractors, and the client him/herself).

According to Fendt, some of the risks commonly associated with project management include:

- Financial risk

This would include exchange rate fluctuations which can cause unpredictable rises in costs, especially with regard to the procurement of electric components, major plants, and so on, which are generally obtained from abroad in a currency other than the South African Rand. Financial risks are also courted if this equipment is purchased at the outset as a contingency, since the project plan can be radically revised, or the project can even be aborted.

- Risks relating to Personalities

It is critical to manage the individuals involved in a project, from the contractor through to the professionals, to the client him/herself, as personal conflicts relating to the project can delay or even scupper it.

- Supply risks

The supply of special materials like iron-mongery, furniture and fittings, ornate timber, and so on, has to be arranged way in advance, and a contingency of parallel procurement may have to be put in place as a safeguard against fluctuations in the exchange rate, or supplier unreliability, for example.

Fendt remarked that any deviation from the project plan, e.g. unduly retarded or advanced progress, needs to be carefully analysed in addition. Even early completion, for instance, of some aspect of the project, has a knock-on effect on other aspects of the project, and may result in delays in procurement. It is essential, likewise, to monitor carefully the expenditure on a monthly basis, so as to establish whether one is on- or off-target. In addition, quality control has to be monitored from the earliest moment of

project implementation, and all instructions to contractors and other project team members, need to be clear, unambiguous and in writing. Effective communication, therefore, is absolutely critical for project success.

According to Fendt, project management is a hands-on endeavour which requires constant monitoring and involvement on site. All borderline failures during the course of the project process need to be assessed very closely. The best skills for project management success in Fendt's estimation, however, include technical expertise, intuition, and project management experience. The combination of these three components makes it possible for the project to be 'massaged' to completion. At the completion of the project, a debriefing is always conducted with the professional team; BHFK then produce and deliver a 'project manual' to the client. In it one will find the contact details of all of those who have been involved in the project, just in case aspects of the project require tweaking.

## **5.4 BCP Engineers**

### **5.4.1 Introduction**

This particular interview concentrated more on the completion of a particular project, and delved deeper into the nature of the project team, and the various roles that each played in the construction of the Moreland Millennium Bridge which is situated on the Umhlanga Ridge. According to Brian Downie, senior partner in BCP Engineers, the Bridge is an example of what can be achieved when a project team is given the mandate to be innovative and challenged to integrate creative design and technology.

In describing the outcome of the project, Downie remarked that the Bridge is the end product of an "evolutionary design process" commissioned by Moreland Developments. Moreland's brief was to create an icon to act as a focal point for their twin developments of Umhlanga Ridge New Town Centre, and the La Lucia Ridge Office Estate, both of which are to the north of Durban.

The project required input and sustained dialogue from all the parties involved over a fairly lengthy period of time and comprised innovative planning

and design for a structure, which, according to Downie, is unique in South Africa. It was evident that the relationship between those involved in the projects, namely, Moreland Developments, GAPP Architects, BCP Engineers and Bosch Projects, was a dynamic one with each committed to enhancing the urban landscape.

#### **5.4.2 Background to the Project**

In 1987 Moreland Developments began the process which would lead to the vision of a new town centre for Umhlanga with the application for a 37 000 sq m regional shopping centre in Umhlanga Rocks, now known as Gateway.

BCP Engineers were part of the planning team from the outset and assisted in the planning process, the preliminary traffic studies and the technical and financial appraisals of the civil engineering infrastructure, which would be necessary to sustain the development.

During the course of the development of the new city centre, GAPP Architects and BCP Engineers were commissioned by Moreland to design a unique bridge that would link the twin developments of Umhlanga Ridge in the north to the La Lucia Ridge Office Estate in the south. The challenge for the team was to extend the use of standard construction materials and methods in a way that would create a memorable entry to Moreland Developments' holdings in what was to become a premier address.

Downie mentions that the planning process between Moreland, GAPP and BCP began with consideration of all the forms that the structure could take, including cable-stayed structures and various forms of arches. In the end, serious consideration was given to the cable-stayed option and several unusual proposals were considered.

It was obvious from Downie's testimony that the project was a complex endeavour, and that it was only after much dialogue and consultation that the decision was made to proceed with a full study of the final design, where the soffit of the concrete deck is curved in cross-section and a structural steel arch is used to create a combination of urban sculpture and a practical support for an unusual lighting system. In addition, the use of a solid concrete

base structure with an elegant steel superstructure provided an opportunity for the two materials to complement one other.

The important lesson of all of this for this study is that the planning period leading up to the start of the actual construction was lengthy, and was characterised by considerable dialogue and consultation. This once again highlights the importance of the planning prior to the actual management of the project once the building aspects take place.

### **5.4.3 Dealing with Complexity**

In seeking to describe the process that was followed during the course of the planning for the project, Downie mentioned some of the complexities that were encountered, and how these were resolved. The construction design proposal, for example, required a 21-meter wide and 68-metre long concrete deck to be expressed with a soffit curved to a constant 30-metre radius in cross section thinning to a fine edge. To resolve the design requirement, this “inverted aerofoil” was given apparent length by extending the sidewalks beyond the abutments as cantilevers, following the same profile as the bridge deck.

A second challenge was that on analysis, the deck proved to be difficult to model and a combination of three different engineering approaches were adopted. The final pre-stressing and reinforcement details were determined taking a fail-safe approach to the results of the analysis. The curved soffit resulted in the outer ribs having significantly more pre-stressing than the inner ribs and this, combined with a skew of 25 degrees, complicated both the design process and the detailing.

In addition, the continuous deck required careful consideration since the structure was to be founded in Berea Red Sands that is not particularly stable. Adjacent bridges had taken account of the variable nature of this foundation and were simply supported. Grout injected augur piles were specified, but when comprehensive design information was supplied to the tenderers, an alternative was submitted and accepted.

It was clear, therefore, that the Moreland Millennium Bridge was a complex engineering endeavour, and that this created pressures during the



initial planning. Downie, however, mentioned that the co-operative teamwork among the members of the project team ensured that there were no undue delays or unexpected costs.

#### **5.4.4 Structural Steel Design and Construction**

The structural steel design and construction also proved to be challenging aspects of the project, and they were managed jointly by BCP Engineers and Impact Engineering. According to Downie, the outer dimensions and proportions of the structural steel masts and pipe arches were determined largely by aesthetic considerations, but wind pressure effects made to a contribution to the decision to use these elements for the structure. In point of fact, says Downie, these elements were designed for equivalent static wind forces arising from maximum estimated wind speeds in a 50-year return period, taking exposure conditions and other appropriate factors into account.<sup>14</sup> This, therefore, included aspects of scenario planning and “wind-tunnelling” so as to anticipate some of the possible long-term behaviour of the bridge within its geographical context.

#### **5.4.5 Lighting Design and Erection**

A further complicated aspect of the project was the lighting design and erection. This was planned for and managed by Bosch Projects and Zim Power.

Although the concept of up-lighting is not new, Downie mentioned that his research found no other installation anywhere in the world where up-lighting onto a ribbon of reflector panels had been utilised in a bridge application. What was unique was that the reflector panels became an integral part of the steel arch with each reflector panel being calculated separately and secured in a fixed position between two steel tubes.

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<sup>14</sup> According to Downie, the dynamic response of the masts together with the pipe arches has subsequently been checked to ensure that the completed structure would not be subjected to unacceptable wind induced oscillations. By limiting the deflections at the tops of the masts (120mm max for tallest masts) their fundamental natural frequencies have been found to exceed 0,5 cycles per second by an acceptable margin, thereby eliminating the possibility of resonance.

As an example of the complex nature of the lighting aspects of the project, Downie remarked that consideration was paid even to the effect of light pollution when selecting the up-lighters, and a luminaire was used that provided a beam spread of  $28^\circ$  by  $95^\circ$ . To further assist in controlling the light output, provision was made to incorporate shutters above the light fittings that would further crop upward light. The effect was that light would shine up onto the reflector with sufficient illumination to pick up the steelwork of the arch only and be reflected down to the roadway below. There would therefore be no interference on motorists' visibility.

## 5.5 Conclusion

In all of these interviews it is apparent that the complexity of the project, whether relating to engineering, personalities, or design, the importance of planning is critical: all of these issues could have been resolved through a soft systems approach, i.e. recourse to team work, co-operation, healthy relationships between the various parties involved in the project, and the desire to be successful in the endeavour which had been embarked upon. It was not clear to me whether any specific systems thinking methodologies had been utilised, but clearly there is something akin these techniques being used. The important lesson for this study therefore is that a more structured approach to using the techniques and tools of systems thinking may assist the process of completing a project from start to finish. This is owing to the fact that the deliberations that are held at the beginning of the project could use various methods like SSM to involve all stakeholders in the planning, and that any crises during the project could be addressed utilising particular systems thinking tools as well.

Moreover, in the managing of complexity, there is reason to believe that techniques were used by the three project managers interviewed here that were largely the result of intuition and experience, as well as training. It would be useful therefore to incorporate some of the methods of dealing with complexity that are the domain of systems thinking. Cybernetic principles, for example, could form a useful template against which to measure the



possibility of project success or disaster, almost as a filter to anticipate the possible difficulties that may be encountered.

