UNIVERSITY of GREENWICH

Complexity–based tools to complement project management methodologies: An interpretivist approach to project management implementation.

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A Thesis submitted in partial fulfilment of the requirement of the University of Greenwich for the Degree of Master of Philosophy

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Declaration

"I certify that this work has not been accepted in substance for any degree, and is not concurrently being submitted for any degree other than that of Master of Philosophy being studied at the University of Greenwich. I also declare that this work is the result of my own investigations except where otherwise identified by references and that I have not plagiarised the work of other"

Signed **Signed**

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Bankole Olagbaiye **Dr Bruce Cronin**

(Student) **(Supervisor)**

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Abstract

When projects fail, this is often because the social situation is more complex than anticipated. If project teams complement their methodologies by utilising tools designed to interpret complex situations at key points, these projects are more likely to succeed. This research investigates how to complement project management methodologies with complexity tools and techniques and to explain that when a project is implemented within a determinable system it may be possible to use known methodologies to plan and execute the project successfully based on success criteria of time, cost and scope. However, there are certain social situations that are known to be problematic for these methodologies and may need to utilise additional tools to implement the projects. The purpose of my research is to investigate how tools designed to understand complex situations can be used to develop more effective project management in such context.

Throughout the examination of three in-depth case studies it was discovered that many projects are implemented using standard methodologies. Within the complex environment of hidden characters, emergent patterns and characteristics, interaction and interrelationships of various factors the projects were seen to have performed below expectation. By contrast, when tools and techniques for understanding organisational complexity were put to use, the projects highlighted important factors that were not initially considered, either during the inception of the project or at some milestone stages. These additional tools proved valuable in understanding and managing the interactions, interrelationships and emergent patterns that developed in the process. Understanding of archetypes and their extractions within and outside of Snowden's findings were also a valuable finding as Karl Jung invented the concept of archetype. The use of Jungian archetypes proved valuable in discovering hidden factors and identifying critical success factors that are not apparent in standard project management methodologies. Complexity theories and models that were considered are the Kauffmans NK Model, Boisot I-Space and the cynefin model. Once projects were identified in complex environments, it was seen that there was a need to use additional tools for their implementation. It was also identified that project failure can not only be categorised in terms of project scope, time and cost but definition of failure needs to be in reference to an overarching social system (also referred to as ecosystems), which the tools from complexity would aid projects in identifying as well as understanding.

Employing some basic additional tasks and including research processes in project methodologies may make the difference between a project actualising its full potential or being delivered without meeting all the business requirements especially when requirements are emergent themselves.

Chapter One

Introduction

1. Introduction and Aim of Research

Project management methodologies have become and are becoming popular in the delivery of innovations as many organisations are turning to them to accomplish tasks that do not fit neatly into business as usual. However there has been limited success of many of these projects which has given increased cause for concern; various ends either in distress or outright failures (Whittaker 1999; Charett 2004). Many reasons have been identified as responsible for the lack of success of these projects with particular emphasis on I.T. projects. Projects are usually governed by some set of rules and guidelines known as project management methodologies which have been successful with some projects but not always with others. This thesis considers the shortcomings that arise from the application of project methodologies in a variety of settings, particularly where the social context is important. The reasons underpinning the challenges and the potential for mediating these challenges with the concept of organisational complexity are discussed.

I argue that knowledge and awareness of social systems can become extremely useful in the delivery of projects and that certain tools and techniques that are used to understand and analyse organisational complexity and social systems, can be applied to the field of project management to complement the existing models and methodologies in the quest to overcome many of the shortcomings that are encountered during project implementation.

I investigate project management from its conception from linear models such as the traditional waterfall to more iterative approaches such as PRINCE2 and Project Management Institute (PMI). Models and methodologies considered are: the traditional Waterfall model, the Concurrent Engineering Model, the traditional Spiral Model, and the Dynamic Systems Development Model (DSDM), the Rapid Application Model, AGILE, PRINCE2 and the PMI model. The models and methodologies represent a range of project management approaches that have been implemented primarily for software development, but increasingly for other projects over many decades. Though all these models and methodologies are aimed to aid the successful management of projects, product and services delivery, variable success of projects suggests there may be some shortcomings in the methodologies and the way they are implemented. I examine the location of projects in organisations and social systems that make it difficult

for project management methodologies to subscribe to a one size fits all approach. Social systems may have behavioural characteristics and may be subjected to relationships and interactions that often defy the linearity of project management methodologies. Projects implemented within organisations may not have an obvious interaction with the social systems that govern the organisations that implement them, but the viability of each project is still indirectly or otherwise related to the social system, as its implementation would be based on factors that have been identified or defined within that social system.

I make use of complexity theories to consider ways of engaging with social systems to learn about them, adapt to them and work more effectively within them, rather than attempt to control them. Tools and techniques such as storytelling, anecdote cycles and archetype extractions have been used to understand complex systems or systems in a complex situation and have been employed in this research to investigate projects within complex situations or their parent organisations within a complex system. By using such tools and techniques, I attempt to identify complexity in a situation or complex environment and also to search out factors that are referred to as hidden truths which would not normally be identified and prioritised within the implementation of a project. I use an interpretavist research approach to study a system holistically and gain insight through discovery.

I argue that organisational complexity provides a useful framework to explore the limitations of traditional approaches to project management and suggest that a complexity perspective and an interpretavist methodology provide a useful complement to contemporary project management approaches. In the next chapter, I consider the evolution of project management from traditional project management models to the development of methodologies, the linearity of their approaches, their associated limitations and the need to adapt these to complex environments and the tools and techniques used in understanding them. This thesis will proceed as follows:

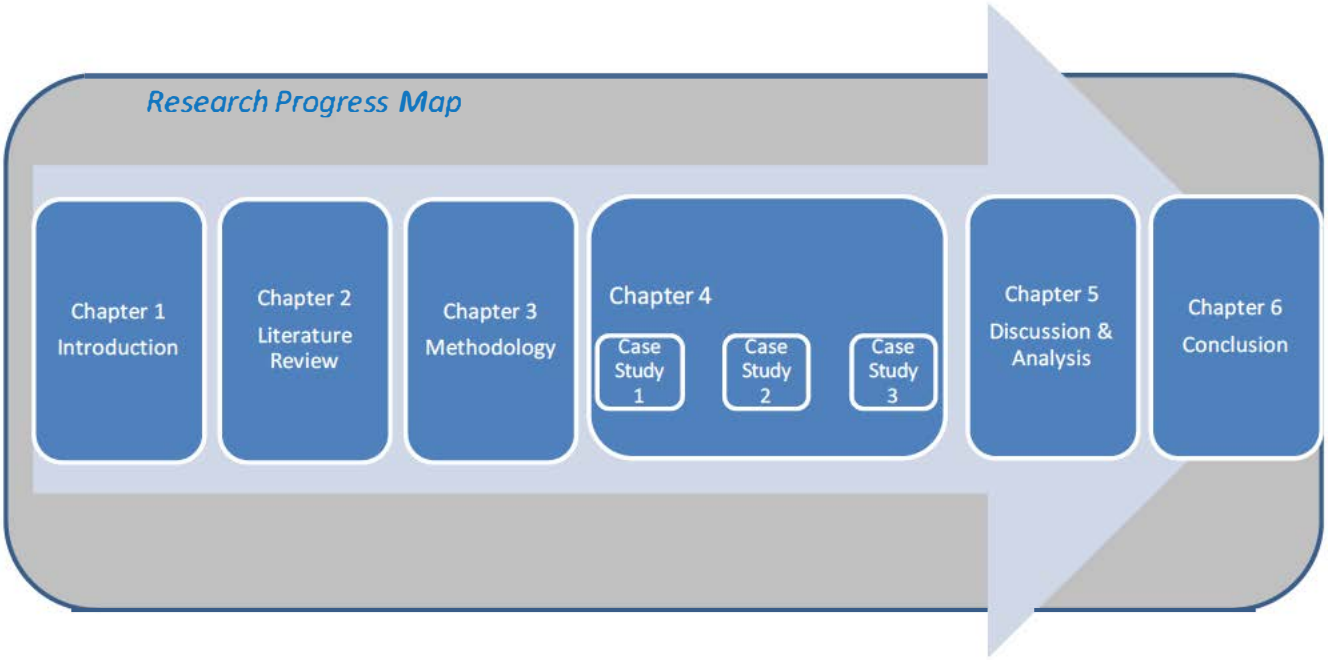


Fig 1.0: Research Progress Map

Chapter one presents the introduction into the thesis providing an over view into project management and complexity theory with emphasis on their interaction and need to complement project management methodologies with tools used in understanding complexity theory. Chapter two presents the literature review which covers the findings, arguments and theories of various authors across the fields of project management and complexity theory. In chapter three, I present the methodological interpretavist approach used for this research project as well as the justification of my chosen research approach. In Chapter four, I presents three case studies which investigate three different projects that implemented some of the known project methodologies but faced situations that seemingly defied their linear approaches, I explained how the projects were located in complex environments and how tools used in understanding complex environments were valuable in identifying the real issues and redirecting the course of the project. Chapter five discusses the findings of the case studies in the light of the literature discussed in chapter 2 while chapter 6 provides the conclusions and recommendations of the research.

Chapter two

Literature Review

2. Projects and Project management

2.1.Introduction:

This chapter reviews the evolution of project management methodologies from the traditional management approach and the traditional waterfall models, a review of more recent models and methodologies are conducted whilst identifying their strengths and weaknesses in the context of social complexity. A further review of organisational complexity, the theories and the associated tools and techniques used in understanding them are conducted. I also carry out a review of failed projects, how they are possibly located in a complex environment and the need for complementing their methodologies with tools and techniques used in understanding these systems.

2.2.Definition of Projects

Projects are unique sets of tasks with a specific deliverable aimed at meeting a specific need or purpose. The Project Management Institute (PMI) defines a project as, "a temporary endeavour undertaken to create a unique product or service" and project management as, "a unique set of co-ordinated activities with definite starting and finishing points undertaken by an individual or organisation to meet specific objectives within defined schedule, cost and performance parameters" (Project Management Institute, 2013). PMI note that projects vary widely in size and type and are multidisciplinary in nature as they normally require input from people with different kinds of knowledge and expertise. One of the notable major characteristics of a project is its difference from general management which is the management of organisational tasks as part of everyday functional activities that do not necessarily involve the use of project management tools and techniques to perform the set of deliverable tasks. Project management differs from general management because of the generally high level of conflict present in projects which in turn requires conflict resolution as a key skill for project managers. The unique nature of projects and the absence of routine means that everything is in exception which implies that the person managing the project must be creative, flexible and have the ability to adjust to changes rapidly. From the most well-known definitions of projects, it can be said that a project is temporary, it is usually embarked on to meet a particular business or organisational need in line with their associated goals, it is controlled, follows standard procedures for its implementation, and is normally the responsibility of an individual

with a particular set of skill sets ('the project manager') to implement a chosen methodology and manage a selected number of people ('the project team') under a given time frame with budget restrictions as a major consideration (Mantel et al., 2005; Lester, 2007). The fact that these standard procedures as directed by the models and methodologies are followed, does not give automatic immunity to the projects either being troubled or failing. This research investigates projects that implemented these methodologies and still failed in some respect as defined by this research. The definition of project success is also reviewed in this research as success of a project can be defined based on perception or based on some requirements. Part of the argument is that some of the requirements that will determine the success of a project can be hidden and need to be searched out otherwise the project will be completed successfully based on some parties' perception but may not fully satisfy the need for which it was intended. The success of a project should therefore not be based solely on time, cost, scope and stakeholder requirements. Success may have to be based on some requirements that feed inwardly from a social system through an organisation and to the project.

2.3. Background of Project Management

Royce (1970), describes his views about managing large software developments as a sequence of phases, and with each phase completed before the next is initiated. This is popularly referred to as the traditional waterfall model. Though Royce gave good guidelines on how to make the waterfall model more successful such as completing the programme design before the analysis and coding, involving the customer, documentation, repeating steps and testing were argued to be necessary for the success of software developments especially for the implementation of large software developments. The fundamental principles of the traditional waterfall model however remains as an iterative development process with some overlaps and allowances for flexibility and fine tuning of requirements. The model has undergone criticism by various authors for various limitations. Many such authors have developed other models for managing software development projects, Overlapping the processes of the traditional model revealed the concurrent engineering model as put forward by Ainger (1995) and Lu (1993). Other project management models include but are not limited to; The spiral model approach that was developed by Bohem Boehm (1988), the information systems development method (ISDM) (Fitzgerald et.al 2002), the rapid application development (RAD) method (Martin 2002), the dynamic systems development method (DSDM) (Deakins and Dillon 2005), the agile development model (Williams and Cockburn 2003), and the helical model for software development (Ainger 1995).

2.3.1 The Traditional Waterfall Model:

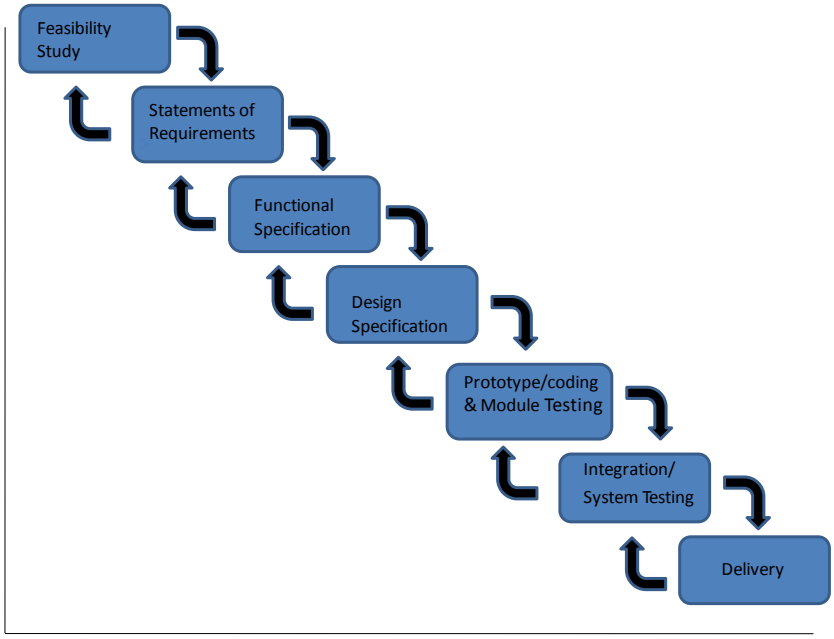


Fig 1.0 : The Traditional Waterfall Model (Source: Ainger 1995, Scacchi 2001)

The traditional waterfall model, as seen in Figure 1, follows a sequential process of product requirement and specification requirement, design and implementation of the product. Though many organisations and prestigious companies adhere to the waterfall project life cycle, failed projects have tended to follow the waterfall model more rigorously than others, though its failures may not have been fully and widely recognised (Ainger 1995). The model has been increasingly criticised as providing limited interaction between developers and customers and hence poor feedback that results in late changes to product development (Boehm 1988). It can be argued that many approaches to project management such as PRINCE2 developed by the Office of Government Commerce and PMI from the PMBOK are variations of the traditional waterfall model with a decent attempt to cater for its flaws whilst maintaining the approach of underlining the discipline of the approach. This is because the methodologies follow similar linear phases and stages of the project from the start through implementation to completion. The traditional model however, places a strong emphasis on a linear thinking, task and control oriented, efficiency focused approach which is aligned to systems analysis. Some of the limitations of the traditional waterfall model have led to the development of other models such as the spiral model which seeks to overcome the rigid iteration and limited feedback by introducing feedback and risk analysis within its iteration. The spiral model is further discussed in this chapter.

Project Phase	**Traditional Waterfall**	**PRINCE2**	**PMI**
Start-Up	Feasibility Study	Starting up a Project	Initiating
	Statement of Requirement	Initiating a project o Planning o Design o Discovery o Proof of Concept o Applications	Planning o Scope Planning o Cost Planning o Activity Sequencing o Risk Planning
	Functional Specification		
	Design Specification		
Implementation	Prototype Coding, Module Testing	Planning	Planning
	Integration System Testing	Controlling a stage	Executing
	Delivery	Managing Product Delivery	Monitoring & Controlling
		Managing Stage Boundary	
Project Closure	Delivery	Closing a project	Closing

Table 1. Comparison of Waterfall, Prince2 and PMI methodologies (Source: Ainger 1995, Scacchi 2001, PMBOK 2013, OGC 2005)

The similarities in the stages can be seen in Table 1; I have attempted to split the stages of each model across the three major phases of a project: start-up, implementation and project closure. Under the PRINCE2 and PMI methodologies, I have included planning as part of the start up phase and the implementation phase as both methodologies specify the planning phase across both stages. Similarities that are immediately obvious in the start-up phase are phases such as requirement gathering, discovery or scope planning. This is where the actual deliverables of the project are agreed between all parties and the project is delivered against the agreed specification. In many cases, the human resource requirement, the time requirement and the associated costs will be determined as part of the project start up process (PMBOK 2013, Scacchi 2001, OGC 2005). Some of the project models and methodologies considered include:

2.3.1. The Traditional Spiral Model

In response to the rigid processes and limited feedback in the traditional waterfall model, Barry Boehm (1988), then Chief SW Engineer at TRW Inc introduced a spiral model, which is a risk-driven rather than product-driven approach that uses process modelling rather than sequential phases. The spiral model is a non-operational process model which was popular for software development projects; it is driven by elements of specification and prototype methods with the addition of processes from the traditional waterfall model. The spiral model is shown by iterative development cycles as an expanding spiral where the inner circle shows the early processes of analysis and prototyping and the outer circle represents the processes from the traditional software development cycle (See Figure 2).

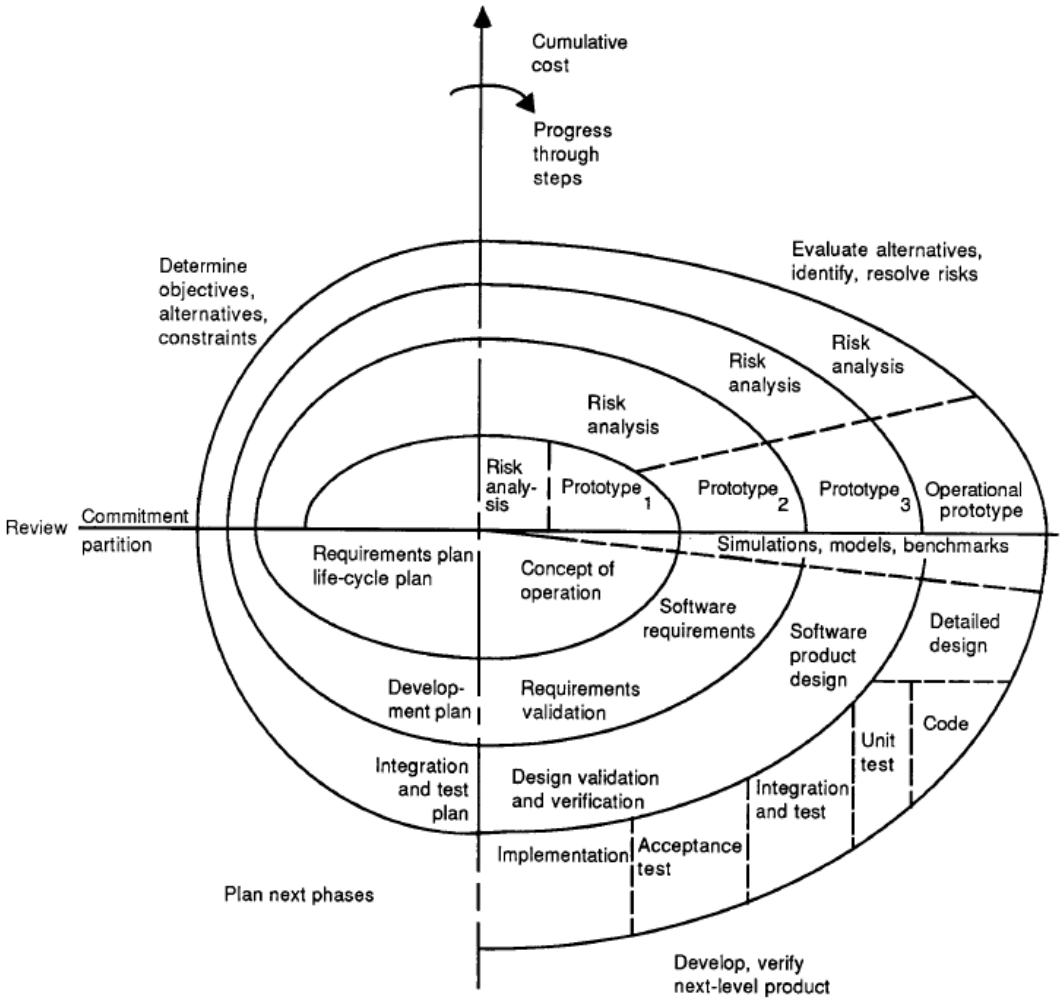


Fig 2.1: The Spiral Model (Source: Scacchi 2001)

As shown in Fig 2.1 while the radial dimension denotes the cumulative development costs, the angular dimension denotes the progress made in every development spiral. There is a risk analysis process within every spiral that attempts to identify events that might cause a development effort to fail, or overrun time or budget. In the spiral model, system development spirals out only as far as required according to the risk that must be managed. The spiral life cycle also shows that the traditional model needs to be followed only when the risks are greatest and after early system prototyping, as a way of reducing risk which may imply greater costs. (Bohem 1988, Scacchi 2001, CaseMaker 1997)

In as much as this project model caters for some of the flaws of the traditional model which includes the possibility of changing requirements at late stages, which will have major cost implications by introducing the risk analysis processes within every spiral of development, the model may help us deliver projects such as software development, website creation, architectural or engineering models. However,

with increasing variety of projects such as migration (which is one of my case studies), transformation, major IT infrastructure upgrades and telecommunication projects which may be the core of strategy and collaboration within organisations may not find all the core functionalities of the project management models beneficial. These projects may have requirements and possibly risks that may have been identified but not fully known, the requirements may be known but subject to change since we exist in a world that is extremely fast paced and competitive in technology.