What was less clear was whether a great deal had been done to review and understand the larger systemic ramifications of the projects that were completed by the three project management organisations mentioned in this section. The fact that this aspect of the projects was not foregrounded would seem to suggest that this was indeed the case, and that the only environmental aspects taken into consideration were those that were mentioned during the course of the environmental impact study.

## **6 OBSERVATIONS AND STUDY CONCLUSIONS**

### **6.1 Introduction**

This study has adopted a quirky conceit: it has attempted to utilise project management techniques and tools as part of the completion of this study (i.e. has treated this study as a project to be managed like any other) while at the same time critically reviewing the basic techniques and tools that make up the project management endeavour. In addition, while investigating the efficacy of traditional project management practices in this way, it has also attempted to provide an argument for the incorporation of systems thinking methodologies alongside the project management approach, in the belief that systems thinking can improve the project management endeavour.

My basic premise, therefore, was that because project management is a 'hard' approach to problem solving, it can be improved by the inclusion of 'soft' techniques that constitute much of what is termed the systems thinking approach. It is assumed, moreover, (and hopefully accepted by the reader) that although projects are temporary endeavours, they cannot completely divorce themselves from the contexts in which they find themselves, whether they be organisational, cultural, and/or temporal, and thus can be considered to be a temporary interference in a functioning system, with the attendant challenges that this brings. Given that this is the case, the problem statement that this study sought to investigate was: is it possible to improve project management practice by incorporating systems thinking tools and techniques? At the end of this study one is bound to ask what observations and conclusions can one extract from this investigation?

### **6.2 Planning vs Implementation**

As has been mentioned, the design of this study is predicated on a parallel process which tests the hypothesis of whether project management can be improved by the incorporation of systems thinking, while at the same time developing a model which combines these two approaches. This general idea is referred to in the first chapter, while chapter two attempts to develop a

research model that demonstrates that this hybrid is in fact possible in theory: the rest of the study has attempted to follow the plan that is developed in this second chapter so as to prove the efficacy of this model. Whether or not this model is successful is discussed in a short while hereunder. Suffice to say, however, that it has not been particularly successful in completing the project in the planned time.

In order to provide a comparative example of this project management/systems thinking hybrid in use I have appended here (Annexure 2) a paper that incorporates a similar approach to project management, based on an investigation into the sugar industry in KwaZulu-Natal.<sup>15</sup> It is important to note that this paper deals only with the *planning* aspects of the project, and not the implementation phase. My overriding sense is that while planning is a vitally important component of any project, it is not sufficient in itself, as a test of efficacy, and neither is it the planning phase that creates the challenge; it is rather the implementation phase itself. Hence, while the paper in Annexure 2 is strong on the planning, it proves nothing about whether the implementation is going to be successful. It is for this reason, therefore, that I have sought to test the implementation phase by treating this study both as a 'project' being implemented, and by interviewing the three individuals who have actually managed a number of projects.

### 6.3 The *PMBOK* and its Critics

It would have been noted by the reader that the aspects of this study relating to the description of the project management approach have taken an orthodox route in that I have summarised the key aspects of project management practice as revealed in the *PMBOK*, and then gone on to mention various criticisms that have been levelled at project management. The main criticisms relate, predictably, to project management's linear processes that allow very little latitude for change of plan (given the restraints of time, and cost, ranged against issues to do with quality and risk) and its

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<sup>15</sup> This paper was the result of a joint assignment researched and completed in 1999 by Lungile Fakazi, Kaspar Grossenbacher, Joy Mills-Hackmann, Ralph Tyrrel, Bruno van Dyk, and Anita van Soelen.

inability to deal with the unexpected demands of increasingly unpredictable environments.

What is undeniable indeed, however, is that a project is a temporary interference in a functioning system, and that the management of any project, therefore, creates a trade-off between a number of components or processes that are present in that functioning system. These would typically be the knowledge that one has of organisational theory (including in this instance both the knowledge that is found in the *PMBOK*, and systems thinking tools and techniques); knowledge of the domain in which the project is located (in this instance a study of itself); and informational knowledge of the project itself (i.e. what are the objectives of the project, which in this instance are to make a case for the inclusion of systems thinking techniques in the project management endeavour).

#### **6.4 Systems Thinking**

The systems thinking suite of tools and techniques like the various SSM interventions, its underlying cybernetic principles, its scenario thinking scanning of the future environment, its stakeholder analysis, and so on, is, I believe implicitly, of valuable use in the enhancement of project management practice. It is of some interest, however, that all of these systems thinking techniques and tools are exercised prior to the start of the actual project roll-out. Most of them are, in fact, located in the planning phase of a project's life-cycle. This is well and good since careful planning is an essential component of the project life-cycle. Again, however, it cannot act as a measure of implementation. Nevertheless, it is my contention that the slavish dedication to project management as espoused in the *PMBOK* is not a sensible way to deal with projects in an increasingly complex world, characterised by shifting environments.

This is not to say, of course, that systems thinking itself as an approach is a panacea for all things. Senge (1990) makes it clear that systems thinking too can be improved:

Systems thinking also needs the disciplines of building shared vision, mental models, team learning, and personal mastery to realise its potential. Building shared vision fosters a commitment to the long term. Mental models focus on the openness needed to unearth shortcomings in our present ways of seeing the world. Team learning develops the skills of groups of people to look for the larger picture that lies beyond individual perspectives. And personal mastery fosters motivation to continually learn how our actions affect the world.

In essence, however, it can be argued that all of Senge's suggestions are now part of the systems thinking corpus (Senge was writing in 1990) and it would be unlikely that any serious systems thinking endeavour would omit one of these aspects in any complex intervention.

If one considers the process that has been adopted in the completion of this study, then it is apparent the even both careful adherence to the precepts of project management (as found in the *PMBOK*) and the incorporation of soft systems thinking techniques, are insufficient to ensure the systematic and successful implementation of the project plan. This study also falls prey to the vicissitudes of inappropriate and perhaps even insufficient planning on my part and other unforeseen complications that resulted, for example, in massive overrun. It is perhaps a moot point, of course, that any project is a complicated enterprise that brings with it difficulties of balancing time, quality, cost and risk, and that endemic in any project is the inevitability of delays and a variety of other complicating factors. My initial sense, therefore, was that what makes the management of projects so difficult is not what occurs once the project has been initiated (because this should essentially be a sequential procedure) but what actually occurs before the project roll-out begins, i.e. during the planning stages, but that the failure is only measurable during the implementation phase.

## **6.5 Project Management in Practice**

Much of these observations are borne out by the testimonies of the three project managers interviewed in Chapter 5. There was deliberate reference by these project managers in their responses to the incorporation of a number of systems thinking considerations, which would appear to have been

incorporated as a matter of experience, or common sense, rather than by training or adherence to the *PMBOK* alone. These include the importance of understanding the effects of the various systems that impinge upon the project; the value of scenario planning so as to “wind tunnel” the possible outcomes; the essential place of dialogue with stakeholders and their respected involvement in the process; the significance of identifying emergent properties, especially those that are potentially disruptive, and so on. These interviews impressed upon me once again the vital importance of careful planning, which seemed to confirm my own initial sense that it was within the planning phase that my own project had its failure to be completed on time.

I am now of the opinion, however, that there was not much wrong with the planning of my study, but that it was during the implementation phase that problems occurred, particularly owing to the fact that little was done to address the underlying symptoms of my inability to complete the project. This has become clearer towards the end of this investigation.

## 6.6 A New Model?

There is no denying the value that systems thinking adds to the initial phases of the project life-cycle. While one cannot plan for every contingency or eventuality, for example, one can at least limit exposure and vulnerability by anticipating the kinds of disruptions that can emerge in the environment, be they structural, organisational, cultural, or what have you. Moreover, there is no denying the value of anticipating what drivers are present in the context that may interfere with the objective of attaining project outcomes. It is equally important, likewise, to set the boundaries within which the project is to be located, while at the same time acknowledging the part that is played by the various systems that go up to make the system-in-focus, the sub- and supra-systems.

These are all, of course, conventional systems thinking considerations, and all contribute to project success. I have utilised them to the best of my ability during the course of the planning of this ‘project’ and yet it would appear that while these are necessary, they are insufficient to ensure project success. Put in another way, even though I have put in place careful planning

and have followed the stages in the project management life-cycle during the implementation, there are complicating factors that are inherent during this implementation that have bedevilled the project roll-out. What is it then that is missing? I believe that Senge (1990) clarifies this phenomenon for me:

The systems perspective tells us that we must look beyond individual mistakes or bad luck to understand important problems. We must look beyond personalities and events. We must look into the underlying structures which shape individual actions and create the conditions where types of events become likely.

The value of this observation is that it articulates a possible continuum in the systems thinking approach that can be implemented in the planning phase and the actual project implementation phase. What Senge is identifying is that it is at a structural level that patterns of behaviour are formed, and it is at that level that they need to be challenged if one hopes to implement projects with any degree of success. Senge (1990) goes on to suggest that:

The reason that structural explanations are important is that only they address the underlying causes of behaviour at a level that patterns of behaviour *can be changed*. Structure produces behaviour, and changing underlying structures can produce different patterns of behaviour. (*original italics*)

Was this the reason for the inability of this study to be completed on time, and thus to result in the failure of my hypothesised project management/systems thinking hybrid? Quite possibly, since I omitted to analyse the reasons for my failure to any great degree along the way, and certainly did not look at the underlying structural foundations of the problems in any great detail.

In hindsight, what may these structural problems have been? One can of course point to the contending demands on one's time that comes as a result of pursuing part-time study in the midst of a busy professional, civil, and family life; to the relatively muted sense of commitment to complete the project in a stipulated time frame; to the lack of threat owing from limited risk (there were no large costs involved in the overrun, for example); one might

even point to the distressing revelation that my hypothesis was being disproved as the project developed, coupled with the desire to complete it.

## **6.7 Conclusion**

What final conclusion can one draw from my failure to complete this project in the stipulated time, and thus, by extension, the failure of my hypothesis? I would have to say that the most basic lesson is that there are a whole gamut of systems thinking tools and techniques that one must incorporate when one wishes to undertake a project, and that these must be utilised *throughout* the project life-cycle, and not just during the planning phase, or in the debriefing session, but during the implementation phase itself, otherwise one courts disappointment, and/or failure.



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**ANNEXURE 1****QUESTIONNAIRE: PROJECT MANAGEMENT PRACTICE**

1. What formed the strategic imperative that gave life to the project?
2. Who was involved in drawing up the project management plan?
3. What was the level of stakeholder participation in the lead up to the development of the project management plan?
4. What threats (risks) were there to the success of the project?
5. What contingency did you make for possible threats to the success of the project?
6. Describe the basic methodology that you have followed in the course of the management of this project.
7. What were the critical success markers as the project developed?
8. How did you deal with deviations from the project plan?
9. Did the project progress within the parameters of the cost and time that had been budgeted for its completion?
10. What was the extent of the overrun?
11. With hindsight, should other stakeholders have been involved?
12. What were the indicators of project success?
13. What would you do differently if you had to do it again?
14. Is project management (as a methodology) able to deal with uncertainty?

**ANNEXURE 2****A Project to Capacitate Small- and Medium-scale Sugar Cane Growers in  
the uThungulu Region of KwaZulu-Natal**

(A Systems Thinking Approach to Project Management)

A paper submitted for the “Project Management” module of the Masters in Organisational Management and Systems course, Leadership Centre, University of Natal, September 1999, by Lungile Fakazi, Kaspar Grossenbacher, Joy Mills-Hackmann, Ralph Tyrrel, Bruno van Dyk, and Anita van Soelen

## **A Project to Capacitate Small- and Medium-scale Sugar Cane Growers in the uThungulu Region of KwaZulu-Natal**

(A Systems Thinking Approach to Project Management)

### **1. INTRODUCTION**

Vukazenzele Rural Interventions has identified an urgent need to capacitate small- and medium-scale sugar cane growers in the uThungulu region of KwaZulu-Natal. The rural assistance component of Vukazenzele has been involved in the uThungulu region for the past eight years, and has a keen understanding of the region and the community.

During the course of this period of time, it has become apparent that the short- and medium-term need of the community is to improve sugar cane farming for the small-scale growers, in the context of economies of scale that lean towards co-operative and medium-scale growing, while at the same time introducing agricultural diversity as a hedge against the possible decline in the sugar industry.

A range of challenges faces the industry right now, and industry that generates R4 billion, of which small-scale growers earn R500m. Paramount is the devising of strategies to deal with the challenges, are ways of responding to the threat of the abolition of the import tariff, the introduction of land reform, and the need for skills- and capacity-development among small-scale growers.

With this in mind, this proposal makes a case for funding to be provided to enable Vukazenzele to undertake three interventions under the auspices of the rural assistance programme:

- Strengthening the sugar yield of small- and medium-scale growers;
- Introducing agricultural diversity; and
- Capacity building, including conflict resolution.

The potential recipients are numerous, since the target population computes as the 6000 small- and medium-scale growers in the region, of which there are approximately 10 dependants per family, which equals

roughly 60 000 people. It is our intention to reach these resource-poor individuals and to provide them with the wherewithal to improve their livelihoods.

## **2. CONTEXT**

### **2.1 The Sugar Industry in uThungulu and its Stakeholders**

It is considered essential for an understanding of the context in which we wish to operate (i.e. the system in focus) that the stakeholders be identified in the uThungulu region, and that their actual and potential impact on the project be identified. The political influence, for example, and the interests of the stakeholders are considered to be of primary relevance to the success of the project. With this in mind, it is useful to describe each stakeholder and to reflect on the strengths, weaknesses, opportunities and threats that each introduces into the context.

#### **2.1.1 Small-scale Growers (SSG)**

- Within the project's geographical area of operation, there are approximately 6000 of the total 45 000 small-scale growers registered in South Africa.
- 65% of these growers are rural black women who often support a large family and whose husband is a migrant worker.
- Job losses in the mining industry have contributed to decreased migrant labour and increased unemployment in this rural area.
- A land tenure policy has yet to be implemented in any meaningful measure. This fact impacts particularly on rural black women who have traditionally not have access to land rights. It is thus imperative for this project that land tenure issues be clarified, since this will have an influence on the strategic direction of this project.



- The lack of representation of small-scale growers on decision-making structures is an area of contention.
- There is a demand from the small-scale sector for increased focus on skills training or transfer, and other forms of capacity building.
- A challenge is to find creative options for new forms of income generation to broaden the base of income, and in so doing, to improve the sustainability of these rural households.

#### 2.1.2 Medium-Scale Growers (MSG)

- 10 out of the 40 MSGs in KwaZulu-Natal are farming in the uThungulu area. This is a new and growing sector where the potential for business sustainability is higher. The same needs of the SSG for effective agricultural extension support and development opportunities also exist for the MSG. Naturally, they identify more with the small rather than the large growers.

#### 2.1.3 Large-Scale Growers (LSG)

- The need to be globally competitive continues to bring pressure to bear on this sector. There is an average debt of approximately R1 million per farmer, and to service these loans, farmers have to reconsider farming practices quite fundamentally.
- These larger farmers are relatively independent and self-sufficient (bar the loans). They do not depend on the support of aid agencies or the Sugar Association as much as the SSGs and MSGs, yet they do have access to all the available services.

#### 2.1.4 Mill Cane Committee

- This committee of 15 is a structure elected from 15 farmer associations each comprising between 50-2000 SSGs each. Committee members have had extensive training, but their skills and capacity vary, and their capacity is still largely emergent.

- The MCC is not sufficiently resourced to provide services (e.g. it does not have an efficient secretariat or structure).
- The MCC is understaffed (2 unskilled staff) and the leaders of this committee are not proficient in the management of the staff.
- A further impediment is that the Committee has to often cope with members using the MCC as a political platform.

#### 2.1.5 The Amakhosi

- The Amakhosi are primarily landowners and their decisions to the rural poor are law.
- They are often politically powerful, and are often vocal in respect of development needs. Their will and determination can effect access to resources.

#### 2.1.6 South African Cane Growers Association (SACGA)

- The SACGA has a 50/50 representation on the Board of Directors of SACGA, which consists of 66 members.
- An Executive of 11 members is elected each year from the Board of Directors.
- A levy from each farmer supports the salaries of SACGA professional staff of 40 people, and their operational budget.
- SACGA is directed by an Executive Committee. There is much dissatisfaction by the staff regarding the governance of the Executive Committee. This leaves the staff feeling disempowered and devoid of initiative.
- Legitimacy is questioned owing to SACGA's failure to manage delivery of services to its members. This is partly a result of a lack of understanding by the Executive Committee of the needs of the members of SACGA.

### 2.1.7 Breakaway Black Growers Group

- The SSG have (as a result of their dissatisfaction with the status quo) for a group in opposition to SACGA. This development is gaining in momentum, as the Group has already raised international funding, and successfully lobbied local support.

### 2.1.8 Millers

- Besides the employees of the mill, the Miller also offers extension support. This is totally separate to the services provided and co-ordinated by the South African Sugar Association or the Department of Agriculture.
- The Miller is not concerned about the split between the SSGs and the LSGs. This conflict is perhaps viewed as an advantage by the Millers, as it lessens the chance for a united front of growers developing (and collective bargaining from occurring).

### 2.1.9 South African Sugar Association (SASA)

- This organisation of 1100 staff is always under pressure to demonstrate its value to the industry.
- It has professional skills and resources to offer the industry.
- There is much room for improvement regarding the services provided to the SSGs.
- It is a non-profit, and thus has to compete for resources.
- There is reason to argue for systemic intervention in its organisation and management if evolution of the association is to proceed successfully.

### 2.1.10 Department of Agriculture (DoA)

- SASA solicits extension support from the DoA. The capacity of the DoA varies from region to region, but is largely weak to ineffective.

- It is a priority that they support this present project, as it will increase rural income. This should be done in co-ordination with SASA.