2.3.2. Dynamic Systems Development Method (DSDM)

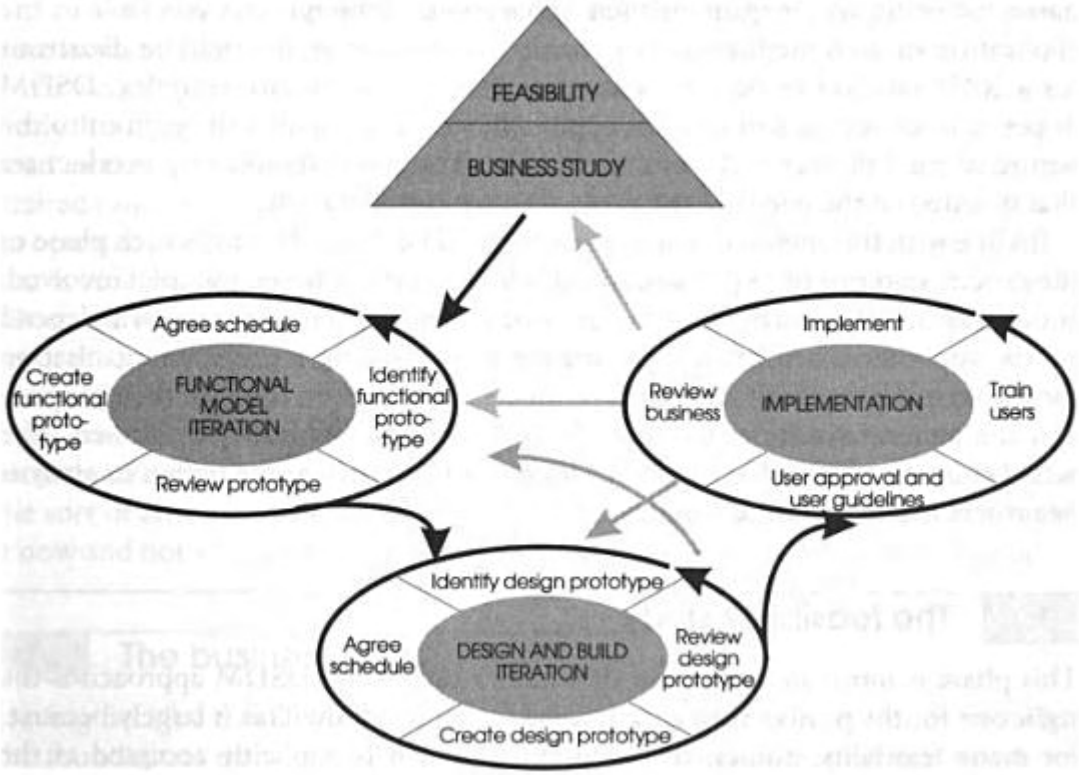


Fig 12.2: DSDM Process Diagram (Source: Stapleton 1997).

This model is described by Stapleton (1997) as a way of developing application systems that truly meet the needs of the business. The DSDM was a product of a consortium of consultants and project managers from some of the largest IT industries and was aimed at resolving some of the complexities faced by development projects, which are said to gain a life of their own and become enmeshed in their own complexity. The DSDM method defines a process and a set of products at a high level in order to ensure that it can be tailored to any technical or business environment. The DSDM does not have a prescribed technique, but rather it has suggested paths that are supplied for implementation of

both a structured and an object-oriented approach to product development. The DSDM has an emphasis on people and business needs rather than tools. The DSDM works closely with end users throughout the development as their regular input and feedback is essential for the model to work. DSDM aims to deliver to timescales that would naturally be challenging if using the traditional waterfall model, although it is said to be an exact peer of good systems developed by the waterfall model it takes a lot less time to develop as it works with a product based view of development rather than an activity based view. The DSDM also takes less time to develop because less time is spent in briefing people and repeatedly getting them up to speed, and only features that are required are actually developed which is also due to the product based view that the model focuses on. DSDM in a nutshell can be said to be a more people-oriented version of the waterfall model which is quicker co-delivered and easier to maintain (Stapleton 1997).

A limitation of the DSDM may be in the resource intensiveness that may be required to implement the model. The dynamic nature of the model will require that the users and the developers be trained on the model and its methods of implementation. Cost concerns may therefore be raised with its delivery. Based on the cost concerns, this model may not prove useful for projects in small to medium enterprises (SME) or projects that are run as a one off. It may prove quite useful with mature organisations that will require the implementation of a type of project repeatedly.

2.3.3. Rapid Application Development Model (RAD)

A prime business concern for highly competitive industries such as software development is the speed of development (Martin 1991). By replacing the hand design and coding processes, which can be heavily dependent on individual skills that are sometimes isolated, with automated design and coding, the rapid application development (RAD) model gives a more stable process that forms a real basis for continuous improvement. RAD is also said to be a faster process that is less error prone than normal hand coding. The rapid application development model compresses the step-by-step development methods of the traditional waterfall model into an iterative process by developing and refining the data models, the data process and the prototypes in parallel with iteration, where the user requirements are refined, a proposed solution is designed, the solution is then prototyped and reviewed. The user input is provided, and the process begins again (See Figure 3)

Again as with the DSDM model, when implementing the RAD model, users and developers will need to be trained about the approach of the model. This is unlike the PRINCE2 model where planners and the project manager will gather information from the developers on what they are to produce and how

long it will take, developers then work and report back to the project manager on progress made or on any issues encountered. Another issue with RAD is that if there are no final requirements and design specification. Development may commence as requirements can change during the lifecycle of the project. This may result in a lack of satisfaction of the final products as there may have been various iterations. The question of using this model for all types of projects other than software development also arises as it is argued that not all projects require a phase of coding.

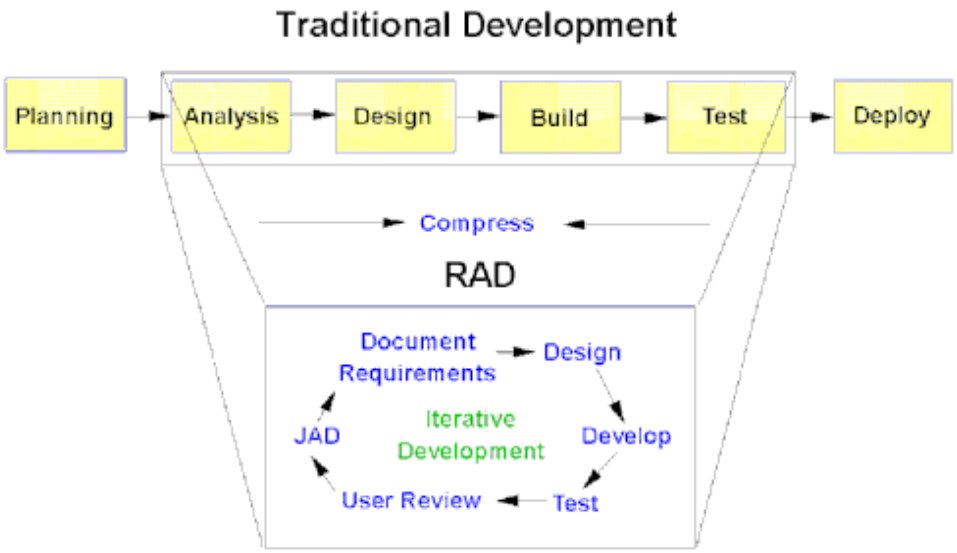


Fig 2.3: The Rapid Application Development Model (Source: CASEMaker Inc. 1997-2000)

2.3.4. Agile Development Model:

Like the dynamic systems development method (DSDM), the AGILE method was introduced as a result of frustration with the steps of the traditional methods. Williams and Cockburn (2003) argue that the scale of initial requirements documentation were frustrating and sometimes impossible for many by the mid-1990s as both technology and business environments kept shifting during the project, resulting in the requirements and projects quickly running out of date. This was an issue even with relatively short projects. These changes and risk to projects and requirements obsolescence moved practitioners to embrace a world of higher rates of change while implementing a project. As discussed above, the DSDM method developed in Europe was one expression of this. In a bid to achieve even greater customer satisfaction and product quality, other practitioners and authors developed the AGILE methodology, the term “agile” being popular in flexible manufacturing practices. A manifesto for AGILE software development was developed by the practitioners (www.agilemanifesto.org) describing four values; individuals and interactions over processes and

tools, working software over comprehensive documentation, customer collaboration over contract negotiation, and responding to change over following a plan (Williams and Cockburn 2003). As with the spiral model, the AGILE methodology is tailored towards software development as stated in their manifesto. How well the AGILE methodology will perform with non-software development projects is unknown and I am not sure whether to even attempt exploring that journey. The AGILE methodology welcomes the changing of requirements late in the course of the project. Though this may be one of the strengths of the methodology in the development of software, changing requirements late in a non-software development project may have huge negative impacts. This was observed in one of the case studies analysed in this research.

2.3.5. The Helical Model:

The helical model is based on the principles of the Concurrent Engineering Model. The helical approach is based on the generation of models as opposed to the waterfall model which is based on the generation of prototypes. The helical model caters for some of the downsides of the traditional waterfall model. When following the waterfall model, feedback from the design stages often happens too late, no matter what level of communication on the specification of the final product is given to users and clients, the only real feedback will be during the latter stage of the project which may be the latter stages when a prototype is available. At this point it is often too late and too costly to make major changes. The helical model follows an iterative spiral like iteration that evaluates the requirements against the progress at various iteration points that can also be referred to as its calibration points (See Figure 4).

As opposed to other models such as the traditional model and the spiral model, the project team within the helical model is known to have complete freedom to operate within the space of developing the design components subject to time and space. In the helical model, when the requirements are gathered and a baseline agreed, the activities of the project team tend to spiral inwards towards the final solution while it makes its transit through four design phases; the ‘identifying the problem’ phase identifies the immediate problems to be addressed or the opportunities to be maximised. This phase

ends when the project team is convinced that the identified problem is important and deserving of immediate attention and when the project team is convinced that the design alternatives generated cover a range of achievable solutions. The ‘evaluate alternatives’ phase evaluates alternatives according to relevant decision space criteria which includes a formal risk analysis for each alternative. The phase is referred to as the reflect quadrant because an interim design component solution will be temporarily set aside to allow time for reflection by the design team or for the developments to become aligned in a related design spiral. The ’generate alternatives’ phase provides alternative solutions as a result of a formal requirements determination. The fourth phase is the ‘soft-code a solution’ which is where “solutions remain soft-coded (remain ‘live’) until either the project ends naturally within time and budget (Deakins and Dillon 2004:70).

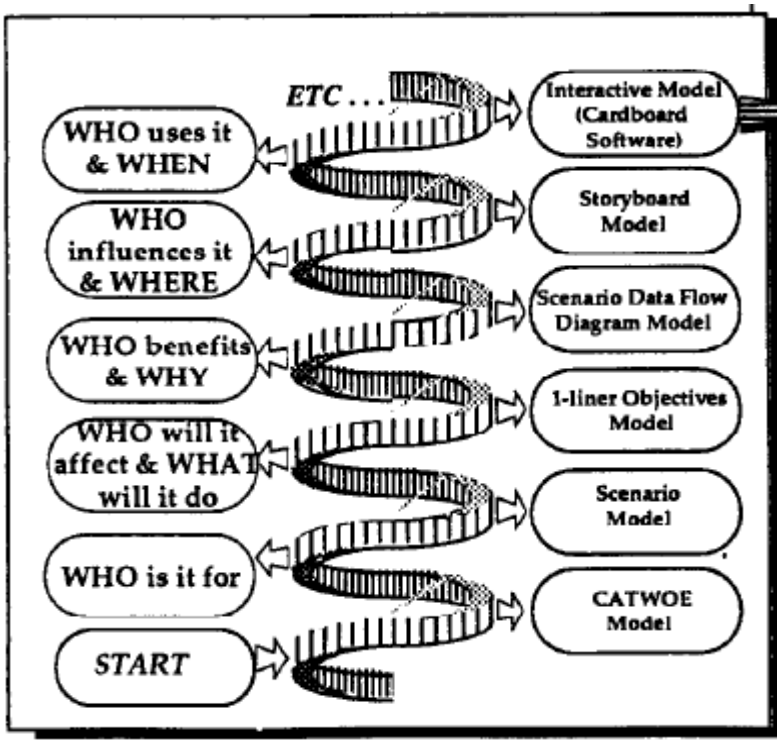


Fig 2.4: The helical Model (Source: Ainger 1995)

Where standard organisations may base their operations on function, product, geographic

area or some combination of these, project-based organisations use projects as the primary unit for production, organisation, innovation and competition (Hobday 2000). To manage, implement and deliver these projects, appropriate information systems are critical and various approaches to information management have been central to project management practice.

2.4. Understanding Project Management

Mainstream approaches to project management have centred on formal methodologies which are assumed to lead to good practice when followed with rigour. But, as with research, while formal methods help perception and contribute knowledge, an intellectual framework of paradigms embodying system ideas and beliefs is also required. Paradigms of intellectual framework and beliefs then undoubtedly shape the ways practitioners, including project managers shape its tools and techniques for managing projects. Systems Analysis forms a rational deterministic approach dominant in most practices. The organisational design approach considers integration and differentiation which includes the characterisation of organisations into temporary and ad-hoc project-based structures look on major projects and project activities in different economic sectors to analyse the strategic front-end factors within a project and the factors that may affect the project. Information processes look at uncertainty in projects as an overriding feature, drawing on concepts such as transaction costs analysis. Critical management investigates critical social theories and issues concerning the general maintenance of the state of affairs and views project management as an instrument of social control through the control of projects (Smyth and Morris, 1995; Winter et al., 2006; Hobday, 2000).

The traditional waterfall model is an expression of systems analysis, with a strong emphasis on control tools and techniques; it is task-oriented, sequential and driven on efficiency. This is a rational deterministic approach and is based on known teachings and practice (Winch, 2002; Engwall M 1998; Pryke and Smith, 2006). There are, however, the existence of other approaches to systems analysis which seek implementation based on social theories and not only approaches of control such as planning, tracking and monitoring in use by our everyday project methodologies. The information processing approach is a technocratic input/output model of managing projects as it contains social theory and focuses on efficiency. The information processing approach draws on economics and managerial paradigms to address information as a means of reducing uncertainty and improving risk management. This approach attempts to graft a more integrated approach to a linear task-orientated thinking and human

dimensions tend to be subsumed under the technocratic managerial considerations Winch (2002). Other approaches that could be better placed in viewing projects outside the control measures of systems analysis are the functional and relationship approaches.

The functional management approach which deals with the strategic front end management of projects as it draws on the organisational design and social theory of being a more holistic approach with a focus on effectiveness and efficiency. This paradigm is more integrated as it embraces structures, open systems and processes that seek functional outcomes. The task orientation of the functional management approach also gives way to a broader appreciation of a variety of human issues. This approach considers the internal and external factors that influence the project and therefore embraces a broader definition of the project's success by linking the project into the business strategy, portfolio and programme management while addressing issues such as learning, competency development and stakeholder analysis. This approach may be considered less linear than other approaches but most research methodologies have reported not to have recognised this -Morris (2004). The functional management approach is however not the same for project management models which look at detailed project activities, though they may attempt to cater for the holistic view by the use of risk analysis and constant feedback from clients. The approach may prove useful in software development and construction projects; we are not clear about the use or understanding of these models and methodologies in defining the project in the context of a more holistic world.

The relationship approach looks at managing social relationships as a means to management and adds value to projects and through projects to the overall organisation. The relationship approach is also based on social theory and focuses on effectiveness. The approach is an emergent approach that proposes that people add value individually and through relationships, as it identifies that relationships are behind all the tools and techniques. The relationship approach addresses a dichotomy of object-actor relationship as relationships are not just actor-to-actor or object-to-object but that of actor-to-object as well. The relationship approach does not substitute other approaches in the implementation of projects but complements them as it is diverse in theory, not linear in thinking and has a wide variety of definition of managing projects and defining its success across board Pryke and Smith (2006). The spiral, helical, DSDM and RAD models will be arguably best placed in the systems analysis approach ahead of placing them in the information, functional and relationship approaches though they may well use some of the functions of the later approaches.

These different concepts and approaches attempt to redefine contexts of project management and further

contribute to the Bodies of Knowledge or project management. The Bodies of Knowledge have attempted to conceptually shift the focus of managing projects from the traditional approach to management. Though there have still been some difficulties in the definition of projects and project management, this may in turn lead to difficulties of defining the success of project and project management respectively (Smyth and Morris 2007).

The PMI's Project Management Body of Knowledge (PMBOK) which is widely used is an example of this, a formal model for project management. The PMBOK model is quite simplistic with its primary focus on tasks execution; it is a product and variation of the traditional model which also has the paradigms of the information systems model feeding into it. According to PMBOK (2013), the PMBOK is said to seek general explanations and solutions for practice though it may not fully cater for other contexts of project management such as the strategic angle of projects which may draw on organisational design and social theory having a more holistic approach. It also omits the relationship approach that acknowledges that people add value individually and through relationships, as relationships in a system cannot be limited to actor-to-actor alone. The APM BOK who provide the PRINCE2 project management methodology also reflect the functional management approach as its task-oriented ways appreciates the human-organisation relationship while it tries to consider the internal and external factors influencing the project and also tries to link the project to the strategic concerns of the business and programme management.

These bodies of knowledge generally assume that there are generic and identifiable patterns from which rules, guidelines and controls that are repeatable can be developed and established. These may not be the case for all environments and some authors, such as Hodson and Cicmil (2006), have argued that seeking such generalisation may lead to an unsuccessful effort and end up in futility as the variety of context is too vast. The use of lessons learned has also been considered to generalise insight and research findings but this further poses a problem of determining the point where such knowledge becomes so generalised that it becomes of limited value and at what point it becomes so specific that it is no longer generalisable (Crawford 2004).

In comparing the models listed above such as the traditional, spiral and the helical models, some similarities are identified in all three approaches. The spiral and helical models have techniques that are used as a complement to the traditional model. As discussed, the traditional model places a strong emphasis on a linear thinking, task and control oriented, efficiency focused approach which is aligned to systems analysis. Though these may be recognised as the downsides of the traditional approach, more

recent developments like the critical change management and performance management attempted to move away from the rigid linear approach of the traditional model by introducing some elements of social science and behavioural elements.