#### 2.1.11 NGOs

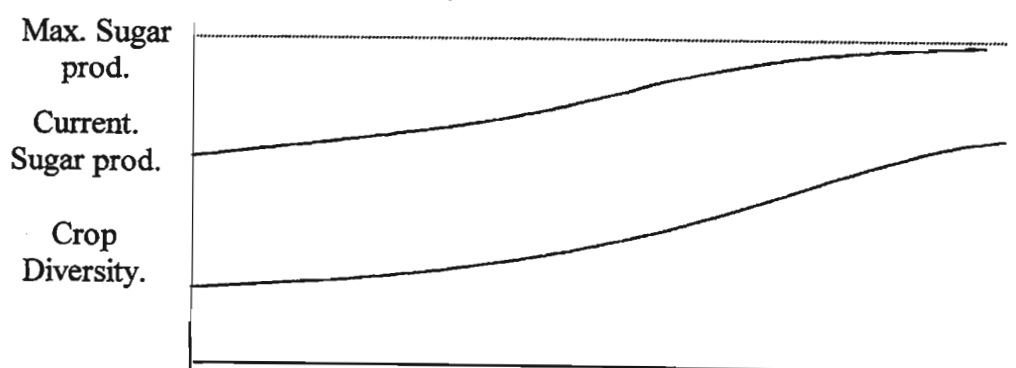
- Few NGOs are based in the uThungulu region. Survival is difficult, as not many donors are prepared to support projects in an area as remote as this. Not many co-operatives are based in this area either.
- Recent work by government in encouraging tourism has changed the focus of rural development and has resulted in a slight increase in development activities. This provides an excellent opportunity for further development.

## 2.2 Trends /Scenarios in Land use and Agricultural Production

One of the major uncertainties for the entire sugar industry is the possible decision to lift the tariffs that currently protect the sugar industry in South Africa. There are various scenarios that are connected to the possibility of the abolition of tariff protection, and these are represented in the graphs below.

These graphs are speculative and are intended to illustrate possible scenarios based on levels of productivity in sugar cane and diverse crops against changes in the sugar tariff.

### Scenario 1: Sugar Tariff Stays

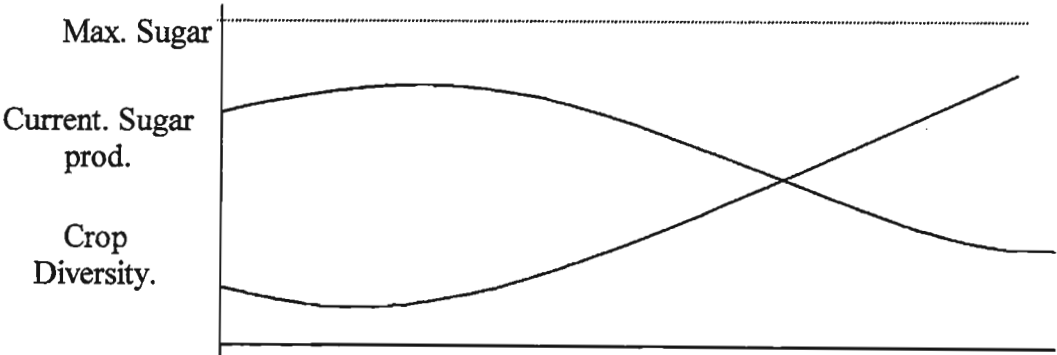


Graph 1: Tariff Stays

In this scenario, the sugar tariff remains. This infers that sugar prices remain protected and sugar therefore remains a viable crop to farm. Sugar

production in the area could show a gradual increase in production levels due to inevitable learning that would occur over time combined with the efforts of the SASA agricultural extension programmes. Farming (and production) in diverse crops could continue and could also show a gradual increase in production owing to inevitable learning and agricultural extension programmes.

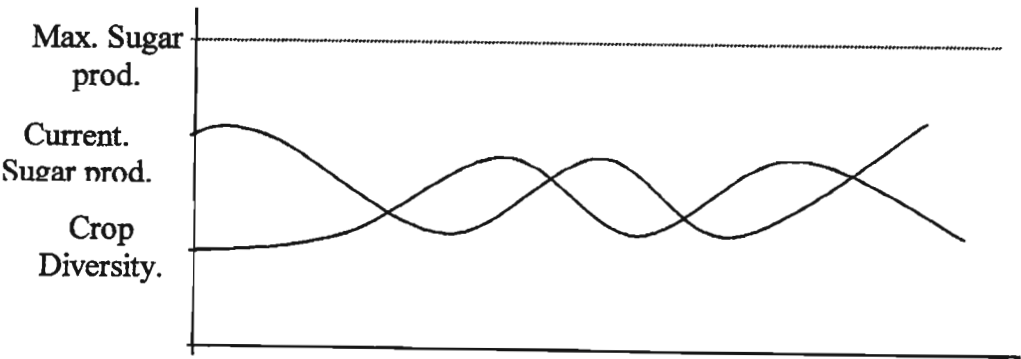
**Scenario 2: Sugar Tariff Goes**



Graph 2: Tariff Goes

In this scenario, as the sugar prices begin to drop so does production and farming in sugar. This would result in experiments in alternative farming options leading to an increase in production of discovered diverse crops.

**Scenario 3: Complementary Relationship between Sugar and Diverse Crops**



Graph 3: Relationship between Sugar and Other Crops

This scenario attempts to illustrate a possible relationship between sugar production and crop diversity in the region. As sugar production declines (for whatever reason) production in diverse crops increases. As

sugar regains its viability, and production increases, farming in diverse crops declines.

### **3. PROJECT RATIONAL AND BOUNDARIES**

It is not possible to make a case for the decision to provide project assistance to the small- and medium-scale cane growers in the uThungulu region without mentioning that Vukazenzele Rural Interventions has been involved for the past eight years in this area in rural community development of one sort or another. This has allowed us to establish an excellent working relationship with the various stakeholders involved in this sector, and to have a working knowledge of the physical conditions and socio-economic context in which we plan to establish this new project. The unhappiness of the small-scale growers with SASA and other players in the sugar industry, for instance, has been known for some time. Given that the overall purpose of the new project is to strengthen and diversify the operation of small- and medium-scale growers in the uThungulu region, it is useful that we indicate how we came to bound our intervention for this purpose.

Of initial consideration, of course, is that agricultural assistance is our distinctive competence, since we have a range of rural specialists within our employ who have worked in this area for most of the past eight years. We would not feel comfortable (and would probably be unable) other kinds of intervention. Secondly, we participated in the scenario thinking exercise that was held to consider the various futures that were possible for the sugar industry in this area (as described in the various scenarios presented in the previous section of this appendix) and selected the area of strengthening and diversifying agriculture as a particular niche in which we could be involved. Thirdly, having selected (and bounded) the intervention, we further bounded our involvement with this farming community by tracing a causal-relationship diagram for our specific intervention. The latter two aspects of the bounding process will be dealt with in more detail hereunder.

#### **3.1 Project Rationale**

It was considered useful, nevertheless, to provide an independent rationale. In arriving at this rationale, a number of different steps were followed, and they will be sketched here for ease of reference. As has been mentioned, a scenario thinking exercise relating to the sugar industry in the whole of the uThungulu region was conducted with participation by all major stakeholders. This exercise is referred to the previous section; of interest for our purposes was an indication of what the drivers were and what emerged as likely area of intervention. These area are usefully captured in the causal diagram (Addendum 1) which maps the links that exist between the various components of the state of the uThungulu sugar industry in the mid-term (5-year) future.

It is clear from this diagram that the drivers of the crisis that exists in the industry are three-fold: the gradual abolition of tariff protection; the conflict between small- and large-scale growers; and the possible implementation of land reform. Ancillary to these factors are the incremental rise of HIV/Aids infection in the region; and the retrenchments in other large industries like mining, with the concomitant problems associated with these economic factors.

Of significance for our purposes were the possible solutions that were identified in this causal diagram, namely agricultural diversification, and increase in the number of medium-scale farms, the introduction of conflict resolution practices, and the diversification of the livelihood base. Since our strengths are in agricultural assistance, it is natural that we concentrate on the initial three areas: agricultural diversification, and increase in the number of medium-scale farms, and the introduction of conflict resolution practices. Our experience told us, however, that it would be foolhardy not to attempt to strengthen the sugar industry as well (where we were able) since it is the major source of current income for the families of the 6000 small-scale farmers in the region.

#### **4. OVERALL GOALS AND OBJECTIVES**

Taking the abovementioned causal diagram into consideration, we proceeded to further limit the scope of the intervention to the point where we could

accurately identify where our intervention would be best suited. Knowing that our best efforts would be in the area of agricultural assistance and support, we drafted an additional causal diagram that is specific to our objectives for the project. This diagram is reproduced as Addendum 2 and shows that a number of significant components are present in the context of this project. For our purpose in bounding this project, however, it was instructive in that it helped to identify the two areas in which we could usefully become involved, namely, capacity building in the agricultural sector and conflict management. From this analysis we were able to bound our intervention to four specific objectives: to increase the profitability of medium-scale growers in the region from 2% to 10%; to increase sugar cane yield of small-scale growers by 40%; to increase the agricultural diversity of small-scale growers by 4 additional agricultural products; and to improve the institutional relationships between the small-scale growers, SASA, and the other stakeholders in the sugar industry to improve effective provision of services. The overall goal, therefore, is to improve the livelihood security of small-scale growers and their dependents. It is useful at this juncture to look at the objectives in more detail.

#### 4.1 Objective 1: To increase the profitability of medium-scale growers in the region from 2% to 10%

From the statistics provided by SASA, it is evident that only 2% of all growers in the region operate medium-scale units. From information on income generation, it is evident that the annual yield and subsequent income of the MSGs is much higher than that of individual SSGs.

Our proposed intervention is a five-year project that envisages increasing the number of MSGs by 2% each year, thereby multiplying the existing number of MSGs by five by the completion of the project period.

By increasing the number of MSGs, we can establish units with a higher income that will offer better livelihood security for the growers. These larger units will also offer employment opportunities and an income for financially dependent people and thereby decrease the demand for support from SSGs. The MSGs have better representation on decision-making bodies and have a better chance of qualifying for support services and financial



assistance. We intend offering support to new MSGs to help them establish themselves and sustain viable economic units.

#### 4.2 Objective 2: to increase sugar cane yield of small-scale growers by 40%

Although the income generated from sugar production has dropped and the proposed abolition of tariffs may further eat into profits, this is still a well-established industry in the uThungulu region. Many growers know no other occupation, and have no other income than that generated by their cane growing activities.

We want to offer support to the SSGs by providing information and training to enable them to enhance their agricultural and marketing skills. Through developed technical skills they will be better able to increase their yield and be competent at negotiating for the best prices. Better representation on decision-making bodies will enable them to obtain the assistance required allow them to market an increased yield. This will increase their income and a recognised position in the industry will offer them sustainable livelihood for their dependents.

We have aimed at a 40% increase because our research suggests that these units are currently under-producing by 40%. Care should, however, be taken not to flood the market. Over production will force the lowering of the unit price of sugar cane, and result in price fluctuations. Unrealistic expectations should not be encouraged, and the market should be carefully monitored and reliable information made available to them.

#### 4.3 Objective 3: to increase the agricultural diversity of small-scale growers by 4 additional agricultural products

With the decline in the income from sugar and the threats facing the sugar industry as a whole, it has become essential that we look at other forms of income generation. As this is an agricultural area, it seems most feasible to encourage further development in this field. We hope to do so by encouraging SSGs to introduce alternative agricultural products. Tests have proven that conditions in the area are suitable for growing other products such

as mango and avocado. These products are not labour intensive and as these fruits are already grown in the region for personal consumption, the growers are familiar with the conditions required to produce the best fruit for marketing purposes. These products are anyhow already sold or traded in the informal sector and we will tap into these existing systems to establish a suitable formal market. We could (in addition) assist SSGs to obtain the best seeds. Establishing alternative products will offer employment opportunities and ensure an income, even if the sugar industry (in the worst scenario) should collapse. The growing of alternative products, moreover, will assist livelihood security in the region, more specifically for SSGs and their dependents.

#### 4.4 Objective 4: To improve the institutional relationships between the small-scale growers, SASA, and the other stakeholders in the sugar industry to improve effective provision of services

Working in this rural area has made us aware of the political under currents in the industry and the general dissatisfaction of the SSGs with the service provision and representation on decision-making bodies. They have set up the controversial “informal” structure mentioned earlier (the Mill Cane Committee) to ensure that their needs are attended to. Opposing interests and competition for scarce resources and services have led to distrust and a lack of co-operation.

We envisage acting as mediators to bring the parties together. Through shared planning and decision-making sessions we hope to establish the integration of available services and proportional representation on decision-making structures. It is not in the interest of the sugar industry to have conflict of this nature in its ranks. To enable the SSGs to take part in negotiations on an equal footing, would require training in skills of one sort or another. We propose to offer such training and believe that once all parties share the same conceptual understanding, they will be able to work together to strengthen the position of the sugar industry as a whole. Improved understanding will enhance working relationships, which will in turn increase the livelihood security of the SSGs.

## 5. PROJECT COMPONENTS

Several sub-projects/project components have been planned and formulated, which will enable us to work towards the four main objectives that have been identified. A schematic overview of these sub-projects is given in Addendum 3 in the form of a project work breakdown structure. For one of these objectives, the work breakdown structure has been broken down to a more detailed level (see Addendum 4).

### 5.1 Objective 1

#### Sub-Project 1.1: Information, Education & Demonstration

- Information that is relevant to the community of SSGs in terms of expanding their business;
- Education materials and campaigns that raise the awareness of SSGs concerning improving their business;
- Five suitable MSGs to be used as demonstration farms.

#### Sub-Project 1.2: Pilot Projects

- Two farms to serve as pilot projects;
- Information and know-how on social, technical, economic and ecological aspects of medium-scale farming which is continuously fed into the development of training/extension support services and systems.

#### Sub-Project 2.3: Support Services

- A system that links medium-scale farming initiatives with SASA Training Division and the MCC, and which is responsive to the actual needs of innovative small-scale growers;
- Support from SASA Management and Training Extension staff who are aware of the needs of emerging medium-scale growers;
- Training that is correctly implemented by SASA staff, making optimal use of the SASA credit scheme.

## 5.2 Objective 2

### Sub-Project 2.1: Intervention Development

- An inventory of existing know-how and farmers' initiatives in the field of better husbandry for cane farming;
- Farming techniques that are successfully used by resource-poor cane growers to improve their produce and yield;
- The support of SASA staff who research and promote farming techniques and approaches that are responsive to the realities and needs of resource-poor SSGs;

### Sub-Project 2.2 Extension & Training

- The undertaking of a baseline study and the establishment of a monitoring system which focuses on the socio-economic, the technical and the ecological viability of small-scale cane farming;
- Extension methodologies that are appropriate to the specific environment of the resource-poor small-scale cane farming community;
- The assistance of SASA staff who are skilled in providing training and extension support;
- A system that facilitates communication and dialogue between the cane-growers and SASA and enables them to adjust the interventions in accordance with emerging trends and changes in the sugar industry.

## 5.3 Objective 3

### Sub-Project 3.1: Crop Field Trials

- A network of lead-farmers who host the field trials on diversified crop production;
- A system that is used to assess the acceptance and the economic and ecological viability of potential crops;
- Documentation of the experiences that support the promotion of alternative farming methods and diversified crop production.

**Sub-Project 3.2: Seed Supply**

- Information on the availability of local and affordable seeds and potential sources of seed supply;
- A system that facilitates access and exchange between farmers and seed suppliers;
- A feasibility study on options to establish farmer-to-farmer seed exchange networks.

**Sub-Project 3.3: Marketing**

- Information on current marketing practices and potential markets for the future;
- A study to propose alternatives on how to improve the skills and abilities of local small-scale growers to process and market their produce.

**Sub-Project 3.4: Livestock Integration**

- Information on small-scale growers who integrate livestock successfully into their agricultural activities;
- A system that links farmers and the Livestock Department of the Ministry of Agriculture and facilitates exchange of experience;
- A study to investigate potential livestock interventions.

**Sub-Project 3.5: Forestry Component**

- Information on the perception and readiness of the small-scale cane-growing community to engage in forestry, and on the relevance of the services provided by the Forestry Division of the Ministry of Agriculture;
- A system that links farmers, the Forestry Division, and the timber industry and facilitates the relevant exchange of opinions;
- A study to investigate potential forestry and tree-planting interventions.

**Sub-Project 3.6: Training and Extension**

- The undertaking of a baseline study and the establishment of a monitoring system that focuses on the socio-economic, the technical, and the ecological viability of diversified agricultural production;
- Extension methodologies that are appropriate to the specific environment of the resource-poor small-scale cane-growing community;
- The assistance of Ministry of Agriculture staff who are skilful in providing the envisaged training and extension support;
- A systems that facilitates communication and dialogue between the farmers, the Ministry of Agriculture, and SASA, and enables them to adjust the interventions in accordance with emerging trends and changes in agriculture.

#### **5.4 Objective 4**

##### **Sub-Project 4.1: Situational Analysis**

- Information of the context and character of current conflicts;
- A study that provides analysis of possible intervention points and suggests alternative options for conflict management implementation.

##### **Sub-Project 4.2: Stakeholder Dialogue**

- Information of the perceptions and positions of the major stakeholders regarding the current conflicts and their readiness to get involved in conflict resolution processes;
- Decisions and possible agreements by the major stakeholders to participate in the envisaged conflict resolution processes and to engage in the necessary capacity-building measures;
- A system that secures continuous consultation and dialogue among the conflicting parties.

##### **Sub-Project 4.3: Training & Extension**

- A system that enables Vukazenzele Rural Interventions to monitor developments in the various areas of conflict and provides continual

information relevant to the planning of the conflict management interventions;

- Coaching in conflict resolution methodologies that may be successfully used by the conflicting parties in order to overcome their differences;
- A system that provides support to the facilitators who have been recruited from among the conflicting parties.