A new method of content creation proposed is based on an argument of one of the most significant phases in product and service development (which can also be referred to as projects). Though for many companies, the requirements gathering for this deliverable may be restricted to focus groups in the environment, the team responsible for development must also elicit customer expectation from consideration of known competitor products and services and also from a vast range of external factors and trends such as global issues of taste and socio-cultural norms, product market positions and associated budgets. It is further argued that strategy is implemented through these projects and therefore every project should have a clear link between the project success and organisational strategy. There must then be an awareness within the project team that the project being developed are designed to achieve goals that are strategically aligned with the overall aim of the organisational (Deakins and Dillon 2005, Gray and Larson (2000). This, however, is not the full functionality of the traditional waterfall model which tends to consist of functionally focused individuals who may be multi-skilled and competent across functional areas which are required in the project. It can be seen that the spiral approach complements the traditional approach by including the risk driven approach, specification and prototyping while the helical model complements the traditional model by introducing alongside with the iterative spiral design an enclosed decision space within the spiral iterations. The decision space is the domain of making decisions for the developer teams and which expands or contracts as the project progresses in response to changing internal and external problems or opportunities.

2.5. Project Management Processes

As with major project management bodies of knowledge such as the APMBOK and PMBOK, a project management methodology follows standard processes from the start of a project to its completion and handover to the project awarding body. Mantel et al (2005) explain the life cycle of a project as follows:

2.5.1. Planning the project:

"Without a plan, everything is a deviation" (Lewis 1998 pg 215). The primary function of the project plan is to serve the project manager as a map of the route from the project start to finish. They maintain that if a problem occurs during the life of the project, the first hunch would be that the project was not properly planned. They also explain that the plan should contain sufficient information that, at any time, the project manager knows what has been done and what remains to be done, when it needs to be done, by whom

it will be done, when the task will be completed and what specifications the output should meet. Cadle and Yeates (2004) give some important reasons why a project plan is required; they argue that developing an information system is a complex or arguably a complicated undertaking, generally involving the synthesis of various elements – hardware, software, data capture, user training and many others. The success of this complexity is only possible with advanced careful planning, they explain that the people involved in a project need to know exactly what their role is, what they are expected to produce and when it is wanted. The project plan is said to communicate this information to all concerned. The project plan naturally can take different approaches. A project plan can have a work breakdown structure or a product breakdown structure. The work breakdown structure is more of a PMI approach, which defines it as a deliverable-oriented hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required deliverables. It is further stated that the work breakdown structure defines the total scope of the project. The work breakdown structure subdivides the project into smaller more manageable pieces of work. The lowest level of the work breakdown structure is called the "work packages". These work packages are scheduled, monitored, cost estimated and controlled (Cadle and Yeates, 2004; Project Management Institute, 2004)

2.5.2. Budgeting for the project: following the planning phase, a budget must be developed in order to obtain the resources needed to accomplish the project's objective. Mantel Jr. et al. (2005) define a project budget as a plan for allocating organisational resources to the project objectives and managing costs. .It includes the processes involved in planning, estimating, budgeting and controlling the cost so that the project can be completed within the approved budget. The PMI breaks this down into (1) Cost Estimating – developing an approximation of the costs of the resources needed to complete project activities, (2) Cost Budgeting – aggregating the estimated costs of every individual activity (referred to as work packages in PMI or as deliverables/products in PRINCE2) needed to complete the project, and (3) Cost Control – influencing the factors that create cost variances and controlling changes to the project budget (Project Management Institute 2004). Budgeting and cost management are vital for any project as the budget is one of the key means by which the success of a project can be measured. As with many projects, there are natural concerns for budgeting and cost control, some of the reasons for cost control issues are said to include (1) poor budgeting, (2) uncertainty about cost status, (3) scope creep which is normally caused by uncontrolled

changes in the projects scope where factors that were not initially considered in the planning of the project become part of the project therefore adding to the need for more funds and resources; and (4) unforeseen problems. The budgeting of the project is an important issue at every level of the project and is known to have been monitored and reported at every level of the project; project stages and milestones as well as project check points and project board levels. (Project Management Institute 2004; Lewis, 1998, Zwikael 2009, Zwikael and Globerson 2006, Meredith and Mantel 1995)

2.5.3. Scheduling the project: The project schedule is defined as a project plan in an altered format. It is a convenient form for monitoring and controlling the project activities. Scheduling a project involves drawing out the activities, which are tasks or sets of tasks required by the project. Activities make use of resources and time. Scheduling the project also involves drafting of events, which are identifiable states resulting from the completion of one or more activities. Events do not use up resources or time and before an event can be achieved, all its predecessor activities must be completed. Identifiable and noteworthy events marking significant progress on the project are normally referred to as milestones, while a network is a pictorial representation of events or activities and their interconnection a network diagram is usually used to determine a path; a set of connected activities between any two events, a critical path; a set of activities on a path from the project's start event to its finished event that, if delayed, will delay the completion date of the entire project, and a critical time which is the time required to complete all activities on the critical path.

2.5.4. Allocating resources to the project: This deals with allocating physical and human resources to a project in order to meet the project's performance objectives. The amount of resources that can be allocated depends on the timing of the allocation as well as the total supply of resources for allocation. The resource allocation mainly concerns how specific resources are allocated, the issues of limited resources being allocated to specific activities or projects when there are competing demands for the same limited resources. Scheduling the project also deals with the manipulation of project tasks and critical paths to fit in with the availability of scarce resources that compete with other projects or organisational tasks. In the PMI methodology, the allocating of resources to the project is catered for in the project human resource management process. The 'project human resource management' process includes the human resource planning where all the project roles, responsibilities and

reporting relationships as well as the staffing management plans are identified and documented. The 'acquire project team process' obtains the human resources needed to complete the project, the 'develop project team process' looks to improve the competences and interaction of team members to enhance project performance while the 'manage project team process' handles the tracking of team members performance, providing of feedback, resolution of issues and coordination of changes to enhance project performance.

2.5.5. Monitoring and controlling the project: To keep the project on schedule, to budget, within scope and to meet quality and stakeholder requirements, the monitoring and control processes are performed to track project processes associated with initiating, planning, executing and closing. Corrective or preventive actions are taken to control the project's performance. The monitoring and controlling processes are in place to ensure the project has a way to measure where the project is for each variable of interest. Any risks and issues that relate to the project and can hinder, stop or affect the delivery or quality of the project are identified, planned, monitored and controlled in the risk management process. In the PMI methodology, the responses to the risks are also planned, where options and actions to enhance opportunities and reduce threats to project objectives are planned and implemented. In the PRINCE2 methodology, the monitoring is an aspect of project management that is performed throughout the project. Project monitoring and control are in some ways the opposite sides of project selection and planning. The basis for selection dictates what to monitor and the details of planning identify the elements to be controlled. Monitoring is defined as the collection, recording and reporting of project information that is of importance to the project manager and other relevant stakeholders, while control is defined as the use of monitored data and information to bring actual performance into agreement with the plan. All talk about monitoring and controlling processes is easier in principle than in practice because where work being done is tangible, progress can be measured fairly well, but tracking, measuring and controlling progress gets a bit more difficult and particularly tricky when we deal with knowledge work progress (Lewis, 1998; Mantel et al.,2005; Project Management Institute, 2004).

2.5.6. Evaluating and terminating the project: This is said to be the final stage of any project where the results are evaluated and the project is shut down. Evaluating the project is said to mean setting the value for its appraisal. The evaluation appraises progress and performance

in relation to the project's initial or revised plan. The evaluation also appraises the project against the goals and objectives set for it during the selection process. Mantel Jr et al (2005) further express that eventually the project will be terminated, either quickly or slowly, but the manner in which it is closed out will have a major impact on the quality of life in the organisation. The closure of the project has to deal with the lessons learned on the project, the consideration of sunk cost, a smooth transition of the project and the associated changes to the organisation, further recommendations to the organisation, training needs, future support etc. It also deals with an early termination of a project as this remains a possibility. This should result from a mutual agreement of the parties or from default of one of the parties. The rights and responsibilities of the parties in the event of an early termination are normally contained in a termination clause of the project's contract.

2.5.7. Other project management processes that are followed by the PMI (Project Management Institute 2013) include **Project Scope management:** This includes the processes required to ensure that the project includes all the work required and only the work required to complete the project successfully. The scope is concerned with defining and controlling what is and what is not included in the project. A practice in the PMI methodology which is not necessarily a big part of the PRINCE2 methodology is the planning of the scope. The scope planning deals with the creating of a project scope management plan that documents how the project scope will be defined, verified and controlled and also how the work breakdown structure (known as project activities, deliverables or products in PRINCE2) will be created and defined.

2.5.8. Project Time Management: The PMI methodology includes a process in defining the processes required to accomplish timely completion of the project. The project time management process includes the activity definition process which deals with the identification of specific schedule activities that need to be performed to produce the various project deliverables, the activity sequencing process which identifies and documents dependencies among the scheduled activities, and the activity resource estimating process which estimates the types and quantities of resources required to perform the defined activities. The activity duration estimation and schedule development processes are concerned with estimating the number of work periods that will be needed to complete each individual schedule activity and the analysis of the activity sequences duration, resource

requirements and constraints in order to create the project schedule. Monitoring and controlling the project schedule is done in the schedule control processes.

2.5.9. Project Quality Management: To meet stakeholder requirements and to ensure that the project satisfies the needs for which it was undertaken, quality policies, objectives and responsibilities are put in place in the PMI project management methodology. I can safely argue that this is catered for in the PRINCE2 methodology as managing stakeholder expectations. In the PMI methodology, the project quality management is implemented through the policies, procedures and processes of quality planning, quality assurance and quality control with continuous process improvement activities conducted throughout as appropriate. The quality planning process identifies which quality standards are relevant to the project and determines how to satisfy the standards. The quality assurance process deals with applying the systematic quality activities to ensure that the project employs all processes needed to meet the requirements. The final quality management process is the quality control process, which monitors specific project results to determine whether they comply with the relevant quality standards and identifies ways to eliminate causes of unsatisfactory performance.

2.5.10. Project Communications Management: This is a knowledge area in the PMI methodology that employs the processes required to ensure timely and appropriate generation, collection, distribution, storage, retrieval and ultimate dissemination of project information. The processes provide critical links among people and information that is necessary for successful project communication. Without a proper communications management process in place, project managers can spend an inordinate amount of time communicating with the project team, stakeholder, customer and sponsor. The project communication management processes include: the communications planning process, which determines the information and communication needs of the project stakeholders; the information distribution process, which makes the required information available to project stakeholders in a timely manner; the performance reporting process, which collects and distributes performance information including status reports, progress measurement and forecasts; and the stakeholder management process, which deals with managing and communicating to satisfy the requirements of and resolve issues with project stakeholders.

2.6.Project Delivery (Implementing the Project)

The implementation phase is the stage at which the project is given shape and form. As such it makes considerable demands on organisational conditions and the commitment of the people involved adjusting to the project to bring about the proposed innovation. Some say that the implementation phase is the heart of the project and its most crucial phase. Most failures can be expected to come out of this phase. The aim of the implementation project is said to be that it would achieve the best possible result with minimum efforts and cost This would typically follow detailed planning, dependency and contingency planning, task scheduling, sequential decision making, risk management, and also the management of project buffers (Cozijnsen et al (2000, Pich et. al., 2002, Vrakking, 1995).

Once the project plan described above has been agreed, the next step is to implement the plan. The plan implementation is a maximisation of the degree to which the actual use of an innovation corresponds with its intended use. Having a plan is what I can describe as the first step to a long and tricky journey. The plan may give instructions on what needs to be done but the question about how it will be done is quite different and from my experience is not normally quantified in the plan. Project managers may follow the PMI methodology and re-plan when they have more information, they can follow a breakdown approach where the activities in the plan are broken down into actual schedules and actions. These are then assigned to people who are given a deadline on when to complete the actions. Risks or issues are usually raised if the deadline for the tasks will not be met (Fullan and Pomfret 1977). An arguable problem seen with all the approaches is that if an activity, action or task which cannot meet its deadline has a critical dependency on other activities or is on a critical path, which is described by PMBOK (2013) generally as the sequence of scheduled activities that determine the duration of the project, i.e. generally the longest path through the project plan. We may see a direct relationship between the slipping of that activity and the project failing.

Implementation also constitutes monitoring and tracking other project activities such as risks and issues. If these activities are not tracked, then every person who is tasked with a project activity may run off and carry out the tasks in their own way and at their own discretion. It then becomes the responsibility of the project team to track and monitor the activities of these people to ensure it is being carried out in line with the plan and in view of the other Dependencies (PMBOK 2013, Fullan and Promfret 1977). If an organisation operates a strict hierarchical structure where an engineer may not necessarily have access to a senior manager while working in a project environment then the engineer may encounter issues that require the decisions of such senior managers. It will then be the responsibility of the project to coordinate the affairs of engineers and senior management to resolve any issues, in order to ensure that the progress

of the project is not hindered or halted.

Cozijnsen (2000) notes that the stage at which the plan is implemented is one area that receives very little attention and that this attention does not typify the importance of the implementation phase. This is because it is believed that many projects fail because the implementation phase, which is one of the most difficult phases, is not handled correctly. An arguable reason why implementation seems to be given so little attention may be because it proves very difficult to establish a success measure for implementation, but rather its success is measured in view of the requirements identified for which the project was to deliver based on some agreed blueprint or requirement documents. While organisational perspectives can measure success across the board based on some individual/team results and performance in line with organisational goals, the success criteria of a project will have to relate directly to the innovation which brought about the project. The problem here is to check and measure the results of the internal project implementation with external success criteria, therefore the degree to which the overall goals as defined by the organisation may become a success criteria for the project's implementation phase. The level of analysis, unlike the other perspectives, is the innovation project itself. If in the implementation phase, one wants to find factors that influence successful innovation, the success measure will have to relate to the results (output) of the innovation project. The most important result of a successful innovation project is the degree to which the defined goals have been achieved. It is necessary to quantify the results in terms of defined goals. The implementation phase is the final active phase in an innovation process. Implementation factors such as management factors, resistance and intervention refer to events in the innovation process itself. In all likelihood, the way in which the innovation is implemented during the process has a direct effect on the final results of innovation projects. Whereas the other perspectives can design their success measures and criteria based on the results of (individuals in) the innovating organisation, the success measure of the implementation activities will have to relate directly to the results of the innovation project. So a way must be found to quantify the results of the innovation project. How can project results be quantified? It is rather tricky and maybe impossible to check innovation results against an external success criterion. There simply is no success measure external to the innovating organisation that is useful for organisational as well as technological and product innovations. The objectives of the different types of innovations are too diverse.

I have recently subscribed to a professional body that is known for problem solving. They use methods such as Heuristics which is the rule of thumb; a writing procedure, which makes sure things are done without mistakes and omissions; system diagrams, which deal with understanding the way factors

interact; swim lane diagrams, which is the mapping and improvement of organisational processes; storyboarding, which involves planning and checking a process as a team; 'the five whys', which attempts to get to the root of a problem quickly; root cause analysis, which traces a problem to its origin, unblocking bottlenecks and fixing unbalanced processes; cash flow forecasting, which tests the viability of a project; and risk analysis, which involves managing any risks. Other methods include: CATWOE, which involves understanding the different elements that contribute to a problem; inductive reasoning, which involves drawing good generalised conclusions; soft systems methodology, which involves understanding very complex issues; queuing models, which involve optimising services and resources; drill down, which is breaking problems down into manageable parts; cause and effect diagrams, which identify the causes of problems; appreciative inquiry, which involves solving problems by looking at what is going right; the straw man concept, which is made up of the following stages - build it, knock it down and create a solid final solution; and failure mode and effect analysis (FMEA), which involves spotting problems early on. These methods all make use of various tools and techniques that intend to help us understand problems we face in our environment and in turn propose the way to go about finding a solution. I have seen some of these methods in use within a commercial environment and some of them give some meaningful insight into different situations. In my training as a business analyst, I understood the working principles of methods such as CATWOE, swim lane diagrams, and root cause analysis whereas in my capacity as a project management analyst, I had a working knowledge of cause and effect diagrams, flow charts, soft systems methodology and risk analysis. It becomes safe to say that the various tools listed above look deeply into cause and effect relationships, they are help the users who more often than not are analysts, consultants or some form of experts to determine what sorts of relationships exists between these cause and effects and in turn they give some form of advice to clients on the lessons learned and also what the suggested way forward should be.

2.7.Critical Reflection

The planning, monitoring, tracking, analysing and evaluating of processes practised by project management methodologies can be argued to naturally follow structured management patterns that can be said to have been the modification of old management patterns. Fayol (1916) proposed 14 management principles and 5 elements of management. The five elements of management are more in tune with the management of projects known today, they are as follows;

- ☐ Prevoyance: Forecast and plan, known as the elements of strategy; the future is examined and a line of action is drawn

- ☐ To organise: Involves building up the resources (human and material) for the undertaking (which can be comfortably referred to as project)

- ☐ To command: Maintain activity among the personnel. This is likened to direct monitoring and involves managing project execution according to PMI and directing a project in PRINCE2 terms.

- ☐ To coordinate: This is binding together, unifying and harmonising all the activities and efforts. This can be said to be, in PRINCE2 terms, controlling a stage and managing stage boundaries, whereas in PMI terms it will be determined by monitoring and controlling project execution.

- ☐ To control: Seeing that everything occurs in conformity with established rules and expressed commands. This can be likened to a more detailed level of the controlling and managing stage boundaries processes of PRINCE2 and monitoring and controlling project execution in PMI.

Another approach to project management is posed by Pich et al. (2002). They talk about the approach of task scheduling and risk management as the approach of instructionism, where actions are pre-specified and triggered based on signals. This is deemed sufficient as long as the information about the state of the world and payoff effects of actions are adequate. Where information is inadequate based on either ambiguous factors or the complexity of too many interactions, the combination of learning and selectionism is required. Learning being the capacity to conduct new planning in the middle of the project, while selectionism is pursuing multiple approaches and choosing the best that can be identified. Pich et al. (2002) argue that the process of selectionism can be likened to the probe and learn process of Lynn et al. (1996) which is a continuous and incremental improvement of products and processes that involves turning products over and over again, getting new products out, and starting work on an even newer one.

The project management processes discussed express the traditional view of management as put forward by Cleland and King (1968) that the management of processes concerned with the achievement of objectives. To achieve these objectives, they say that managers perform a number of functions such as planning, organising, motivating, staffing, controlling etc. They categorise these functions as two salient functions of deciding and doing or better still planning and implementing. The planning process is quite similar to the planning process highlighted in project management methodologies. It is expressed that though there is no general agreement on what constitutes planning, it encompasses activities that deal with goal setting, policy making, strategic planning or strategic decision making. Planning thereby involves the

identification of the broad goals of the organisation or in this case a project and the specification of strategic policies which prescribe the way in which the organisation, group or project will go about achieving its goals. The function of implementation involves all the things required to achieve the objectives once the strategic choices have been made as put forward by Cleland and King (1968). They continue to express that to accomplish the objectives; the process of implementation requires organised effort, which further requires that people are given specific directions with the appropriate motivation to follow the given directions. These individuals must then be monitored and controlled to ensure that they have performed their assigned functions properly. They defined motivating as a face-to-face leadership situation between supervisors and subordinates and between peers and associates. Controlling was defined as the process of making events conform to plans by coordinating the action of all parts of the organisation according to the plan established for attaining the objective.

In the implementation phase, there is a dynamic process that deals with many organisational factors such as resistance to change, interpersonal communication and power relations. This can be referred to as the people side of the innovation. There is also a control aspect to the project which ties in with the process documented by the PRINCE2 methodology. The control aspect deals with methods such as planning, budgeting and monitoring. Another dimension which is also well attached to projects is the dimension of intervention methods which deals with training, surveys and conferences to help users handle the dynamics of the results of the innovation process.

The success of a project could be argued to be based on the delivery of the project implementation, the organisation that owns/sponsors the project, as discussed, the factors that control and externally influence the delivery, the project manager who is personally responsible for the overall implementation of the project, as discussed by Frame (2003) who proposes a surgical team approach which is considered later in this chapter, the project team assembled by the project manager or the organisation, and the methodology in use.