#### Sub-Project 4.4: Organisational & Management Development

- An organisational diagnosis that provides an analysis and inventory of the current state of the MCC, and its relationship with the other stakeholders;
- A process of Organisational & Management Development that enables good governance and provides continuous advice and coaching to the staff running the day-to-day affairs.

## 5. PROJECT IMPLEMENTATION

### 5.1 Project Strategy

This strategy will be adopted for the implementation for the project will be characterised as follows:

- *Phased Implementation:* The project will be carried out in two main phases. The first two years will basically serve to mobilise the necessary resources (including the recruitment of qualified staff) to secure the participation and commitment of the target population for the target activities; to develop the working approaches/methodologies and to design the respective interventions that will be used in the course of the project. BY the end of this phase, Vukazenzele Rural Interventions will carry out an internal evaluation in order to reflect on the learnings and to prepare the second phase accordingly. The following three years will see in the first place efforts to spread the project activities over a larger population through appropriate training and extension interventions. This phase will be completed with an external

evaluation, which takes a critical view of the processes and results produced by the project, and provides suggestions of viability and sustainability;

- *Co-ordination:* Co-ordination and stakeholder involvement will be emphasised at various levels. A Steering Committee will ensure meaningful participation of the main stakeholders in the development of the contents, the policies and guidelines of the project. The involvement extends to their participation in regular reviews and evaluations of the project. Special Task Forces, where the stakeholder organisations come together to undertake common planning, organising or implementing activities, are supported as they provide opportunities for effective networking. Co-ordination with other donor and development agencies is given the necessary attention on the one hand to avoid duplication, and on the other, to promote optimal utilisation of the available resources.
- *Principles and Working Approaches:* Strong emphasis will be given to the concepts of strong reliance and empowerment. This means the project will pursue development that is based on cultural and economic independence, and the application of technologies appropriate to local conditions; it will co-operate with persons and organisations that show willingness and commitment to overcoming constraints by mobilising their own resources; it envisages co-operation which is less geared towards the delivery of services than to facilitating access to power, knowledge and skills, and therefore towards improving people's technical and organisational competence to organise and arrange for problem solving. Both principles reflect the need for process-oriented and participatory approaches and the search for strategies and models that may grow out of the project realities at the grass-roots level into boldly recognised and applied concepts.

## 5.2 Project Organisation



The project organisation comprises four teams, each of them responsible for the sub-projects defined under one of the four objectives. The overall responsibility for the project and the supervision of the sub-project teams will rest with the Project Manager, who reports directly to the Board of Vukazenzele. The project will be supported by two administrative staff who will deal with accounts, secretarial work, and logistics. Another important element of the project organisation is the Steering Committee as has been described under 6.1. A schematic representation of the organisational structure is provided in Addendum 5.

### 5.3 Work Schedule & Resources

The work schedule shown in Addendum 6 gives the timing of the different sub-projects and therefore an indication of when the above-mentioned deliverables can be expected. The same table (Addendum 6) demonstrates the requirements in terms of personnel. Whilst the Project Manager and the Agricultural Co-ordinator are already available in the organisation, all other leaders and co-ordinators of the different sub-projects and some Extension/Research Officers will have to be recruited in the course of the first, and in one case, in the second semester of Year 1. All staff will be on full-time employment, except the Conflict Management Facilitator and the Systems Consultant who will reduce their involvement in the second phase of the project to 75%. The overall budget for the five-year period amounts to R9 900 000, of which R3 800 000 will be required in the first two years (Phase 1). The cash flow on a semester basis is also included in Addendum 6. 60% of the budget is expected to go into wages and allowances, 15% into transport, and 25% into all other overhead items (administration, infrastructure, services).

## 6. RISK ASSESSMENT

Given the volatility of the sugar industry and the potential for a conflict and/or resistance, it is thought useful to undertake a stakeholder relevance exercise in order to identify supportive stakeholders, those who would be indifferent,

and those who were potentially hostile to the Vukazenzele interventions. In Addendum 7, the results of the stakeholder analysis are made available, and their clusterings explained in the next few paragraphs.

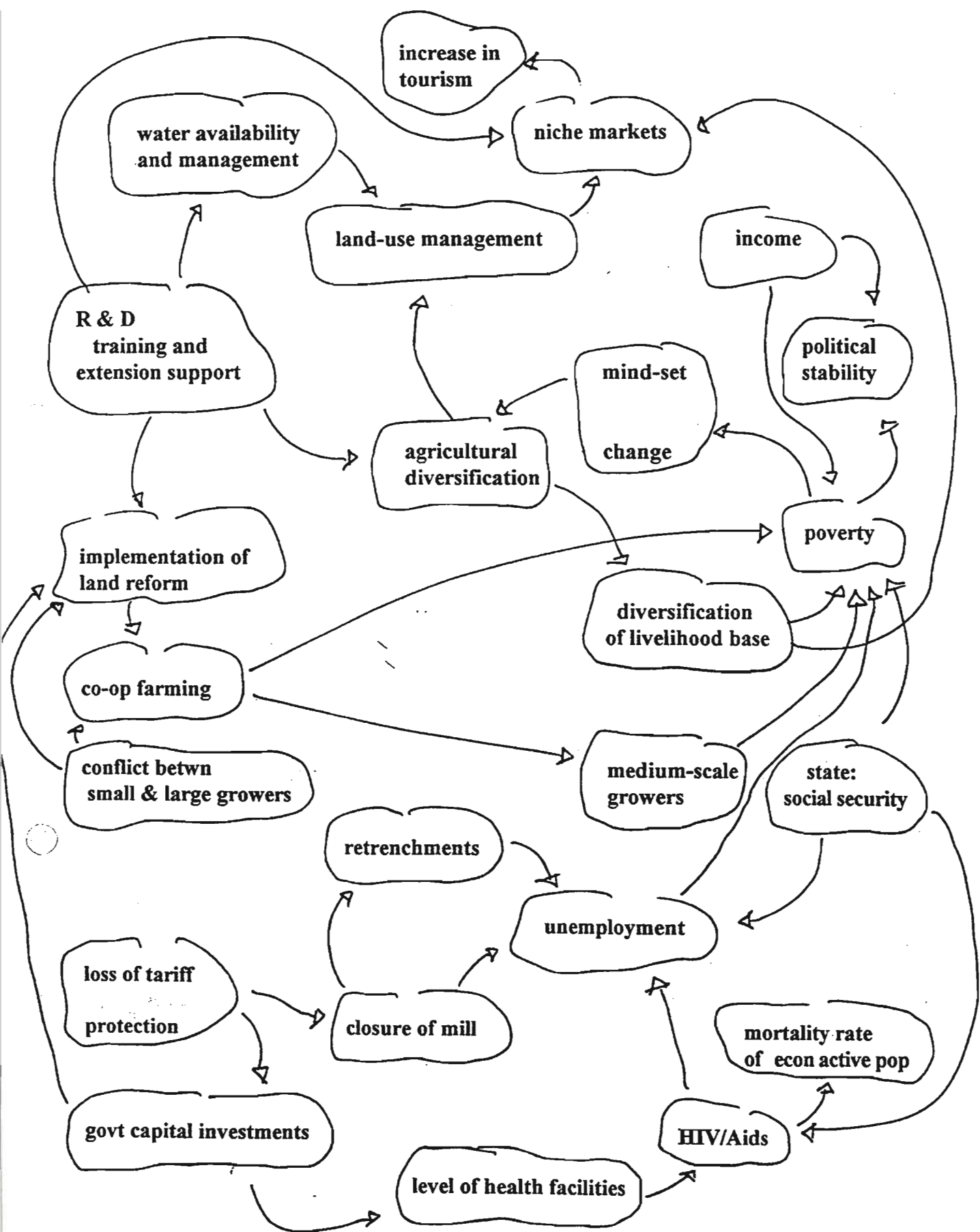
- *Subjects* are those stakeholders who cannot influence the situation and who could also be ignored. The danger of excluding these types, however, is that they can create a coalition and become relevant *Players*. They could have more powers, which could impact the project either positively or negatively. In our case, there are two stakeholders who fit the profile of “stakeholders”, namely, the South African Cane Growers Association (SACGA) and the Large Scale Growers (LSG). SACGA has a minimal impact on all four objectives perhaps because they first need to work on their legitimacy and their ability to assess the real needs of all of the sugar cane growers. LSGs have less impact on most of the objectives because they are relatively independent and self-sufficient. They cannot be ignored, however, because they could also become *Players* in the establishment and strengthening of relationships between the Small Scale Growers (SSG) and the entire group of important role-players in the industry.
- *Players* are the most powerful stakeholders, and they demand attention. They are able to influence activities and have an interest in the outcome of the project. The players in this instance are the SSGs, the Mill Cane Committee (MCC), the Medium Scale Growers (MSG), the South African Sugar Association (SASA), the Amakhosi, the farmers’ dependents, suppliers and contractors, and the Break-away Black Growers Group. They all have crucial roles to play in the meeting of the four objectives.
- *Referees* are the ones who set the environmental context and whose role is that of a mediator and cannot be influenced by individual players. The Department of Agriculture, the Regional Council/TLC, and various civil society organisations (including Vukazenzele) are there to

set the context, and to resist any temptation of favouring one stakeholder over others.