Bresnen et al. (2004) put forward an argument that although project basing is often conceived of as an appropriate way of organising for innovation, research on project-based learning consistently highlights the problems involved in attempting to capture, share and diffuse knowledge and learning across projects. There are many inherent contradictions between organising to meet short-term, project task objectives and the longer term developmental nature of organisational learning processes and others suggest that project basing can limit the innovative potential of firms. It is quite possible therefore that far from being the vehicles of creativity as presented in the literature, projects can create barriers to change and innovation,

by privileging short-term task performance over long-term knowledge accumulation. This will imply the importance of understanding diverse logics of actions that underpin project management processes on the one hand and organisational knowledge accumulation on the other hand. Developing such understanding will become particularly important in the case of project management within organisations whose work is partly or wholly project based. Further arguments express that many analyses of project organisation and management deal with these idiosyncratic aspects of projects by depicting them as relatively short term and fluid activities set against a more permanent and static organisational background .

In some project-based organisations, it is suggested that projects do not simply occur against a backdrop of relatively established, routine activities. Instead, they constitute the organisation, creating a scenario in which knowledge diffusion and emergent working practices are likely to be the result of a complex interplay between constantly changing project conditions, on the one hand, and a partly indeterminate and shifting organisational terrain, on the other (due to the diverse range of projects being undertaken). In more 'radical' project-based organizations, such features can lead to highly attenuated links between the projects and the organisation(s) in which they are embedded and, consequently, to a mode of governance that differs radically from that associated with more traditional bureaucratic organisations (Lindkvist 2004: 5–6). Nevertheless, it is clear that even supposedly 'one-off' projects tend to be situated in a wider organisational and historical context (Engwall 2003). The same applies in the case of project-based organisation, where existing organisational practices and broader networks of relations comprise the organisational and institutional context within which projects are embedded (Lindkvist 2004: 15). Consequently, it becomes important to recognise not only that those definitions of project-based organisation vary, but also that their empirical manifestations and characteristics will vary too, depending on their approximation to 'pure' or 'radical' conceptions of the form.

A criterion that could arguably be added to the success criteria can be said to be the interaction of the project team with the organisational goal. Frame (2003) discussed the surgical team approach, where a team that becomes expert in implementing a project time after time should be used in the delivery of known projects. Though I subscribe to this argument, another area for further investigation will be the involvement of every project team in the commitment of not only delivering a successful project but also a commitment to achieving an overall ultimate goal that is in line with the vision and goals of the organisation they deliver the project to. Simmons (2002:16) narrates a story "A man came upon a construction site where three people were working. He asked the first, "what are you doing?" and he answered, "I am laying bricks." He asked the second, "what are you doing?" and he answered, "I am

building a wall." He walked up to the third man who was humming a tune as he worked and asked, "What are you doing?" and the man stood up and smiled and said, "I am building a cathedral."" This does not only point us to the fact that everyone in the project, be it consultant or in-house team member, should have an understanding of the overall aim with which the project is being undertaken. A developer should not only be concerned about getting his coding right but seeing how his coding will aid the competitive advantage of the organisation in the social world where it competes. If this is achieved, then a project manager or the project sponsors will have reduced time in tracking the performance of project team members because when someone understands what you want them to do and does not buy into why you want them to do it, you will never be satisfied with their performance (Simmons 2002).

2.8. Comparing Project Delivery Models

In comparing the models, I draw up a matrix of project contexts and possible usability of these models. The model that is known for its orientation of establishing control in the implementation is the traditional waterfall model. The developers of this model believe it can be used with all forms of projects if implemented properly and it has also been known to accompany the spiral and helical models hence the "Y" in the last field. The other models have tried to cater for the shortcomings of the model by introducing the ability to capture requirements and receive feedback from within the project and also from customers who are assumed to have a view of the external world with particular interest in the project. The PRINCE2 methodologies and the PMI methodologies have also been considered alongside the models as they are being used for various types of projects. These also establish control mechanisms in their implementation approach but may tend to suffer in their knowledge of the outside world and the required feedback that may introduce minor or major changes to the delivery of the product or service in question.

Project Model/Methodology	Control (Time & Budget)	Internal & External Requirement	Flexibility	Internal & External Feedback	Risk Based approach	Use of alternatives	Relationship	Visibility	Learning & Adaptive Approach	Overall Useability (for all kinds of projects)
Traditional Waterfall Model	Y	N	N	N	N	N	N	N	N	Y
Concurrent Engineering	Y	Y	Y		N	N				N
Spiral model	Y	Y	Y	Y	Y	N	N	N	N	N
Helical Model	N	Y	Y	Y	Y	Y	Y	N	N	N
Prince 2	Y	N		N	Y	N				
PMI	Y	Y		N	Y		Y	N	N	Y
Agile	N	Y	Y	Y			Y		N	N
Complemented PMM	Y	Y	Y	Y	Y		Y	Y	Y	Y

Fig 2.5: Methodology and Aplicability Matrix

Questions that arise from this comparison are:

I. How are the requirements gathered? Using these methodologies, requirements are normally gathered in workshops where experts and consultants meet with the business to fully understand what deliverables are required from them. It has been noted that the use of focus groups and brain storming sessions are common in requirement gathering (Smyths and Morris 2007). Though these methods may capture the main requirements from a systems analysis, end user or stakeholder point of view, disposition and abilities to articulate true standpoints should be considered. It may be necessary to enhance known models and methodologies such that hidden factors and other requirements that are born out of the functional and relationship management approaches are identified and revealed.

II. With the iteration and high level of flexibility, we may be open to allowing/wasting too much time. We may never have a complete product if the requirements are never frozen. The rate of changes introduced in our world today is alarming and high paced. You simply can't keep up with one project (product delivery). The control mechanism introduced in the traditional model may have a place, as having customers and the outside world have a say may lead to scope creep, which according to the PMBOK (2013) is normally caused by uncontrolled changes in the project's scope where factors that were not initially considered in the planning of the project become part of the project and add to the need for more costs and resources. Though the benefits may have a good pay-off, the downside should not be ignored as it may be the difference between the overall success or failure of the project.

III. Models such as the spiral model and the helical models that cater for capturing requirements and feedback from within the project team and also from the outside world, may be helpful for implementing a project that exists in a stable environment while interacting with a world that is unstable, complex or chaotic. Though these models may attempt to capture the requirements of these interactions we are unsure of how well it caters for understanding and successfully working with and within the interactions.

IV. There is also the constant argument that one-size does not necessarily fit all (Smyth and Morris 2007) and it can be argued that some of the intelligent models will be useful for software development. However, projects such as transformation projects, migration, software & hardware update projects, network infrastructure projects, projects involving

mergers and acquisitions, data fusion projects, and so on, which are increasingly common today, may not need the use of models or prototypes but may require deeper understandings of environments where they are being implemented. With fusion and migration projects, for example, data or infrastructure may require merging two separate systems in which case it becomes the job of the project to understand the systems and implement the changes with little or no impact to the users of the two systems, who work totally or partially independent of or dependent on each other as they intend to work as a single unit.

2.9. Failed Projects:

Given the preceding discussion on what factors facilitate project success, some factors might also cause projects to fail. Expenditure on projects in many large organisations and multinationals can often run from thousands to millions of pounds annually. There is an increased emphasis for project management to succeed even though high rates of failure have been observed - especially in relation to IT projects. Whittaker (1999) and Mantel Jr et al (2005) say that there is a large emphasis on project management because organisations are asked daily to accomplish tasks that do not fit neatly into business as usual. According to Whittaker (1999), project management is a critical issue for organisations, but the rate of failure for I.T projects in particular is astounding. The claim is that failed projects exceeded their initial scheduled estimate by 30% or more, 56% of failed projects that exceeded their estimated budget by the same amount, and 45% of failed projects that failed to produce the expected benefits. However, some researchers feel that these do not necessarily classify the projects as failed but as mere blunders (Charette, 2004). In this regard, a project would be considered to have failed if the risks were assessed, managed and accepted where required; the assumptions were checked and success criteria defined; and the plan was estimated and well-funded, but that for some reason the project did not work. One of the points for consideration here is if "some reasons" might be what Gilb (1998) referred to as the critical factors necessary for the success of the project. Both terms, project blunders and failures, are referred to in this research as unwanted characteristics in the world of projects and project management. Blunders or failures infer that a project did not succeed irrespective of time, cost and the efforts exerted on its implementation. Mantel Jr et al (2005) and PMI define a project as a temporary endeavour undertaken with a specific deliverable which is aimed at meeting a specific purpose. It can be argued that a project is required at a specific time and an estimated cost is attached accordingly. It can also be further argued that the relevance of the project might not question if it fails to meet some time requirements. For the same reasons, Cadle and Yeates (2004) express the need to validate and revise the business case of the project as the project

proceeds and more is discovered about the cost and benefits of introducing the project. This again poses the risk of exerting time and cost constraints on a project only to discover that these are no longer needed due to further improvements in the relevant field, new or upgraded platforms for the operation of software/applications, new legal requirements etc.

The failure of these projects does not necessarily apply to IT projects alone. Records and history show that many other kinds of projects fail and are prone to failure. The Jubilee Line extension project was reported by Lynch (2003) and Chaffin (2001) to have increased in cost by about £3.5 billion from an initial budget of £1.8 Billion; the project had an initial completion date of Spring 1998 but had not been completed by early 1999 making it late and around 66% over budget. The Kansia airport in Japan was built over reclaimed land and after its implementation, it was announced that the reclaimed airport island was sinking into the murky depths faster than expected. Vast amounts of money had to be spent on keeping the existing structure from being literally submerged and by the end of the year following its implementation, it was estimated that around JPY 27 billion had been spent on shoring up the terminal. It was reported that the airport had been in debt in each year of its operation and by 2001, the airport was in debt again to the tune of JYP 15 billion. The overall debt of the airport soared to about JYP1 trillion. The debt was supposed to be paid off by 2027 with estimated take-offs and landings of about 160,000 flights by 2007. The estimate was revised to about 130,000 flights for that year. The Kansia International Airport can be seen to be a project that had issues with its budget, and its ability to meet its initially set requirements Al-Badri (2003). The London Ambulance project was meant to follow a particular process but the technology in place did not perform as planned and the project failed almost three times before completion, according to Dewsbury and Dobson (2007). The INCIS project was not a stranger to project blunders with cost and time overrun issues. In New Zealand the INCIS project went wrong by going over its initial budget to the tune of about $34.6 Million dollars. The INCIS project was expected to have been completed in September 1997 but by March 1997, it was reported to be at least 9 months behind schedule on the existing plans, and the project was expected to be over its schedule by at least 3 years Hutchinson (1999). Failure is not restricted to any types of organisational sector as they all have a tendency to fail irrespective of their organisational sectors or organisational environments.

One of the arguments put forward by Gilb (1998) is that the failures of some software development project results as the failure to determine and control projects' attributes critical for survival, the failure to find architecture suited to those critical attributes and the failure to evolve a useful system in smaller useful steps. These critical attributes are those qualities and resources which can cause the collapse of the

system as a whole if they are allowed to go beyond certain limits, which he referred to as the worst acceptable levels. He argues that it is necessary for project managers to determine these dangerous attribute areas and to take steps to manage them. Some of the critical factors identified were: a compelling business case, agreement to requirements, executive support, user involvement, cross-functional teams, an executive steering committee and adequate budget. They identified other success factors as: the management of expectations, the project plan, accurate status reporting, strategic use of consultants, the project manager, the scope of the project and the change control processes (Gilb 1998, Lang and Mahon 2006).

The existence of a viable business case can be said to be the main control condition for a project. The business case is defined as a description of the reasons for the project and the justification for undertaking the project - based on the estimated cost, the risk and the expected business benefits and savings. It needs to be developed according to any organisational standards that might exist and the nature of the project, is said to drive the decision-making process, and is used continually to align the projects progress to the business objectives and benefits (OGC 2005). The project can be stopped if the viability of the business case disappears for any reason. In this spirit, Gilb (1998) made reference to corporate information systems (CIS) project which he said had failed for not meeting the critical attributes of the project which were mainly: the requirement specification for the CIS project and the stand point of the various "team players" that put together their efforts to complete the project. He reported that on interviewing the project leader of the project, he was unable to find specifications which had to do with the project handling the daily work capacity, the analysis of the worst case and a planned acceptable level. He also described the various project team members as being more concerned about their bit of work functioning properly irrespective of the entire project meeting the specification or the desired project attributes.

Many arguments have been made concerning what is needed for the success of a project (Young, 2009; McGraw, 2009 and Voge, 2009). Successful projects are mainly based on the abilities of the project manager to communicate, organise, solve problems/make decisions and build good teams. The success rate of projects can be improved with good leadership as the ability to implement a methodology or project management knowledge areas alone is insufficient. The successful project manager must be able to lead courageously and have the ability to influence others to resolve some of the critical problems that projects experience. (McNamara, 2002)

Gilb (1998) argues that the CIS project is typical of multiple projects which commit the same sin and end in failure as he points out that the failures are due to:

1. Unclear specification of “un-measurable” critical system attributes

2. Lack of real engineering of systems and software to achieve those critical attributes. Lack of a trained project team (software architects and engineers). He says the “bricklayers” are left to do the architecture by default.

3. Lack of any systematic notion of evolutionary delivery, feedback and change-upon-learning process. He expresses that we are always looking for a ‘big bang’ delivery and are too foolish and immodest to realise that we must accomplish something real in order to learn what we have achieved and build and design complex systems safely.

Frame (2003) notes that the success of a project is largely dependent on the project team responsible for executing the project; he uses the analogy of a surgical team. At the heart of the team is the surgeon who performs the surgery on the patient, the surgeon is surrounded by her assistants e.g. anaesthesiologist, nurses and interns who provide the surgeon with all manner of assistance but it is the surgeon who has the final say and carries out the surgical procedure. One fundamental objective of the surgical approach is to allow the surgeon to pursue her work freely, unencumbered by the administrative and technical obligations. He further explains that in project management, one individual is given total responsibility for carrying out the main body of the project while being shielded from administrative paper pushing.

An advantage of the surgical team approach is that it tackles the issue of system integration head on. Since project output flows from one individual, the pieces being produced are likely to fit together nicely such that inconsistencies and duplication of efforts is minimised. The downside of this is that it requires a superlatively capable individual to play the role of the surgeon, in this case, the project manager. If such a person is not available, the resulting product will be mediocre. The surgical team approach is effective for design projects and projects that entail large amounts of writing. Many other team approaches can be undertaken as there is no one perfect structure for managing projects. The surgical approach addresses the issue of system integration, while the egoless team approach offers an intense and open communication among team members but might suffer a lack of leadership. The isomorphic team approach is conceptually simple and straightforward but may yield system integration problems and the specialist team approach fits together with a matrix environment but may have all the problems that come with matrix management. The team structure of a project team would come as a result of examining the organisation’s architecture. Project staff are thus able to develop the ability to predict the things that can happen on a project since much of what happens on the project is induced by the organisation’s structure

(Frame, 2003).

A project can be said to have failed if it does not meet certain critical requirements that governed the viability of the project before its inception or start up, or is unable to evolve with the growing needs of the business for which it was embarked on. The "project team" executing the project can be argued to be another factor responsible for the failure of projects (Gilb 1998, Frame 2003 and OGC 2005).

The importance of stakeholder commitment is said to be the basis for driving any relationship forward, irrespective of the kind of relationship, whether of family, friends, romance or business. Stakeholders play various but vital roles in the delivery and success of any business. A downside to the literature of Mantel et al (2005) is the omission of stakeholder management. Voge (2009) puts it that stakeholders can be: dormant or discretionary; demanding, dominant, dangerous, dependent or definitive; and their level of involvement can be simple awareness, understanding, buy-in or full commitment. He reiterates the fact that involvement is not enough, as involvement can be mere awareness or a total commitment. However, can these success factors be applicable in all cases and all organisational environments? The understanding and possession of such a skill set might be a factor that will separate a general manager from a project manager. For the purpose of the project and its success, a project manager will need to have and spend a good amount of time on negotiating with stakeholders who may be passive or active, as long as they have a reasonable amount of authority over the project. In a project management environment, having a place of strength can't be seized, but must be given however reluctantly by those over whom it must be exercised. A project leader should have the ability to negotiate from a place of strength: Jandt (1985). Even though power is said to be to the attainment of stakeholders' goals, the power to make decisions might not be an automatic one especially from an overall organisational point of view. A manager, be it project or functional, should be able to negotiate by separating people from problems, focusing on interests rather than positions, inventing options for mutual gain, and insisting on using objective criteria for negotiating one's way into getting to an agreement that is required for the project's success Fisher and Ury (1983).

When the environment is fast changing or uncertain, there is a multiple solutions approach where multiple solutions should be pursued in parallel, with the best solution chosen once their outcomes are observable. The viability of the approaches pose an argument for the researcher as we are unsure if there will be the liberty of time and cost to accommodate the approaches in a real world scenario. This research will look at a variety of real projects as case studies and aims to investigate the various approaches to project management. The project approach advocate partially conflicting approaches to the project teams, such as

the need to execute project tasks, trigger pre-planned contingencies based on unfolding events, experiment and learn, or try out multiple solutions simultaneously. While these approaches encompass the idea of uncertainty, they argue that no conceptual model currently exists that enables project managers to understand why different approaches exist, which one to choose, and when. They say that as a consequence, project failures are numerous in practice, they gave an example that budget and schedules overrun, performances are compromised, and opportunities are missed. This is another argument that categorises project failures as a result of budget and schedule, though they also look into the issues of performance which can be argued to be measured by requirements and stakeholder management. Project failures can also be categorised with missed opportunities Pich et al. (2002)

These approaches all categorise and define project failures in a relatively stable business and organisational environment where if we know and define the environment we work in, as discussed in the PMI methodology, some environments can easily relate cause and effect relationships either in a straightforward way of cause equals effect or environments where there may be use of experts to help understand the cause and effect of relationships if they seem more complicated. This is not always the case with business and organisational environments especially when they are located in a social system. Where some organisations may seem to exist in a straight forward orderly environment, there is also the existence of a “not so straightforward” environment where they may exist in states of disorder, un-order, or in a chaotic or complex environment.

Other thoughts on project failures are categorised by Cozijnsen et al. (2000) who first explains that projects are carried out as a result of innovation, which could either be in the form of total quality management, business revitalisation, vision, values and attitudes, business process systems, or information technology. Regardless of the reasons behind each innovation, the table below reports different projects based on various innovations:

Type of change	Degree of Success Successful %	 Neutral %	 Failed %
Total quality management (TQM)	29	50	21

Business Revitalization	16	50	34
Vision, Values and attitudes	32		
Business Process Systems (BPS)	27		
Information Technology	20		

Table 2 Source Carr (1996)

The table above which is based on a US research effort by Carr (1996) indicates that 21 percent to 34 percent of projects ended in failure while 50 percent of the projects showed no improvement. The conclusion of the table above is that 70 to 80 percent of projects end up as failures or are unsatisfactory i.e. they either fail in part or fail completely. Whatever the innovation is, each innovation has its own different evaluation criteria such that different success criteria have been developed to determine whether or not the innovation has been successful. This raises the question about whether the success of the project is based on different success factors defined for it as a project or if it is based on an overall complex organisational innovation, aim or goal. Looking outside the implementation of the project is a strategic perspective which concentrates much less on the end results of the actual project, but focuses more on the indirect results of the project that are more economic in nature. This perspective defines the success of the project in light of market demands, therefore a project may be implemented successfully but if it fails to meet market demands on its completion, then it may be characterised as a failure. The project may have been embarked upon in order to enhance an organisation's competitive advantage, to increase market share, to reduce future spending, meet specific legal requirements or improve operational performance. Success in terms of a strategic objective outside of project implementation may be defined with criteria such as: strategic advantages to be realised; the speed at which the innovation can be realised in light of the market competition; addition of improvements by the project to the markets compared with existing goals, whereas success within the project may be to complete the project within the given time frame, to budget, within scope, and according to the projects requirements. Though the success criteria within and outside of the project can be said to be arguably interwoven, the primary goals and priorities of the people

involved may differ based on the perspective at which they operate. For full project success to be defined, there may have to be a more holistic approach to the definition of project success, the success may have to be defined both within and outside of the project looking at how well both systems (project implementation and a strategic perspective) interact.