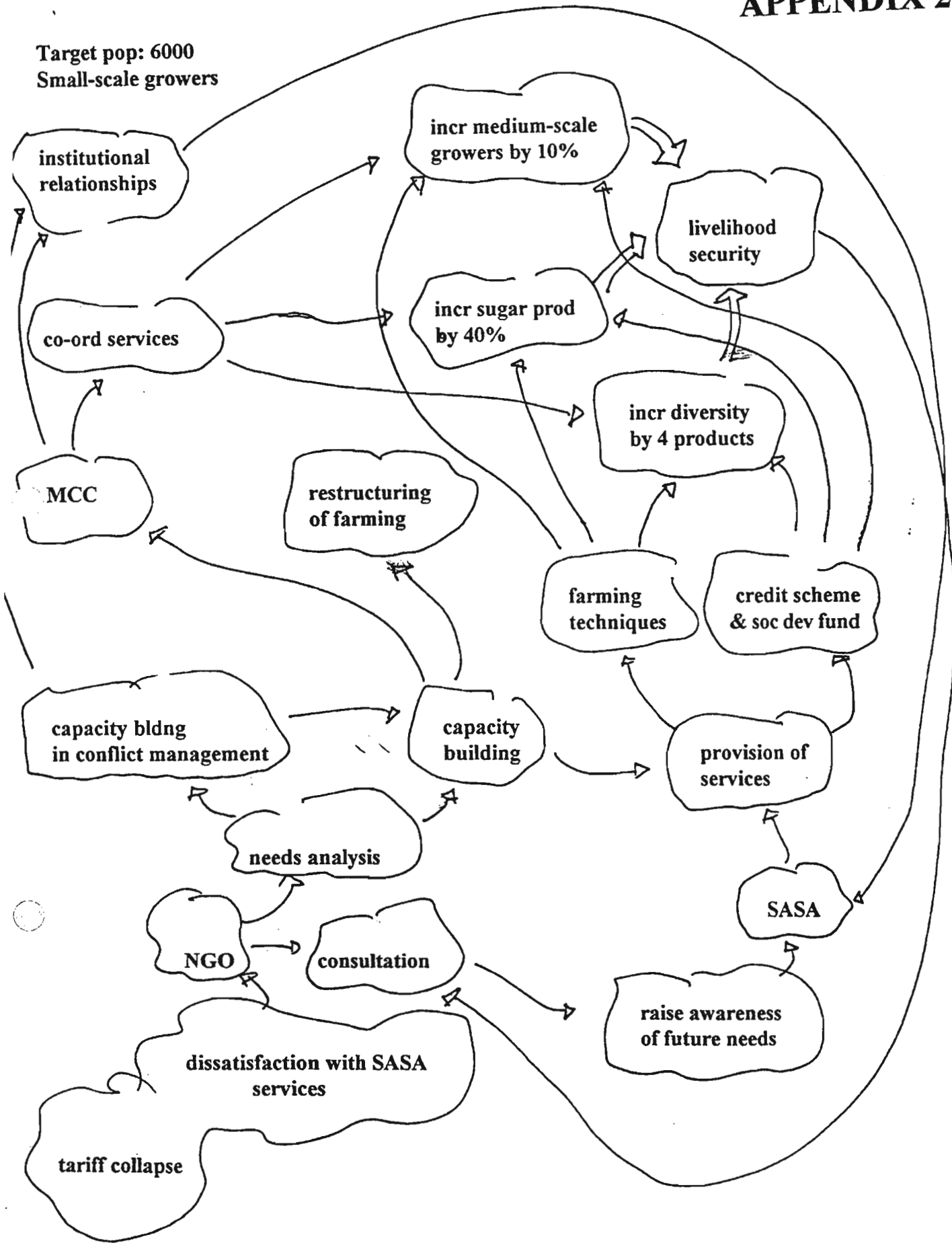
- The *Crowd* are those people who have no immediate interest in the sugar industry and/or the uThungulu region. Obviously they are not relevant to our project, and hence are not considered in any detail.

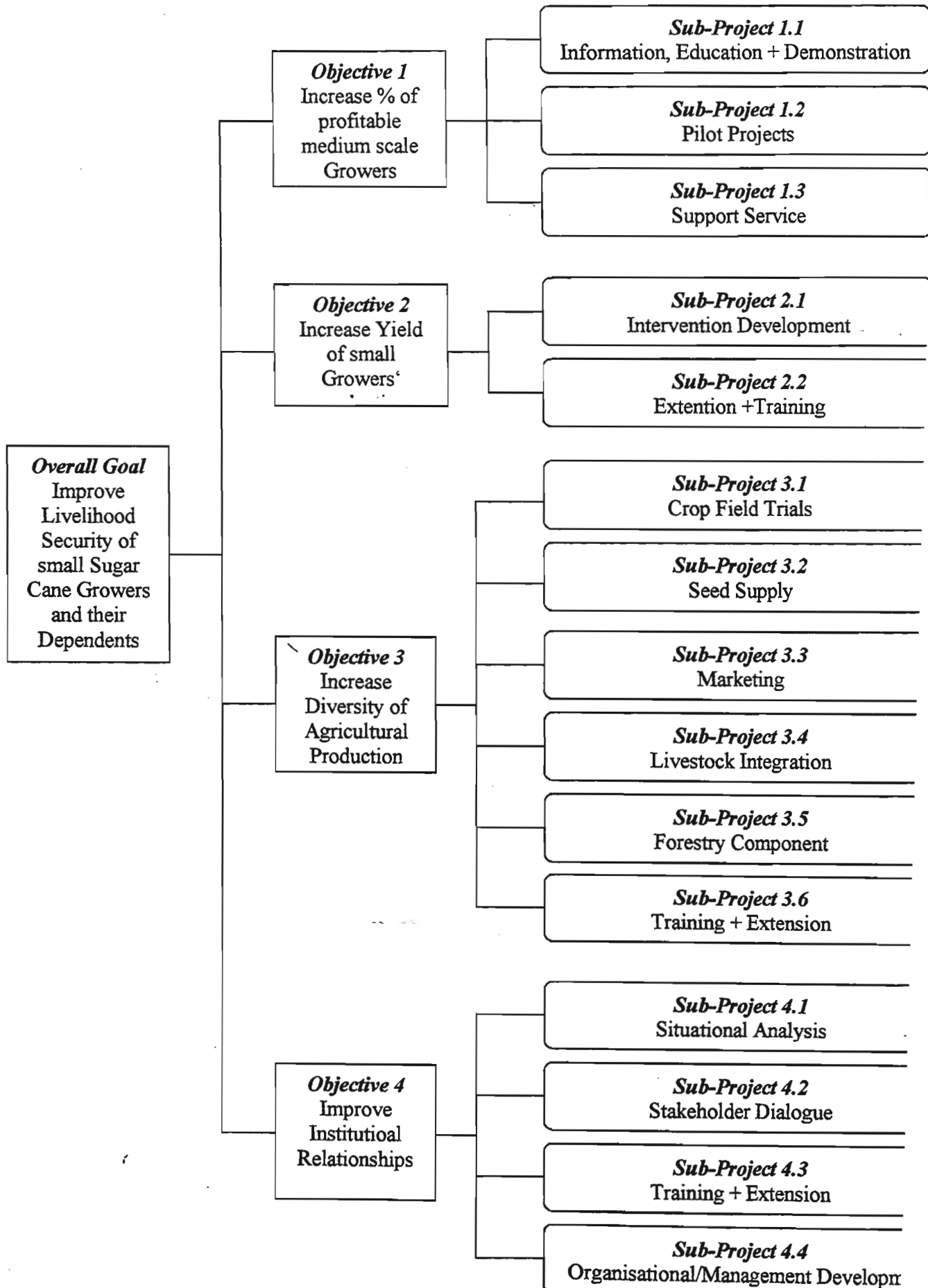
## **7. CONCLUSION**

As a result of the analysis presented in this proposal, it is apparent that the overall goal of the project, namely to improve the livelihood security of small-scale sugar cane growers and their dependants, along with the attendant four objectives, is both a desirable and viable in the context of the uThungulu region. The request is, therefore, that this project rationale be considered seriously by the Help Out Foundation in the interests of supporting the emergent farming capabilities within the sugar industry in the uThungulu region of KwaZulu-Natal.



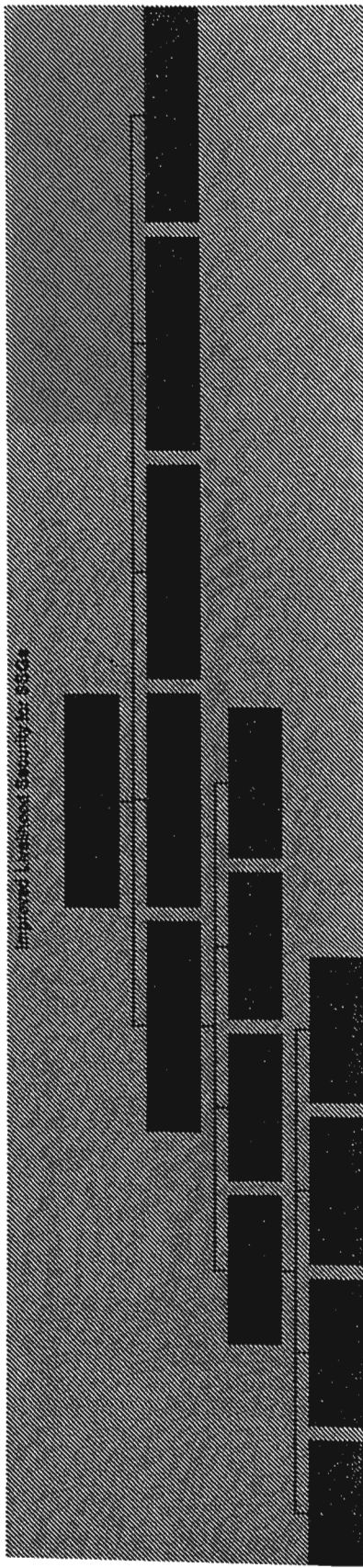
Target pop: 6000  
Small-scale growers



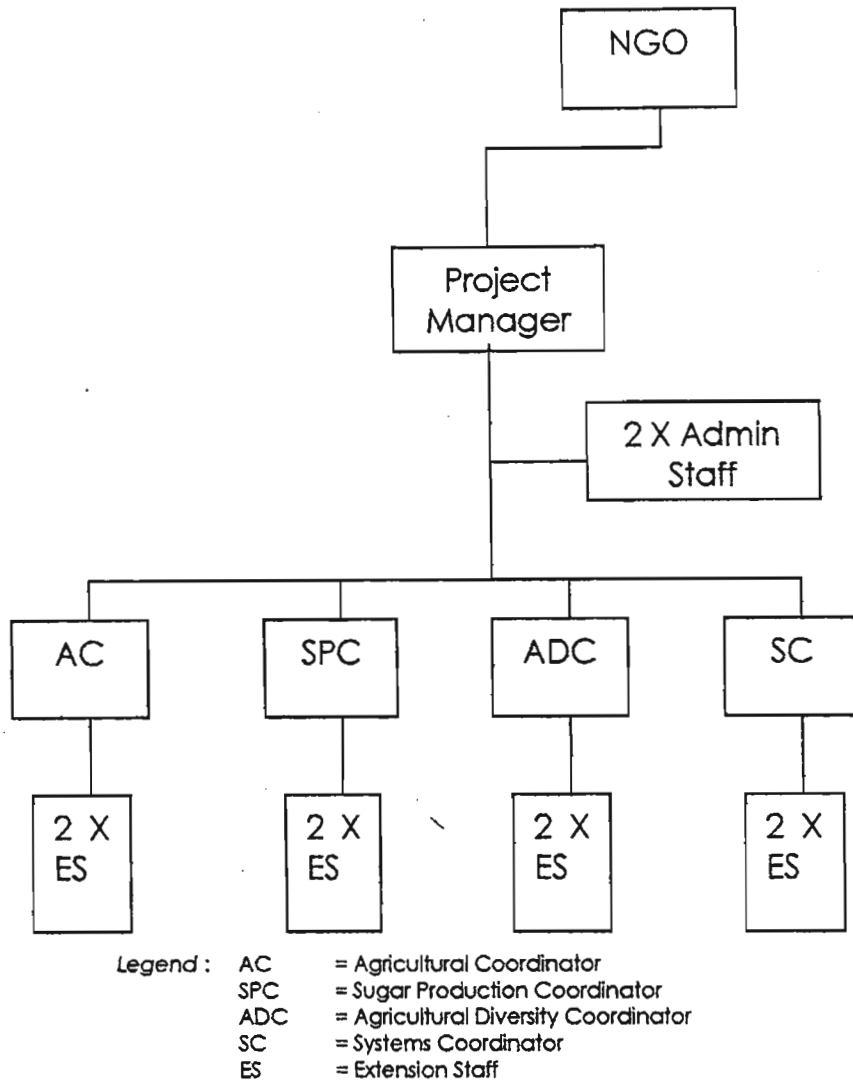




# Sub-Project 1.3 Support Services



## Project Organisational Chart : Capacitate Small/Medium Growers



This organisational chart illustrates the additional human resources required to staff the project and the probable lines of accountability. The chart relates to the "Activities/Staffing/Budget" schedule.



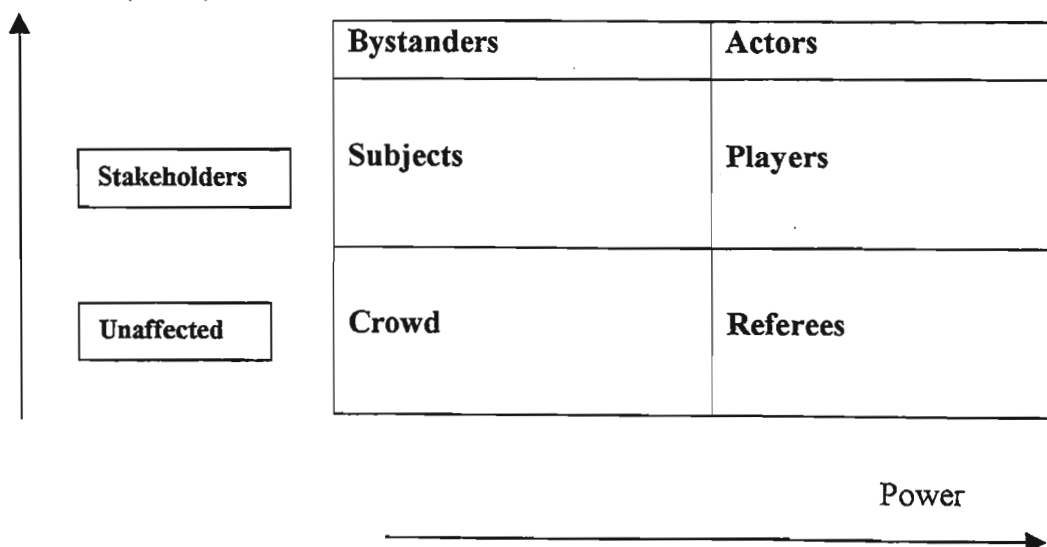
# Timetable/Resources/Cashflow

Objectives	Sub-Projects	Phase 1				Phase 2				
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Objective 1	Sub-Project 1.1									
	Sub-Project 1.2									
	Sub-Project 1.3									
Objective 2	Sub-Project 2.1									
	Sub-Project 2.2									
Objective 3	Sub-Project 3.1									
	Sub-Project 3.2									
	Sub-Project 3.3									
	Sub-Project 3.4									
	Sub-Project 3.5									
	Sub-Project 3.6									
Objective 4	Sub-Project 4.1									
	Sub-Project 4.2									
	Sub-Project 4.3									
	Sub-Project 4.4									
Human Resources										
Project Manager		1	1	1	1	1	1	1	1	1
Agricultural Coordinator		1	1	1	1	1	1	1	1	1
Land Tenure Specialist				1	1	1	1	1		
Sugar Production Coordinator			1	1	1	1	1	1	1	1
Agric. Diversity Coordinator			1	1	1	1	1	1	1	1
Systems Consultant			1	1	1	1	0.25	0.25	0.25	0.25
Conflict Management Facilit.			1	1	1	0.5	0.5	0.5	0.5	0.5
Extension/Research Officers		2	6	6	6	6	6	6	6	6
Costs										
Wages + Allowances		220,000	640,000	700,000	700,000	670,000	670,000	610,000	610,000	540,000
Transport Costs		50,000	150,000	175,000	175,000	175,000	175,000	150,000	150,000	150,000
Overhead Costs		150,000	250,000	300,000	300,000	250,000	250,000	250,000	250,000	250,000
Sub-Totals		420,000	1040,000	1175,000	1175,000	1095,000	1095,000	1010,000	1010,000	940,000

STAKEHOLDER RELEVANCE				
STAKEHOLDERS	OBJECTIVE #1	OBJECTIVE #2	OBJECTIVE #3	OBJECTIVE #4
Small Scale Sugar Growers	+++	+++	+++	+++
MCC	+	+++	++	+++
Medium Scale Growers	+	-	+++	+++
Large Scale Growers	-	-	-	+++
SASA	++	++	+	+++
Amakhosi	+++	++	++	+++
Dept. of Agriculture	+++	++	++	++
Regional Council / TLC	+	++	++	++
Miller	++	+++	++	+
SA Cane Growers Assoc.	++	+	-	++
Other NGOs	+	+	+	+
Farmers' Dependants	+++	+++	+++	+++
Suppliers and Contractors	+++	+++	+	+
Rebels	+++	+++	++	+++

The main purpose of stakeholder testing is to identify different types of stakeholders and their importance in the project in relation to the four objectives. In his *Scenarios* book van der Heijden describes a stakeholder option matrix as having 4 types of stakeholders:

Interest (Stake)



(Borrowed from van der Heijden)