To this effect, Cozijnsen et al (2000) also talks about a relationship between an individual and the organisational structure and the speed at which the individual carrying out the project or the organisation is able to accept an innovation. This adoption behaviour is therefore arguably a criteria for success but is applicable only to the initiation phase or the decision making phase of the project. Once this phase is performed, the project can be said to be underway. This argument ties in with that of Frame (2003) who puts forward the surgical team approach as success factors that can be identified and defined in the implementation phase of the project. If these factors are rightly identified and defined and cause the projects to fail, then the arguments of Cozijnsen et al (2000) would prove very valid in that a failure of the overall project can be traceable to a failure in the implementation phase of the project.

2.10. Project management within social systems

When organisations embark upon projects, they often follow standard project management methodologies to implement and follow through the life time of their project. These methodologies stand as a framework for managing and maintaining the project from start up to completion and implementation of the project. This structured system analysis and design methodology is sometimes thought of as a cookbook approach to the analysis and design stages of the systems development life cycle. There lies a possibility of the combination of various methodologies to create some form of a hybrid or bespoke methodology which should not be exempted. While the methodology may work rather seamlessly for some IT projects there may be a need to tailor the methodology to suit the needs of much larger major projects. Smyth and Morris (2007) argue that projects are context specific, are located in open systems, and that there is no unified method for the management of projects.

Further investigation will include the organisation where the project is being implemented and the wider environment in which the organisation itself engages with and the forces that affect the determination of its goals. Understanding the type of project we are implementing is one thing, understanding the environment where we implement the project and what forces affect decisions is another topic to be considered. As discussed above, Hobday (2000) explains that some organisations' use of projects is as the primary unit for production, organisation, innovation and competition. There is a need to understand the organisations that are the employers of these projects, the external and internal forces that may affect

them and their organisational rationale in order to fully identify and understand the critical success factors as explained by Frame (2003) that may surround the project. These success factors can then be measured in line with the project requirements, the organisational goals and also the factors that may affect the goals that drive the organisation as a whole. There is therefore a need to investigate organisations as social systems to enable us to understand its internal and external interactions and enable us measure the overall success of projects in project management terms and also in terms of the organisation which is a part of a social system.

I am not proposing to replace existing models and methodologies, but to complement them by the introduction of tools designed to assist interpretation of socially complex situations. This may not apply to organisations that are mature in a particular project, i.e. if they have implemented a project repeatedly and have become mature in delivery. How often we get this level of maturity is an unknown at this point but it is assumed that organisations that have become matured in the implementation of a particular project may not need to have their methods of implementation complemented.

I argue that an understanding of project management requires an examination of the organisations in which they are located as social systems and that this wider system determines the goals, strategies and operations of projects. Organisations are assumed to be an intrinsic feature of the social world and organisations are social systems organised one way or another. Our task as researchers is to understand how these systems are organised and why. Tsoukas and Hatch (2001) put forward two schools of thought that attempt to give an explanation into the managing of systems. The first is the sociological-historical-anthropological orientation, which seeks to produce an explanation of specific organisational features either by using the variance model of explanation or through tracing back the origin of the features of the organisation to its institutional history or cultural factors. The second is the cybernetic-systematic school of thought where organisational systems are conveyed more broadly. Features of organisational systems here are seen more as global as some social collectivises. This assumes that there is a great deal of social organisations to be learned by looking at the non-social world. The attempt to study organisations through complexity theory thus falls into this paradigm. There is thus a need to further study these environments, as there is a high probability that there are traits of interaction, interdependence, impacts of positive and negative feedback, loops etc that may defy the categorisation and understanding of the environments if viewed and studied from the lens of a natural, simple, complicated or linear environment. This will also further imply that we may be caught in a loop of attempting to resolve a situation with inappropriate tools and techniques such as mere planning,

budgeting, scheduling, monitoring and reporting which may put us at a risk of never fully understanding the situations of our systems or the environments we may exist in.

I also argue that there is a need to identify complexity as a feature of the social or natural world or a function of our thinking about the world. This leads to one of the ways of viewing systems as complex and exploring ways of thinking about organisational systems as complex systems. This further emphasises the need to look at any system and situation through the complexity lens to ensure that we fully grasp and understand the situation and apply the appropriate tools and techniques in learning and dealing with what we are faced with. Many models and methodologies are in use to implement and deliver projects, the priorities and areas of focus for each of the models and methodologies differ. In an attempt to introduce the need for a narrative approach to complementing known methodologies, I make a brief comparison of the approaches to further understand the models and their approaches to implanting projects in order to see the gaps in their approaches and investigate how the use of complexity theories and academic research methodologies such as the narrative approach of storytelling can be used to complement some if not all of these known methodologies. Tsoukas and Hatch (2001) suggest that we can choose to explore complex thought process in relation to an assumed objective world by using the variance model or we can explore approaches that make use of interpretive methods which are more likely to view the objectivity of the work as a social construction. They make a case for a narrative approach of an interpretive research methodology as the approach considers the objectivity of the world as a social construction and also develops logic of complexity theory, which is entirely compatible with an interpretive approach of narrative analysis. The interpretive approach sees complexity as metaphors that pose new connections and draw our attention to new phenomena that helps us see what we could not see before. In this regard we investigate project management methodologies and models through this lens and use a comparison matrix to identify the gaps and locate how these tools can be used to complement these existing models and methodologies. The interaction, interconnectivity and interrelationships of these interacting agents have been identified as characteristics of an organised complex system by authors such as (Kaufman 1993, 2000 and Hendrick 2009). If these systems that own the projects are supposedly complex social systems, then there is some form of interaction between a project implementing linear solutions with a complex system that may possibly defy these linear solutions.

To this suggestion, Koskela (2002) adds that there is an underlying theory of project management which has become obsolete. He argues that the scope of a project is said to be the reason for the existence of the project. The definition of the scope ensures that the adequate amount of work to be done is done, any

unnecessary work is not done, and the work that is done delivers the stated business purpose. The scope definition is also supported by Morris (1994) who explains the three angles as: firstly, what needs to be done; secondly, who does what; thirdly, when will the actions be performed; and fourthly, the amount of work required to be spent in total, how much has been spent, and how much spending is still required. .

Project management theory is presented here to be based on three theories; Planning, execution and controlling, which they likened to three theories of management: management as planning, the dispatching model, and the thermostat model. On reviewing the theories of management and project management, it is put forward that management of planning must rely on information management. Koskela (2002) further queries by stating "How can this situation of (to a varying extent) counterproductive methodology, based on an implicit and deficient theoretical foundation, have lasted so long? The longevity of project management in its original form must be due to the lack of an explicit theory. Of course, practitioners have observed shortcomings of the methodology, but without the underlying theory, it is almost impossible to have access to the deficient assumptions or to argue with advocates of the methodology. On the other hand, alternative methods developed from practical observations and needs, have not had a theoretical explanation, which has slowed down their diffusion".

Koskela (2002) concludes that the underlying theoretical foundation of project management is deficient and better and complementary theories can be found. He further argues that no single part of the theoretical foundation can be judged adequate, the deficient foundation leads directly to several kinds of problems in practical project management and that these problems are thus self-inflicted, caused by the very theories and methods we are relying on.

The deficiencies of the theory of the project and of the theory of management reinforce each other and their detrimental effects disseminate through the life of a project. Customer requirements are poorly investigated at the outset, and the process of requirement clarification and change leads to disruption in the progress of the project. The actual progress of the project starts to drift from the plan, and the updating of the plan is too cumbersome to be done regularly. Without an up-to-date plan, the work authorisation system transforms to an approach of informal management. Increasingly, tasks are commenced without all inputs and prerequisites at hand, leading to low efficiency or task interruption and increased variability downstream. Correspondingly, controlling by means of a performance baseline that is not based on the actual status becomes ineffective or simply counterproductive. All in all, systematic project management is transformed to a facade, behind which the job actually gets done, even if with reduced efficiency and lessened value to the customer. The empirical evidence and theoretical explanation suggest that the

present doctrine of project management suffers from serious deficiencies in its theoretical base. Firstly, the theory rests on a faulty understanding of the nature of work in projects, and incomplete definitions of planning, execution and control. Secondly, the theoretical base has been implicit. It is then further argued that these shortcomings have led to three classes of problem. Firstly, project management has not achieved the goals set to it: it does not perform in a satisfactory way. In small projects, the theory-associated problems could be solved informally without the impacts of penalties from a wider system. However, in the bigger, more complex and speedy projects, traditional project management has been seen to be simply counterproductive as it creates self-inflicted problems that seriously undermine performance. Secondly, the lack of theory has rendered education and training more difficult and has hampered effective professionalisation of project management. Lacking theory, project management cannot claim, and will not be granted, a permanent and respected place in higher education institutions. Also, the lack of an explanation of project management, to be provided by a theory, has slowed down the diffusion of project management methods in practice. Finally the renewal of project management has been hampered by the lack of theory. Anomalies, deviations from theory-predicted outcomes, have long since been observed in project management, but their cause has been misinterpreted and the project management community has not acted on them. The important functions of a theory, regarding continual validity testing and giving direction for further progress have neither, from the viewpoint of research or practice been realised.

The present evidence is strong enough for the claim that a paradigmatic transformation of the discipline of project management is needed. The transformation required implies that a more intimate relation between theory and practice must be created in project management. Theory and practice have to be developed concurrently, similar to other science-based fields, where theory is explicated, tested and refined in a continuous dialogue between the scientific and practitioner communities.

Inasmuch as Koskela (2002) arguments are compelling, I do not aim to overhaul project management as it is known, but seek to complement the professional outlook of the models and methodologies with complexity theories that subscribe to the interprativist approach of qualitative research. Having examined project management models and methodologies and investigating their contribution to how they are attempted to be used as tools in achieving strategic objectives of organisations, It is clear that the methodologies themselves fall short of these expectations and may have been locked up in a seemingly myopic objective of short term control rather than an overall long term benefit to the organisation. This creates a need to investigate theories which will investigate such innovation tasks from a disposition of

intra-relationship and inter-relationship where the internal objectives and ultimate success of the project are defined in light of the project within the boundaries of the project and also in view of the objectives and success criteria of any social system it may knowingly or otherwise subscribe to. The theories of organisational complexity are known to seek out an understanding of relationships, interconnectivity, interactions and their emergent characters. This research shows how the theories of complexity can respond to many of the short comings of project management models and professional project management methodologies by complementing existing project management models and methodologies with tools used to understand and adapt to complex social systems.

2.11. Complexity & Complexity Theories

It has been said that there is no one definition for complexity theory, rather several theories or elements of theories that have emerged from natural sciences such as mathematics, biology, computer simulations, physics and chemistry (Kaufman 1993, 2000, Hendrick 2009). Kaufman (1993) argues that variation and natural selection only provide a part explanation for the observable whole in the natural world, and that there are sources of self-organising, spontaneous order in the biological phenomena which natural selection has to work with. Complexity is understood by the use of ecosystems comprising of self organisation and in : "Living systems – Organisms, Communities, Coevolving ecosystems are the paramount examples of organised complexity" as a complex system which by itself gets its answers right without a programme, a planning department, a licence to breed or bureaucracy. Nature just works, just as the best map of a country is the country itself so the best computer for nature is nature itself (Beer 1972, Kauffman 1993: 173).

Complexity is further explained as a multi-minded system in social settings; just as chaos is to natural science so is complexity to social systems, complexity as the amount of differentiation that exists within different elements constituting the organisation. This is often understood as the number of different professional specialisations that exist within the organisation, or as an objective characteristic of either the structure or the behaviour of an organisation. Complexity should be understood in terms of the human cognition of a structure or behaviour complexity has been characterised as a social system; here is a whole system whose part cannot be explained by mechanical or mathematical models. The social system has to be understood in its own terms as chaos and complexity are not characteristics of our new reality but are features of our perceptions and understanding (Gharajedagi 1999, Dooley 2002, Fioretti et al 2004). This is in comparison with Kurtz and Snowden (2003), who in recent application seems to see society as

actually complex. and echoes this, explaining that organisational complexity looks at an organisation in terms of the behaviours of its interacting parts and the theory of complexity strives to uncover the underlying principles and emerging behaviour of the complex system which is composed of numerous, varied, simultaneously interacting parts. A complex system comprises many interacting identities in which, while cause and effect relationships cannot be easily distinguished, we can identify and influence patterns of interactivity.

To further understand organisational complexities and complex systems, it may be worth exploring what the basis and causes for complexity can be. complex system has to do with interactions and interdependence of many parts as they form a whole, these interacting agents have some interactions that are unpredictable, resulting in surprising outcomes (Cleland and King 1968, Mitleton-Kelly 2003). The interactions and interdependencies among the elements of a system are a major complicating factor which necessitates an overall systems viewpoint and these interactions and interdependencies are common in all social systems. If one was to conduct a study by trying to treat the elements in isolation and without the consideration of their interactions and interdependencies, then one is said not to be able to achieve much understanding of the ways the system operates. Another important dimension of a complex system is the concept of the second-order consequences which expresses that consequences appear as a result of immediate and obvious consequences of an action. These actions may be beneficial to a system while to other systems they may not be as beneficial, as they may be responsible for a new problem in that system. Looking at technological innovation, some new technologies have produced immediate and clear consequences where the benefits they add to the systems are obvious while some technological innovations or solutions have produced consequences that are not so beneficial. It is further said that in a system which may be an organisation, a group or arguably a project, everything depends on everything else and often in ways so complex and roundabout that it is difficult to understand the interrelationships.

Another insight into complexity is given by Campbell-Hunt (2007), as he puts complexity and complex systems as one, so that it gives access to a considerable body of theory on the emergent orders that may arise from social practice and the evolution of social order over time. Complexity here is said not to offer a well-articulated body of theory, but rather a number of more-or-less related phenomena: dissipative structures; catastrophe; chaos; self-organised criticality; and self-organisation. The complexity phenomena share a set of common properties where systems are made up of a very large number of autonomous elements: grains of sand in a sand pile or snowflakes on a mountainside. Complex systems are dynamic and require a constant flow of energy to sustain their activity and structure. Elements in the

system interact with each other, their interaction governed by what is referred to as 'micro-rules' which specify how sensitive each element is to the behaviour of other elements: for example, a grain of sand or snowflake is either stationary or falling depending on its location and environment at a given point in time. Complex systems have intricate interrelationships of elements (Individuals, organisations and larger ecosystems) gives rise to a multiple chain of dependencies. This intricate intertwining is subject to change but we are only aware of the changes when a different pattern becomes discernible. Complexity is a principle that has characteristics which are common to all natural complex systems. She explains that a way of looking at complex human systems is to examine the generic characteristics of natural complex systems and to consider whether they are relevant or appropriate to social systems. The limitation to this approach is the need to understand that it is a starting point rather than a mapping of the social system and that each social system needs to be studied in its own right. Two reasons are said to be responsible for the limitation, one being that though explanations are consistent from one domain to another, characteristics and behaviour cannot be mapped directly from one domain to another without testing for appropriateness and relevance. The units of analysis may be different and the system (social and scientific) may have certain fundamental differences which may invalidate the mapping. The second limitation is that the theories of complexity are also considered by many as metaphors when applied to human systems. This consideration is said to limit the fundamental nature of a system that is studied. Metaphors are better suited as transitional objects as they help the transition of thinking when we are faced with new or difficult situations or concepts. (Mitleton-Kelly 2003, 2007)

Other authors define complexity as a collection of principles concerned with finding patterns among a collection of behaviours or phenomena across a multitude of scales in an effort to determine their laws of pattern generation or rules that explain the patterns observed. Complexity is likened to a diverse collection of concepts, premises and notions. It is said to be built on a set of organising principles and the tools that are used to explain a natural system would be inadequate to explain a complex system and so the more we use inadequate concepts to attempt to understand the system, the more complex it becomes to us. Complexity is also regarded as a lens through which an organisation can be seen rather than the conventional model of the clockwork enterprise. Through the lens, we can see the core properties of connectivity, emergence, and uncertainty in the system. Simple things arise from a complex system, the simple interactions of many entities which are often in a repeated manner lead to higher level patterns, and through the lens of complexity, a seemingly complicated system can lead to surprising patterns when looked at as a whole (Fitzgerald and Eijnatten 2002, Gharajedaghi 1999, Lissac and Roos 1999).

Complex systems are also said to exhibit “butterfly effects” in that a change as small as a butterfly wing beat can trigger large-scale change. These occur because change in one part of the system can lead to a chain of flow-on effects that ultimately returns in a feedback loop to stimulate further change in cycles of increasing amplification. For example, a body of snow separates from the mountain only to disturb the snow above it, and then above that, in a growing avalanche of change Campbell-Hunt (2007: 797). This is well in line with the concept of “time skip” which complex systems exhibit as put forward by Cleland and King (1968). Time skip phenomena are said to be rather limited in their impact when they occur by virtue of the passage of time and that natural processes have effects which are amplified far beyond the original impact.

Work on complex systems suggests that attractors and the prototypical dynamic orderings they produce, vary depending first on whether the micro rules used to govern the activity of elements are fixed or adaptive, second, on the extent of interdependence between elements, and third, on the dimensionality of behaviour of the system. Dimensionality is referred to as the number of dimensions required to describe the behaviour of the system where there are three fundamental components of any system: the input, the output and the network that connects the two. The interdependence of a system is said to be measured by the number of relationships between elements in which the state of one element influences the state of another. He talks about the three dimensions of the problems facing systems. Firstly, as a requirement for an input arrangement starting with a set of receptors which transduce information about some external situation into the affective channels, and concluding with a sensory register on which the information is collected. Secondly, that the channels used to transmit this information must also be sufficient to take the traffic and third, a dimension as the network connection between the two (Campbell-Hunt 2007, Beer 1972)

Complex systems have also been characterised as adaptive agents and agent based systems by (Ramalingam et al. 2008, Clements 2001), as attractors by (Campbell-Hunt 2007 and Lynn 2003), by self-organisation, interdependence, interconnectivity, co-evolution, emergence and emergence patterns, path dependent, sensitive to initial conditions, space of possibilities, and a system on the edge of chaos and far from equilibrium (Ramalingam et al 2008, Clements 2001 & Mitleton-Kelly 2003), characterised with items such as connectivity, equilibrium, retrospective coherence and also self organisation. In an attempt to understand and identify a system as complex or non-complex, we further investigate the meanings and descriptions of some of these characteristics.

- **Self-Organisation**: This is considered as one of the strongest features of a complex system. Many

authors such as (Lynn 1972, Clements 2001, Mitleton-Kelly 2003, Snowden 2003, Ramalingam et al 2008) to name a few have used self-organisation as one of the strongest characteristics of a complex system. With self-organisation, agents interact within a system without any external governance and in the process produce a new order. Kauffman (2003) makes reference to a spontaneous order which simple and complex systems exhibit. He argues that a single force view which is Darwin's answer to a source of order is inadequate as it fails to notice, stress, and incorporate the possibilities that simple and complex systems exhibit order spontaneously. "That spontaneous order exists, however, is hardly mysterious. The non-biological world is replete with examples and no one would doubt that similar sources of order are available to living things. What is mysterious is the extent of such spontaneous order in life and how such self organisation may mingle with Darwin's mechanism of evolution – natural selection – to permit or, better, to produce what we see". Kauffman (1993: xiii)

- ☐ **Interdependence**: this is a characteristic that ties in with connectivity. Complex systems have behaviours that arise from inter-relationships and inter-connectivity between actors or elements within a system and its outside environment. The connectivity and interdependence in such a system will imply that a decision made by an individual element may affect related elements and possibly the entire system. A characteristic of a complex system that relates to interdependence may be the multi-minded or multi-dimensional nature of a complex system. The interacting and interdependent elements are multidimensional and all the dimensions being interconnected interact and influence each other and in effect the entire system.(Mitleton-Kelly 2003, Mitleton-Kelly 2004)

- ☐ **Co-evolution**: as described above, elements within a system are connected and interdependent and; the connectivity does not apply only to elements within the system but can also be extended to other elements outside the system but within an overall system. Kauffman (1993) uses biology to explain a complex system and talks about the relationships within an ecosystem. He explains the meaning of an ecosystem as defined in biology, saying "Consider an ecosystem. Each kind of organism has parts of its environment, other organisms of the same kind and of different kinds. As is now clear, adaptation by one kind of organism alters both the fitness landscape of the other organism." He further explains that "co-evolution is viewed as resulting in an unceasing evolutionary process in which all species continue to change" or "as a phenotype where coevolving species stop changing at a balance which is stable in the sense that any other mixture of

phenotypes attempted by any species would be less fit." Kaufman (1993: 242), Mitleton-Kelly (2004)

- **Dissipative Structures and far from Equilibrium**: The dissipative structure of a complex system talks about ways in which open systems exchange energy, matter, or information, with their environment and which when pushed 'far-from equilibrium', create new structure and order" (Mitleton-Kelly 2003: 32). An analogy of the Bernard cell's chemical dissipative structure is used. The Bernard cell is made up of two parallel plates and a horizontal liquid layer, where the dimensions of the horizontal plates are larger than that of the width of the layer of liquid. At room temperature, the Bernard cell is at equilibrium and the fluid will tend to a homogenous state where all its parts are identical. With the application of some heat to the bottom of the plate, the temperature at the bottom of the plate is higher than the temperature at the top surface and at a threshold the fluid becomes unstable and far from equilibrium. If this continues and the heat is applied differentially to the system, which takes it farther from equilibrium, at a critical temperature the liquid performs a bulk movement which is far from random. The fluid is structured in a series of small convection cells which are known as the Bernard cells. During this process, the molecules of the fluid self-organise into right handed and left handed cells. The self-organisation attribute is also a major characteristic of a complex system as explained above. The Bernard cell system also emerged as a higher system with order and structure from a chaotic situation. By using the heat as an external constraint, the system was pushed far from equilibrium and though it was expected that the Bernard cells would appear, the direction of rotation of the cells was unpredictable and uncontrollable and the only hint we may have will determine if a cell is right handed or left handed. The Bernard cell experiment also proves that when a constraint is sufficiently strong, the system can adjust to its environment in various ways. During the experiment, the particles were also observed to have behaved in a coherent manner despite the random thermal motion in each of them. The coherence at the macro level arises from micro level interactions within the individual elements; this is an emergent behaviour that has also been identified as a characteristic of a complex system Mitleton-Kelly (2003).

- **Feedback**: in a social system, feedback can be seen either as a positive (also referred to as reinforcing or amplifying) or negative (dampening, balancing or moderating) characteristic. A good explanation of the negative feedback characteristic is the analogy of the room thermostat. When the room temperature drops lower than a certain desired temperature, the thermostat is

adjusted so that the heat is turned on and a desired temperature is attained. Again when the room gets too hot, the thermostat is also adjusted to reduce the room temperature. By balancing or moderating the room temperature the gap between the desired temperature and actual temperature is closed by the negative feedback. The positive feedback will however amplify the gap. The feedback characteristic of a complex system will come to play if a system that is far from equilibrium and sensitive to initial conditions reacts to some external conditions and goes through self-reorganisation. The contribution of an amplified positive or a dampening negative feedback may have a huge part to play in the self-organisation of the system. For a system that is dissipative or far from equilibrium, possibly due to a restructuring or a merger, the system may reach a critical point from where it will either degrade or create some new order or organisation. The feedback process (positive or negative) can underlie the transformation and provide a starting point for the constant movement between change and stability in a complex system. Kurtz and Snowden (2003) explain a process of probing a system to identify several emergent patterns and behaviours from which we can select and work with a desirable outcome. This is also characterised as the cynefin decision making model of probe, sense and respond in the complex environment (Mitleton-Kelly 2003, Kurtz and Snowden 2003).

From the above arguments on complexity, it can be deduced that it varies from traditional organisational or business systems as we know them because it naturally cannot be categorised or predicted. Relationships are natural and changes are inevitable and the existence of relationships and changes give birth to emergence of new behaviours which can be learned and adapted rather than predicted or controlled. As Cleland and King (1968) argue, there is a dichotomy of planning and implementation as put forward in traditional management. They note that this dichotomy might not suffice as the problems of systems are so complex and interdependent that they rule out simple solutions and the understanding and practice of effective learning and management of complex systems becomes crucial in the implementation of methodologies and practices in such systems. In the same manner, if the methodologies used to manage projects are a mirror of traditional systems, then it can be argued that the methodologies will not particularly suffice, especially when the systems the projects are being implemented are complex systems or exist in complex situations that can neither be predicted nor controlled and also if the projects that follow a linear pattern fall into non-linear situations that cannot be explained or corrected by the pattern in place from its inception. In addition, following the arguments of (Gilb 1998) and (Frame 2003) the identification of unclear specifications and determination of critical success factors for the project as well as the experience and adaptability of the team implementing the project may have some contributing

factors to implementing the project in the environment it is found. The need would therefore arise that the teams experience and understanding of a system (complex, complicated, simple or chaotic) may aid the determination of such critical success factors in light of the environment and further help in revealing any unclear specifications that may be in place. I am inclined to agree with Gharajedaghi (1999) who sees complexity as a perception of a system or an environment. He uses purposefulness to describe a system which has three levels of interconnectivity: people, an organisation, and a society. The three levels are so interconnected that an optimal solution cannot be found at one level independent of the other two. Aligning the interests of the purposeful parts with each other and that of the whole is the main challenge of the system. The problem of integration is said to be a constant struggle and a continuous process.

A possible challenge we face may be the ability to understand and determine if a system is complex or in a complex situation. It may be relatively possible to use characteristics such as interdependence, interaction, co-evolution and fitness to determine if a system is complex or not. Attributes such as self-organisation, emergence, Dissipative, far from Equilibrium and feedback may require more observation, research and retrospective coherence to establish complexity in a system. Fitzgerald and Eijnatten (2002) propose that complexity theory is a lens through which a system can be seen. The temptation to see every system as a complex system is one that I have tried to avoid in my quest for understanding a complex system and in the use of its tools and techniques to complement the implementation of projects using known project management methodologies. When things do not go as expected, as desired in project terminologies "as planned", there is therefore a need to identify the nature, situation or environment of the system we consider and establish complexity prior to the use of complexity tools and techniques to understand and control our suspicions.

With many of the models investigated in this research, it can be argued that many of their developments came as a result of the need to cater for some of the shortcomings of the traditional model. These limitations include but may not be limited to some of the values highlighted in the table below which are the true gathering of the internal and external requirements for the project to implement: flexibility; feedback from within the project team and also from the users and any other stakeholders that the project may affect one way or the other; the use of alternatives; the identification, understanding and proper use of relationships; visibility; option of learning and adapting; and the overall usability of the methodology for all kinds of projects. Many of these models have attempted to cater for these limitations of the traditional model. We look at the approaches and compare how they have modified their implementations in light of the weaknesses of the traditional models.

2.12. Organisational Complexity

It is also worthwhile to explore what the basis and causes for complexity can be in the quest for understanding organisational complexity. Cleland and King (1968) express that the basis for a complex system has to do with interactions and interdependence of many parts as they form a whole. The interactions and interdependencies among the elements of a system are a major complicating factor which necessitates an overall systems viewpoint and these interactions and interdependencies are common in all social systems. If one was to conduct a study by trying to treat the elements in isolation and without consideration of their interactions and interdependencies, then one is said not to be able to achieve much understanding of the ways the system operates. Another important dimension of a complex system is the concept of the second-order consequences which expresses that consequences appear as a result of immediate and obvious consequences of an action. These actions may be beneficial to a system while to other systems they may not be as beneficial, as it may be responsible for a new problem in that system. Looking at technological innovation, some new technologies have produced immediate and clear consequences where the benefits they add to the systems are obvious while some technological innovations or solutions have produced consequences that are not so beneficial. The second-order consequences can also be captured when the actions occur by virtue of time and natural processes which have effect beyond their original impact. This is called the phenomenon of time skip. The time skip phenomenon is said to be a way of viewing an aspect of the second order consequence where the cumulative effect of things that affected a small number of people or elements in the past but over the passage of time and space may affect everyone today. Therefore time skip should be considered in historical terms as well as in a proactive way where consequences so minor as to warrant being ignored today may grow through natural processes into a major problem in future. It is further said that in a system which may be an organisation, a group or arguably a project, everything depends on everything else and often in ways so complex and roundabout that it is difficult to understand the interrelationships.

Organisational complexity is defined as the amount of differentiation that exists within different elements constituting the organisation. This is often operationalised as the number of different professional specialisations that exist within the organisation. Organisational theory has construed complexity as an objective characteristic of either the structure or the behaviour of an organisation (Dooley 2002 Fioretti et al. 2004). Other authors define complexity as a collection of principles concerned with finding patterns among a collection of behaviours of phenomena across a multitude of scales in an effort to determine their laws of pattern generation or rules that explain the patterns observed. Complexity is likened to a diverse

collection of concepts, premises and notions. It is said to be built on a set of organising principles and the tools that are used to explain a natural system would be inadequate to explain a complex system and the more we use inadequate concepts to attempt to understand the system, the more complex it becomes. Complexity is also regarded as a lens through which an organisation can been seen rather than the conventional model of the clockwork enterprise. Through the lens, we can see the core properties of connectivity, emergence, and uncertainty in the system. Fitzgerald and Eijnatten (2002) make us understand that simple things arise from a complex system, the simple interactions of many entities which are often in a repeated manner lead to higher level patterns, and through the lens of complexity a seemingly complicated system can lead to surprising patterns when looked at as a whole (Fitzgerald and Eijnatten 2002, Gharajedaghi 1999, Lissac and Roos1999).

Work on complex systems suggests that self-organisation, feedback loop and the prototypical dynamic orderings they produce, vary depending first on whether the micro rules used to govern the activity of elements are fixed or adaptive; second, on the extent of interdependence between elements; and third, on the dimensionality of behaviour of the system. Dimensionality is referred to as the number of dimensions required to describe the behaviour of the system where there are three fundamental components of any system which are the input, the output and the network that connects the two, thus the interdependence of a system is said to be measured by the number of relationships between elements in which the state of one element influences the state of another. He talks about the three dimensions of the problems facing systems; one as a requirement for an input arrangement starting with a set of receptors which transduces information about some external situation into the affective channels, and concluding with a sensory register on which the information is collected. Secondly, that the channels used to transmit this information must also be sufficient to take the traffic; and a third dimension, as the network connection between the two. (Campbell-Hunt 2007, Beer 1972)

From the above arguments on organisational complexity, it can be deduced that it differs from traditional organisational or business systems as we know them, as it naturally cannot be categorised or predicted. Relationships are natural and changes are inevitable, the existence of relationships and changes give birth to emergence of new behaviours which can be learned and adapted rather than predicted or controlled. There is a dichotomy of planning and implementation as put forward in traditional management. This dichotomy might not suffice, as the problems of systems are so complex and interdependent that they rule out simple solutions and that the understanding and practice of effective learning and management of complex systems becomes crucial in the implementation of methodologies and practices in such systems.

In the same manner, if the methodologies used to manage projects are a mirror of traditional systems, then it can be argued that the methodologies will not particularly suffice, especially when the systems the projects are being implemented are complex systems that can neither be predicted nor controlled and also if the projects that follow a linear pattern fall into non-linear situations that cannot be explained or corrected by the pattern in place from its inception Cleland and King (1968). Therefore the identification of unclear specifications and determination of critical success factors for the project as well as the experience and adaptability of the team implementing the project may have some contributing factors in implementing the project in the environment it is found. The need would therefore arise that the team's experience and understanding of a system (complex, complicated, simple or chaotic) may aid the determination of such critical success factors in light of the environment and further help in revealing any unclear specifications that may be in place. (Gilb 1998, Frame 2003)

2.13. Understanding Social Systems with Complexity Theories

In an attempt to explain organisational complexity in relation to social systems, models and applications have been drawn from authors such as Kaufman who uses the NK model, Max Boisat who explains the concept by introducing I-space, and Snowden who uses the Cynefin Domain.

2.13.1. Kaufman's NK Model

Kauffman (1993) explains the theory of complexity with the study of interaction and interrelationships in living systems using biology. He expresses that "Living systems – Organisms, Communities, Coevolving ecosystems are the paramount examples of organised complexity" (Kauffman 1993: 173). To further explain complexity, we employ the NK model proposed by Kauffman to explain epistasis which is the interaction of genetic traits which produce fitness. The Kauffman's NK model investigates social systems with the concept of 'the problem space'. The problem space is as a result of synergies between interacting activities involved in decision making where many local optima are yielded. In the NK model, "Potential solutions may be viewed as a problem space in which each solution has a performance core associated with it. Solutions involve the conjunction of multiple activities, in which the impact of one dimension on performance is contingent on the value of other dimensions. A given example is that of individual activities A, B, and C each hindering performance unless all activities are performed simultaneously, in which case performance improves dramatically. The presence of such synergies produce local optima,

such that any incremental change results in the deterioration of performance, but some large change could produce an improvement" (Lazer and Friedman 2007:667-694).

In the NK model, N depicts the number of traits or factors while K depicts the number of synergies among the interaction. The interaction and interrelationships between factors in an ecosystem leads to synergies among human activities which are inherent in decision making, yielding problem spaces with many local optima. For each N activity, we may have the activity either as present (=1) or absent (=0). To understand and model social systems further, the synergies 'K' among the interactions is manipulated as K=o, K=N-1 or 0<K<N-1. By manipulating 'K' in this manner, social systems can be demarcated as follows:

Fig 1.7 Simple System with a Linear Network System K=0 Providing a Simple Optimum (Source: Kauffman 1993)

The linear network is represented by a simple set of nodes in which each node, except for two, communicates with two other nodes, and the nodes and their relationships are arrayed linearly. A linear network has the minimum number of links possible in a single-component network and produces the maximum degree of separation between an average pair of nodes. The interaction in this network produces a single problem space with a single optimum.

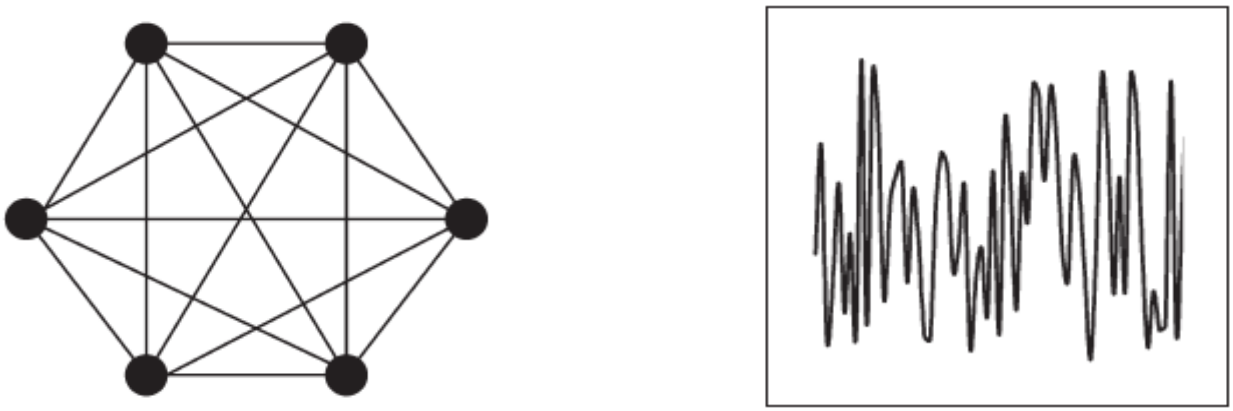


Fig 1.8 Chaotic System with a fully connected Network K=N-1 (Source: Kauffman 1993)

Fig 1.8 shows a totally connected network where every node is connected to every other node. When there is a finite number of nodes N and the number of synergies among the interaction of the nodes is between all nodes having a maximum interaction of N-1 (i.e. K=N-1), a maximum rugged landscape is created which produces what Lazer and Friedman refer to as a chaotic problem space. In this problem space, the performance of a given solution in the space offers no signal as to the quality of adjacent solutions, as a change to a single activity will change the contribution of every other activity. With the full connected network, there is no best way to identify the optimal point as a rugged space which is unknown is produced within the network. However, the possibility of finding a local maximum can be done by searching upwards in the network. In the fully connected "chaotic network", there is no means of proving whether or not a local maximum is the global maximum without measuring every other peak. Therefore, a critical feature of any rugged space is that to move from one optimum to another incrementally, an agent must go downwards in the network before ascending to a new peak.

Fig 1.9 Complex System with a randomly connected Network 0<K<N-1 (Source: Kauffman 1993)

The network in figure 1.9 is dissipated by a randomly connected network. It is described as a network that captures the essence of most interesting real life problems where we have a rugged but not chaotic network. As described by Erdos and Renyi (1959), in a random network each node has a probability "p" of being connected to another node within the network. When p=1, there is a fully connected network which gives a chaotic space and when p=0, there are no network ties. Figure 1.9 shows a network that is

connected by a probability p=0.5 where we obtain a network that is not linear nor chaotic but complex in nature. The random network is said to offer the range between the full and the minimal connectivity that is required to examine the relationship between the connectivity of the nodes and the behavioural performance of the network.

2.13.2. The Boisot's I-Space for Complexity

Another model which aids the understanding and application of complexity is the i-space as proposed by Boisot (2007). The i-space talks about an information space that lies in between the abstract and the concrete, the codified and the uncodified, the diffused and the undiffused. Before delving into the three dimensions of the i-space (codification, abstraction and diffusion) we look into Boisot's explanation of complexity. Boisot sites Gell-Mann (1994) and Taylor (2001) to express the fact that though complexity as a topic of study is becoming quite popular, there is still no single definition for the term and that it is either taken as objective complexity - a property of the world itself, or subjective complexity - our response to the world. This argument ties in with that of various authors who explain complexity as a state of existence and authors such as Fitzgerald and Eijnatten (2002) who explain complexity as a lens through which a system is observed

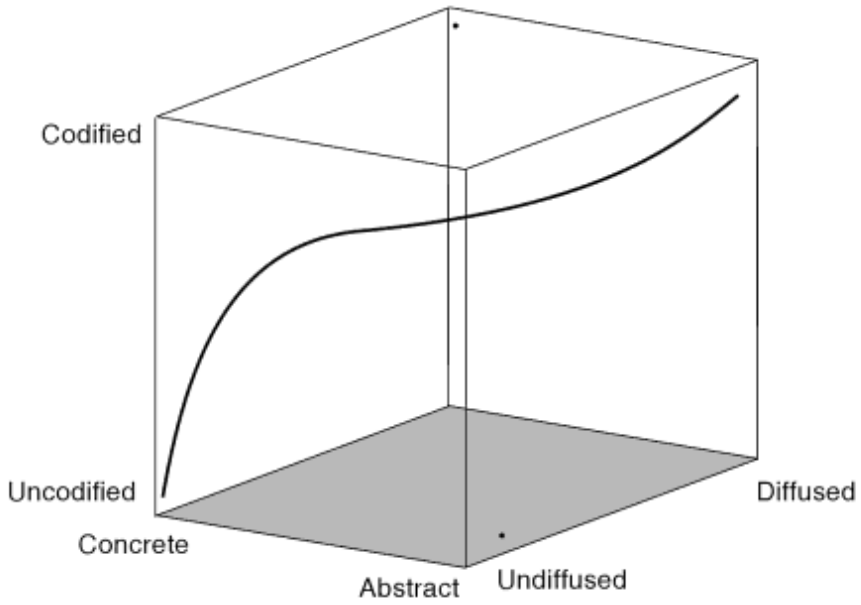


Fig 1.10 The I-Space (Source: Boisot 2007)

Taking complexity as a part of the world, it is understood as an emergence of nonlinear interaction of

elements that make up some phenomenon under study. Taken as a response to the world, complexity measures the effort we need to invest to make sense of such phenomena individually or collectively, depending on the information available to us. The i-spaces' three dimensions all deal with the subjective type of complexity where each dimension is said to deal with a unique description of complexity.

Codification deals with descriptive complexity which measures the amount of data processing that an agent must engage in either to assign phenomena to categories or to differentiate categories relevant to the assignment task from each other. Where the categorisation of some phenomena may require a limited amount of data processing, others may require an uncountable amount of data processing.

Computational complexity is said to look at the dimension of abstraction where phenomena exhibit different degrees of freedom and their description is captured by different numbers of variables in interaction with each other. Computational complexity is thus a function of both dimensionality and nonlinearity of interactions. Dimensionality looks at the number of variables or variations required to capture behaviour. With computational complexity, more variables will require more categories and will move towards the concrete end of the abstraction dimension of the i-space. If interaction of variables can be described by linear correlations, then one category may stand for another, which will move towards the abstract end of the abstraction dimension. To understand computational complexity and the abstraction dimension of the i-space, the question to ask is: what minimum numbers of categories are required to capture some phenomena given how its variables interact with each other.

Relational complexity looks at the dimension of diffusion within the i-space. Interacting agents in the i-space possess and exchange data, receiving data as input from some while transmitting as output in others. The i-space thus depicts social computational processes in which agents try to make sense of the phenomenon that confronts them. When phenomenon is located along the diffusion dimension, indicating how many agents will be involved in making sense, the relational complexity is established while cognitive complexity will be established when phenomenon is located along the codification and abstraction dimensions of the i-space Boisot (2007).

2.13.3. The Cynefin Framework for Organisational Complexity

In a sophisticated application of organisational complexity, Snowden and Boone (2007) demarcates four domains of organisational practice:

The Simple domain is the domain where standard operating procedures and proven relevant "best

practice" might be safely used, where knowledge may be captured and embedded within structural processes, within an overall organisational cultural contact. The decision making model is: sense incoming data, categorise and respond to the data in accordance with the predetermined practice e.g. project management methodologies. (Snowden 2003, Johnson et al 2005). It can be argued that in the simple domain, you get what you see, cause and effect relationships are clear and concise where cause = effect. This can be typical of project management methodologies; a good example is with the project quality management processes in the PMI methodology which has a direct relationship between cause and effect.

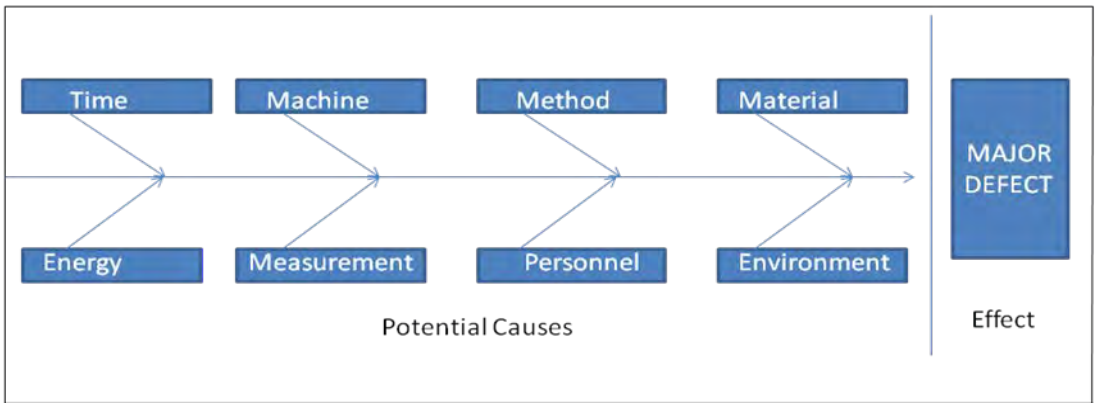


Fig 1.0 – Cause and Effect Diagram: Source (Project management institute 2004: 192)

The **Complicated domain** can be described as the domain of systems thinking, the learning organisation and the adaptive enterprise as noted by Johnson et al (2005). They say techniques such as scenario planning can often be found in this domain and that stable cause and effect relationships are categorised in this domain but might be known by a particular group of experts and may not be fully understood. In this domain, structured techniques are relevant, but many of the assumptions will need to be examined, analysed and challenged. The decision making model here is to sense the incoming data, analyse and respond to the data in accordance with expert advice or interpretation of analysis**.** The complicated domain can be likened to the concept of analytical thinking which consists of three steps: first, it takes apart from a whole system what it sought to understand; second, it tries to explain the behaviour of the parts taken apart; and finally, it tries to aggregate the understanding of the parts into an explanation of the whole, whereas systems thinking, which is arguably in line with the complex domain, uses a different process where it puts the system in context of the larger environment of which it is a part and learns the role it plays in the larger whole Gharajedaghi (1999).

The Complex domain is the unordered domain where complex adaptive systems and organisations are

located. In this domain, Kurtz and Snowden (2003: 462 - 481) explain that "this is the domain of complexity theory, which studies how patterns emerge through interaction of many agents". They say that there are cause and effect relationships between agents and the number of relationships defies categorisation and analytic techniques and that emergent pattern can be perceived and not predicted. They call this phenomenon retrospective coherence. The decision making model here, according to the Cynefin Framework, is to probe the current situation, sense the emergent behaviours and respond.

The final domain is known as the **domain of chaos** where Kurtz and Snowden (2003) refer to a system as being in turbulence where there are no visible or identifiable relationships between causes and effects and when there is not even time to respond and investigate change. They say "applying best practices is probably what precipitated chaos in the first place; there is nothing to analyse, and waiting for patterns is a waste of time". In the chaotic domain, there is a potential for order but only a few people can see it and even when they see it, they might not have enough courage to act. The decision making model for this domain is to act, sense and respond. The domain of chaos is the domain of disorder where in effect there is a lack of coherence in the system.

From Snowden's outlook on complex systems, we see some agreements with other authors such as Cleland and King who talk about interconnectivity and interdependence and Dooley who explains complexity as the amount of differentiation that exists within the system. In light of the arguments concerning complexity theories, we however need to establish if the concept of complexity is a perception, a system as a whole, or both. In terms of projects and project management, the project can be said to be part of a system that represents the whole, the project depends on and interacts with a larger system to define its viability, scope and overall delivery. The system can be said therefore to either exist as a complex system where the entire system is complex or where it is a system in a complex environment or in a complex situation. However the system is seen, if it is a complex system, it can be argued that the worry for project management would be the issue of having a known and proven methodology for managing projects in a system that is complex and unpredictable or having a project that starts with a linear and predictable pattern displays significant changes in behaviour, which can throw the project into an undesired situation. The understanding of such overall systems and complex situations where projects can be found may prove vital for managing projects in either situation.

In all models, Kauffman's NK model, Boisot's I-space and the Cynefin model, a complex environment or a complex situation is dissipated by both the possibility and presence of the unknown which may be the result of an emergent behaviour due to the interaction and interrelationship of factors/nodes within the

network. The complex situation differs from the simple linear situation as the network that creates or describes a complex situation has varying, unpredictable and randomly generated relationships that defy categorisation and need to be learned and adapted to.

2.13.4. Organisational Environment and Project Management:

As discussed above in section 1.2, in the Cynefin model for organisational complexity the situation facing an organisation can be simple, complicated, complex or chaotic. From the Cynefin model, project management methodologies can be seen to exist in the simple and the complicated domains. Where the simple domain is the domain where causes and effects have a direct relationship, the complicated environment as explained by Kurtz and Snowden (2003) is an environment also referred to as the environment of knowable cause and effect. Though the relationship of cause and effect exists, a bit more work has to be done to understand it and this may be the reason why analysts, consultants and experts fit into this domain to help understand the combinations and possibilities of these relationships. The complicated domain is also said to exist in the ordered environment, this is also where the stable causes and effects exist according to Kurtz and Snowden. They say this is so because these causes and effects may not be fully known but may be known by a limited group of people such as consultants, experts, directors, functional managers and project managers. Concluding from the view of Frame (2003) who says that the success of a project is largely dependent on the structure of an organisation, it can be further established that the existence of project management methodologies to fit properly in organisations that exist in the Cynefin's complicated environment. The use of best practices and quality assurance falls under this environment and project management methodologies can be argued to fall under this category as its processes are based on a step by step methodology which goes through quality assurance both within the project and outside the project in line with the quality standards of the organisation.

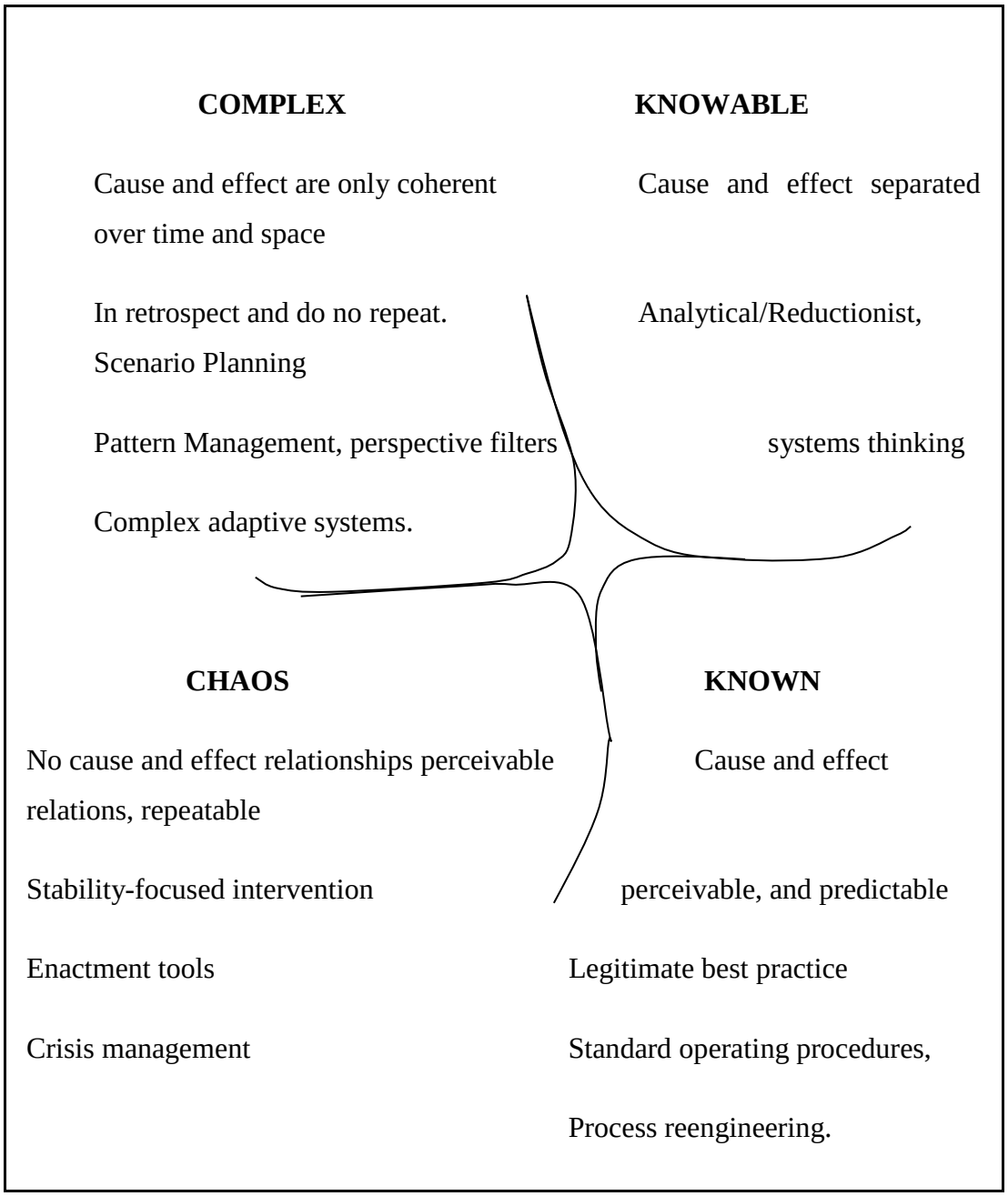


Fig 2.6 Cynefin Framework for Organisational Complexity

Source: Kurtz and Snowden (2003)

The simple/known environment of repetition, standard procedures and best practices is arguably the most ideal environment for projects and general management as cause and effect relationships are clear, they are repeatable, perceivable and predictable and lessons learned techniques will fit in rather well in this

environment. Also due to the fact that standard procedures are used for its operation, the simple domain makes decisions by sensing, categorising and in turn responding to data. This is the environment where fact finding, experiments, expert opinion and planning are appropriate. It is said to be the environment of methodology, which seeks to identify cause and effect relationships through the study of properties associated with quality. This environment is where entrained patterns are at their most dangerous as a simple error in assumption can lead to a false conclusion that is difficult to identify. In a complicated environment, it can be assumed that certain characteristics govern the decision to embark on certain projects to deliver certain goals in line with the goals and objectives of the organisation. The complicated domain is said to be the environment of the learning organisation, system thinking, the adaptive enterprise etc. Kurtz and Snowden (2003). For example, the need for a particular solution can be driven by a political, economic, social or technological aim in an organisation which might have legal, budget, milestone, location, operational and technological constraints attached to the drivers. On evaluating the drivers and constraints, there can be stipulated desired outcomes such as litigation, strategic alignment, increase in revenue, competitive advantage, improved reputation/image while management information, competitive advantage and competitive response may be desired outcomes that drive a technological project with constraints such as IT security, software applications, capacity for technological change and the future of the technology. These can be drivers and criteria that can be responsible for the governing of the business case for a project.

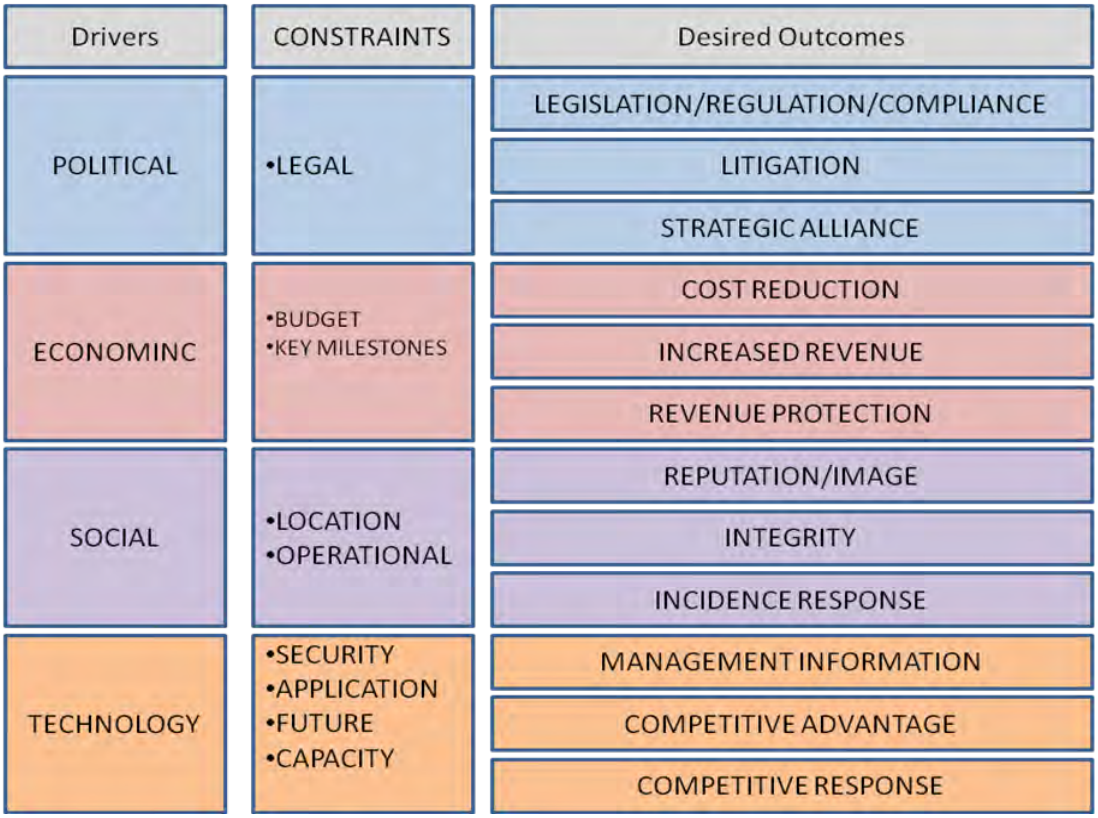


Figure 2.7 Business Decision Drivers (Diagram is an adaptation of PESTLE analysis according to Daniels et.al 2007)

According to Daniels et.al 2007, it can be argued that various drivers that can be political, economic, social or technological. The drivers can further be seen to determine desired outcomes which in turn can be goals, tasks, activities, decisions or projects which will eventually meet an overall organisational goal. In Figure 2.7, there are some constraints which have to be considered and these can eventually govern the business case of a project. These drivers may lead to organisations embarking on projects which will have direct link and success factors to such drivers if an environment is within a determinable system such as the Cynefin's simple or complicated domains. The question therefore arises that what happens when an organisation is not within a determinable system such as the complex system where the drivers, constraints and desired outcomes in an organisational environment remain unknown? What happens to the criteria that govern the project when these drivers, constraints and desired outcomes are subject to change? If the organisation exists in an environment where categorisation and analytical techniques are defied, i.e. what happens when the organisation falls into a complex situation or environment?

Kurtz and Snowden (2003) describe the complex domain as an environment in which patterns emerge through the interaction of many agents. They explain that there are cause and effect relationships between

the agents, but both the number of agents and the number of relationships defy categorisation or analytical techniques. Emergent patterns can be perceived but not predicted. In a similar vein, Mantel Jr et al (2005) note that since projects are multidisciplinary in nature, it makes them complex because of the many factors that have to be interconnected; and that these interconnected elements often require input from groups outside the project. In the complex domain, it can be argued that cause and effect relationships can be so intertwined that you can only make sense in hindsight. It can be an environment where when something happens you may believe you understand the cause and know why it happened but when you rewind the tape, chances are that in a complex environment you get a different outcome each time. This can be due to that fact that in a complex environment, as argued by Cleland and King (1972), Beer (1972) and, Gharajedaghi (1999), it is all about interactions and interconnectivity, it is all about a network that is connected together where relationships are non-linear such that a small activity on one part of the network can have a big impact on another area and vice versa. Things can be unpredictable in detail and the way progress is made is to sense the pattern. Here we may be dealing with things such as culture, innovation, trust, leadership and unity. We normally tend to deal with issues above as simple or complicated and do not necessarily get the right results. But when we see things as complex and from a complexity point of view, we use different tools and techniques to understand our situations. This makes stories important in a complex space because with stories, you can identify patterns and mess within an organisation.

The project decision drivers in fig 2.7 assume a clear organisational environment where the desired outcomes are motivated by the drivers, in line with an organisational aim or objective. Gilb (1998) argues that it is very rare on the other hand to find the objectives of management clearly stated and there is usually no clear distinction made between the results or goals we must aim for and the various possible courses of action for getting those results. He says “we are constantly making the mistake of specifying the means of doing something rather than the result we want.” He concludes that this can only limit our ability to find better solutions to our real problem. Projects are seen to have few or no effective goals with vague remarks about vital subjects like improved customer service or better product reliability with no precise specification of important matters such as adaptability or productivity. In essence, organisational drivers from organisational data and goals might point to requirements such as improved customer services or better productivity while important matters such as adaptability and productivity are not taken as priority.

Kurtz and Snowden (2003) talk about an organisation existing in an environment of un-order and having complex relationships where structured methods that seize upon such retrospectively coherent patterns

and codify them into procedures will confront only new and different patterns for which they are ill prepared. Once a pattern has stabilised, its path appears logical, but it is only one of many that could have stabilised, each of which also would have appeared logical in retrospect. Patterns may indeed repeat for a time in this space, but we cannot be sure that they will continue to repeat, because the underlying sources of the patterns are not open to inspection (and observation of the system may itself disrupt the patterns). They argue that this means that reliance on expert opinions based on historically stable patterns of meaning will insufficiently prepare us to recognise and act upon unexpected patterns. It can therefore be argued that for an organisation in a complicated environment, the phenomenon of retrospective coherence, lessons learned, best practices, standard practices, quality assurance, expert opinion, will govern decision making (including projects) in the organisation.

But in a complex environment, the decision making models are different. In a complicated environment, the decision making model is to sense incoming data, analyse the data and respond based on the analysis of the data. By contrast, the decision model for the complex environment is to create, probe, to make patterns or potential patterns more visible, sense the patterns before any action is taken. These patterns that are sensed are now responded to by stabilising the patterns that are found desirable. This can be seen in the context of project management, with Gilb (1998) arguing that the determinations of critical attributes are vital to the success of a project. In a complicated environment, these critical attributes are the drivers and/or the objectives of the organisation and being constant drivers and unchanging constraints, the project can deliver what it was stipulated to deliver using the temporary endeavour to deliver a product or a goal in line with the organisational objectives. By contrast, in a complex environment, the critical attributes vital to the success of the project are likely to be unknown (hidden truths) and subject to change.

Looking at project implementation described above in light of organisational complexity, we see the existence of two possible interacting systems here, the project internally and the external factors which the project implementation interacts with. In an ideal world, we would not want the project to fail, either in the realm of implementation or from the strategic angle of things. I make an argument on the survival possibilities of a project if the project is in line with requirements, on schedule, on budget and has a high probability of meeting its internal success criteria. If the project existed in the simple or complicated domain but interacts with an organisation in a complex or chaotic domain, then it is arguable that the complex or chaotic organisational factors may further add to an overall determinant of the success criteria of the project and indeed the success or failure of the project. A project being implemented with a standard project management methodology such as PRINCE2 or PMI should therefore be aware of organisational

factors and environments external to its implementation. Tools and techniques used in the simple and complicated domains may not prove very useful in solving or even learning the conditions of a complex domain; the question is what tools and techniques to use for identifying and managing projects in such interactions. Anderson et al. (2009) also buttress the point from an organisational point of view that the organisational culture of the base organisation will affect how the organisation will approach its project work. From the definition of a project according to (PMBOK 2013) as a temporary endeavour undertaken to create a unique product or service, then the base organisation, being the permanent organisation, is the dominant organisation culturally and, as the project is a temporary organisation, is affected by its culture. If this is true then, we can safely confirm that organisational factors will be a big player in the success factors of projects and a good methodology may not be enough to implement a project and ensure its overall success. In some other cases, some organisations become project based companies when they are said to have many large projects running simultaneously thereby allowing the culture of the projects to determine the culture of the organisation. This project organisational relationship can be said to go both ways but in either way, the project's culture is affected by that of the base organisation and more often than not, we have situations where the base organisation's culture or organisational environment influences the culture adapted by the project.

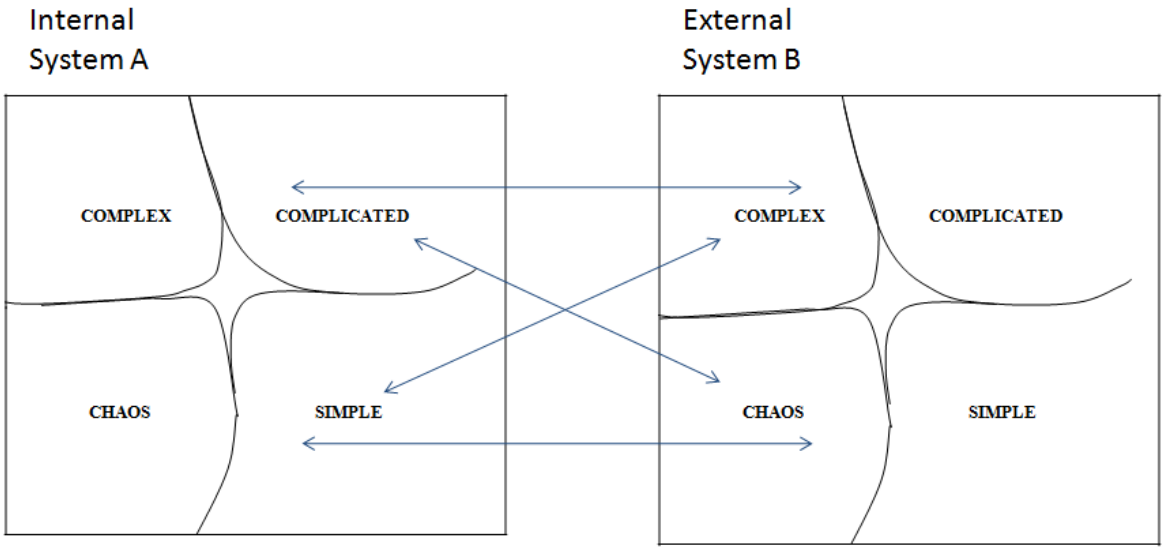


Fig 2.8 Possible Interactions of Systems across Cynefin Domains (Source: Kurtz and Snowden 2003)

In the figure above, we create an illustration of possible relationships of two interacting systems, the internal system A and the external system B. We look at the possibilities of a project existing in the simple

or complicated domain while the organisation where the project is being implemented exists in the complex or chaotic environment. Having established the need for interaction between the two parties, we need to find out if the tools and techniques for implementing the project in the complicated or simple environment will suffice and ensure the success of the project or if we need to identify new tools and techniques that will implement the project in the context of the overall environment of the organisation where the project exists.

When we investigate a project using tools and techniques from complexity theory, there is a higher change that we view and weigh the validity of the project not only within the concept of time, cost, scope and requirements, but we will see interactions of internal project factors with organisational factors and factors from an overall ecosystem. We can then understand and capture how changes at any level within the ecosystem which may not be directly visible or apparent to the project can possibly impact the project in various manners, positively and negatively. We also bear in mind that such changes have the potential of deciding the viability of the project within the lifetime of the project and though it may cause an abrupt end to a project and can be classified as some sort of failure, it may well add to an overall success of the organisation as ending the project may well be beneficial to the organisation in a long run.

2.14. Are Failed Projects Complex?

As discussed above, organisations implement and follow standard project management methodologies for the successful completion of projects that they embark on. These methodologies stand as a framework for managing and maintaining the project from the start up to the completion and implementation of the project. But as Pirsig (1974) argues, traditional scientific methods have always been the best 20 –20 hindsight: “it’s good for seeing where you’ve been. It’s good for testing the truth of what you think you know, but can it tell you where you ought to go?

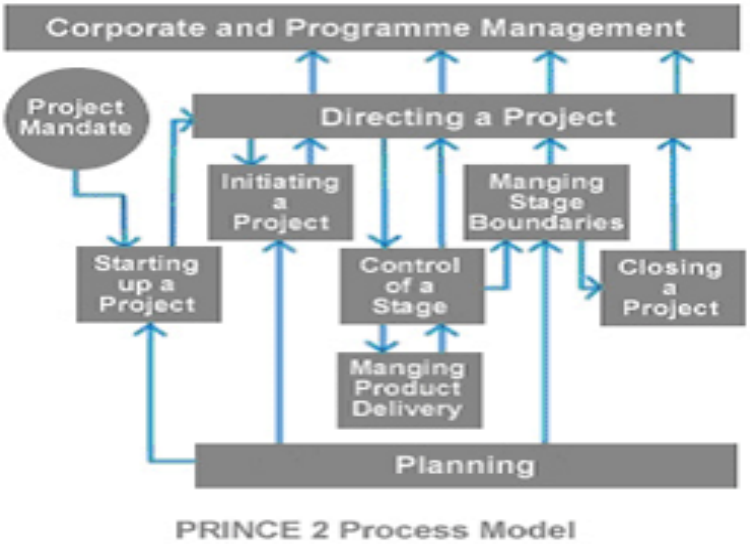


Figure 2.9. PRINCE2 methodology. (Diagram reproduced from Peterday consulting sighted 5th of April 2006)

These methodologies, such as PRINCE2 project management methodology, have standard processes, deliverables in terms of feedback are measurable in terms of their progress and milestone schedule, task deliverables and follow a somewhat linear path progression in the way they are managed and executed.

In Figure 1.3 above, it is observed that a project manager works in the processes of managing a project, directing a project, start up; managing stage boundaries, planning, and reports to the project board/steering committee who are in charge of the process of corporate and programme management. The steering committee are in charge of validating the project in line with the organisational requirements and have the authority to stop the project when it is said to no longer meet the requirements for which it was first embarked on (OGC, 2005).

The question here is what happens when the order of things change and the way they are managed is not competent enough to manage the changes, irregularities and the new non linear nature of the projects. An example can be the situation of the London Ambulance in which the processes just did not work; the planning and analysis and execution of the project all proved futile at the implementation of the project since none of the project managers, the project owners and the users got what they wanted from their projects. The Kasai international Airport began to sink at the implementation stages of the project and had to use up unplanned funds. The INCIS was the National Crime Investigation Project for New Zealand; it

was built in the ‘90s and abandoned in 1999 (Al-Badri 2003, Dewsbury and Dobson2007, Hutchinso 1999).

Thus the questions that arise in this research are as follows:

1) How do we determine the environment or system we are working in?

2) In complex situations, how do we determine the critical requirements that govern projects?

3) How do we continuously measure the viability of a project with the ever-growing demands and changes within the project and in the business environment?

4) How well can we use current project management methodologies to measure these requirements and constantly validate the project against the business case for which it was initially justified? When project management methodologies and or its execution fail to deliver the project in the required manner, what complexity theories can be used to govern such projects, their execution and their adaptation to growing business needs?

5) Does the problem lie with the project management methodology, the organisational structure, project execution or the criteria that govern the project’s requirements?

2.15. Complexity theories and Project management

Complexity theories tackle complex situations with various techniques. The theory deals with the way elements relate to each other within a system. The theory holds that when elements relate, behaviours emerge and these emergent behaviours are not necessarily predictable but can be controlled and managed.

To understand and adapt a complex situation, probes are used to make patterns or potential patterns more visible before moving into action mode. Then you sense the patterns and respond to those patterns that are found desirable, destabilising the patterns that are not desirable and then “seeding” the space so that the patterns that are desirable are more likely to emerge. Probing can be facilitated by the use of organisational complexity tools and techniques such as story telling which includes narratives and archetype extraction. Other tools and techniques include: future backwards, anecdotes and knowledge disclosure points. These tools are normally used to tackle issues in organisations when they end up in a complex or a non-linear situation. (Snowden 2002, 2005 Kurtz and Snowden 2003)

When projects that are normally assumed to be linear in nature become non-linear, unexplainable and reactive, can they be still be treated as structured in the sense that they can be tackled within the known methodologies? Weick et al. (2001) say that one of the greatest challenges of any organisation is how to manage the unexpected; he says that while traditional structured managerial practices such as planning and design are intended to manage unexpected threats, they often make it worse. The question here is whether complexity theories can be used in project management methodologies both to prevent chaos and to deal with non-linear situations if changes or unintended circumstances arise. Another consideration is that of the system in which the project exists. Beer (1972) talks about systems being unthinkable, in the sense that they are far too complex to fathom and though very complex, can be self organising with the potential of working continuously, inexorably and producing answers. If a project were to exist in such a system, it can be argued that the implementation of that project may need to follow other patterns to deliver a desired output in an unpredictable, non-linear, unexplainable complex yet possibly self-organising system. In essence, when a project is implemented within a determinable system (i.e. simple or complicated), it may be possible to use known methodologies to plan and execute the project successfully based on success criteria of time, cost and scope. However, there are certain social situations that are known to be problematic for these methodologies and may need to utilise additional tools to implement the projects. The purpose of this research is to investigate how tools designed to interpret complex situations can be used to develop more effective project management in such context. The hypothesis of this research thus seeks to explain that when projects fail, this is often because the social situation is more complex than anticipated. If project teams complement their methodologies by utilising tools designed to interpret complex situations at key points, these projects are more likely to succeed.

2.16. Discussion

Though various models discussed are available for the development of information systems, software applications and project management, we know that one size does not always fit all. From the study of the processes and modes of operation of some known methodologies of today such as PRINCE2 and PMI, it can be argued that these methodologies are intelligent iterations of the traditional waterfall model that follows phases such as specification, discovery or requirement gathering, planning, implementation, testing, pilot and roll out. The spiral model also complements the traditional model by employing risk analysis at various iterations of the spiral. The helical model invests in customer feedback, use of models in place of prototypes and the arrival at an informed, educated requirement which is both intended to be in line with the project success and the organisational strategy. It can be further argued that though these intelligent models which have catered for some or many if not all of the shortcomings of the traditional

model, may help us deliver projects such as software development, website creation, architectural or engineering models, increasing projects such as migration, transformation, major IT infrastructure upgrades and telecommunication projects which may be core to strategy and collaboration within organisations may not find all the core functionalities of the projects beneficial. These projects may have requirements that may have been identified but not fully known or they may be known but subject to change as we exist in a world that is extremely fast paced and competitive in technology. The requirements are gathered and reviewed by experts and by user focus groups that are kept in the loop throughout the lifetime of the development. The use of models and prototypes in the models identified also gives customers a taste of the final product in order to make last minute changes that are catered for by the just in time (JIT) buffer in the helical model. Though we may argue that this is catered for by the user acceptance testing phase of other methodologies such as PRINCE2 and PMI being considered, the question of gathering the true requirements and understanding what true project success can be in light of organisational strategy under all types of projects may not be fully known. This may be due to the fact that the organisation exists in an unstable environment and is not fully aware of the real requirements for achieving some of its overall goals (which may also be wishes) or is simply naive in its expected strategic innovation as the product or service desired lies within grounds which may be unfamiliar to the organisation.

As the traditional models and other methodologies may be unable to gather true requirements, therefore reducing or removing the ability for projects to meet certain factors as they may remain unknown, there will therefore be a need for an enhanced tool that is able to identify or reveal hidden or unknown factors that may be some unknown success criteria. A tool or technique that will investigate a project's requirements based on natural project factors and also external factors that may be influencing the project and thus defining true project success criteria may therefore be required.

Similar to traditional methods, project management processes follow a pattern where the project starts up, it is monitored and tracked against a known plan. The PRINCE2 process has a planning phase that stretches across the entire process of delivery whereby other phases are fed into and out of the plan in order for them to be tracked and monitored against an overall plan. The main plan is also known to be broken down from a high level plan into granular details where all activities are monitored to specific details. The PMI process breaks its activities into knowledge areas and each area has its plan which is monitored.

If all these go well, the project will be implemented and delivered to meet certain business requirements

according to the agreed plan. This looks simple and straightforward in theory but in practice there are many factors that can determine the course of the project lifetime. The environment the project is being implemented in, the person(s) implementing the project, and the actual methodology being implemented can all be active players in the behaviour adapted by a project. Complexity theories help us look at organisations in a different light. We understood the domains in which organisations exist and how each one can determine the nature of a project in light of the organisational environment i.e. culture, politics, instabilities, people and processes that can have hidden ways of making the project a success or a failure. Since in a project environment, the project manager reports to the steering committee, which in turn validates the project with the requirements for which it was commissioned, part of the required skill sets that would be involved in the constant validation of the project possibly as a member of the steering committee in line with organisational requirements and critical criteria, the project manager should be in a position to negotiate the best interests of the project from a place of strength and understanding of the environment, known and unknown constraints that may be facing the progress of the project.

In this research I investigate non-linear and failed projects and analyse the extent to which they involve the components of a complex system. If these failed projects occur in a complex situation, then the possibility exists of using complexity theories, tools and techniques to tackle the projects. I will test such situations, and attempt to develop a complimentary framework for managing projects in such situations and identify relevant skill sets for a project manager. In section 2.1 above, it was discussed by Frame (2003) that the success of a project is largely dependent on the project team responsible for executing the project; he puts forward the surgical team approach by consideration of how a surgical team functions. Gilb (1998), Frame (2003) and OGC (2005) also argue that a project can be said to have failed if it does not meet certain critical requirements that governed the viability of the project before its inception or start up and if the project does not evolve with the growing needs of the business for which it was embarked on. A project manager must be capable of meeting certain skill requirements as well as have an extensive knowledge of the project management methodology. Knowledge of the organisation, organisational culture, the critical requirements governed by the validity of the project, a good knowledge of a complex environment and a complicated environment as described in the Cynefin framework, are likely to be needed as a skill set that a project manager should have in order to adequately manage a project in either of the environments the project might evolve into.

Chapter Three

Research Methodology

3. Methodology and Methods

3.1. Introduction

As discussed in the previous chapter, organisational complexity looks at organisations with respect to the behavioural aspects of the various interacting parts and organisation possesses. Snowden and Kurtz (2003) explain that organisational complexity theories hold that when elements interact, behaviours emerge. Complex systems consist of many interacting identities where the effects of emerging relationships cannot be distinguished. Research into organisational complexity looks into knowledge management, data analysis using narratives, storytelling and sense making and since projects have always been embedded into the ongoing operations of organisations, there is value in considering project management through the lens of organisational complexity. The main aim of this research is to identify and explore whether the tools of organisational complexity can address some of the limitations of established project management techniques. There are three related research questions arising from this: 1) what social environments and conditions are projects located within when they are implemented? 2) Are the social environments determinable as complex environments due to factors of interactions, interrelations, emergence or any other characteristics of complex systems discussed in chapter 2?) If so, what theories, tools and techniques for organisational complexity can be used to complement project management methodologies when projects are implemented within complex social systems?

3.2. Research Perspective and Justification of Approach

Given the assumption of social interaction within organisations as being complex, this is best interrogated with interpretivist approaches and qualitative methods. The interpretavist approach is characterised as a way of gaining insight through discovering meaning by improving the comprehension of a whole (Neil 2006). Complex situations are not amenable to simple quantitative measurements because of their non-linear nature, but deal with the study of emergent patterns in relationships. The interpretative approach has proven to be very useful in the analysis of complex phenomena as it focuses on whole rather than just interacting parts. This approach also works well with the decision model of the complex phenomena which is to probe, sense (interpret) and then respond. This is consistent with the arguments of Neil (2006) that the interpretavist approach can help explore complexity as it is a way of gaining insight

through discovery. For complex phenomena, the use of predictive methods, best practices and expert knowledge is not very popular, but a more discovery approach is taken where the situation is studied, sensible probes are put in place to gain insight into various emergent behaviours and then an educated course of action can be taken as a way of responding to the emergent behaviours. This is one way in which a case study or an observational approach to research makes a good case for studying a complex situation. According to Kurtz and Snowden (2003) one of the characteristics of a complex system is that things do not necessarily happen repeatedly, which makes its analysis more suited to an interpretavist research approach. Strauss and Corbin (1990) explain interpretavism to be any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification. Neil (2006) further explains that the underlying assumption of interpretavism is that the whole needs to be examined to understand the phenomena. He says that interpretavism proposes that there are multiple realities of phenomena and that these realities can differ across time and place, which as explained is a characteristic of a complex system and will therefore emphasise the fact that the interpretavist approach will be better suited to help understand organisational complexity.

A known approach to interpretative research is grounded theory which Goulding (1998) explains to be a methodology that has been used to generate theory where little is known, or to provide a fresh slant on existing knowledge. She claims that it is an interpretivist mode of enquiry which has its roots in symbolic interactionism where language, gesture, expressions and actions are all considered primary to the experience. She argues that the development of grounded theory was an attempt to avoid highly abstract sociology and to bridge the gap between theoretically uninformed empirical research and empirically uninformed theory by grounding the theory in data. Mansourian (2006) explains grounded theory as a general, inductive and interpretative research method, whereas Strauss and Corbin (1994 p. 237) note that "Grounded theory is a general methodology for developing theory that is grounded in data that has been systematically gathered and analysed. Theory evolves during actual research and is achieved through continuous interplay between analysis and data collection."

Glaser (1978) puts it that one key aspect of grounded theory is the generation of good ideas, and Goulding (1998) says that over the years the theory has been reinterpreted with the disciplinary diffusion of its applications. It can be argued that one of the reinterpretations of grounded theory is the theory of pre-hypothesis. Grounded theory described by Strauss and Corbin (1994) as being achieved through a continuous interplay between analysis and data collection proves a similarity between the theory and pre-hypothesis. According to Cynefin (2006) pre-hypothesis research makes use of sense making items

(SMIs) in the form of anecdotes, drawings, pictures etc. that are collected from a subject population. Pre-hypothesis research makes use of material indexing either by the originator or by analysts; pre-hypothesis allows for the tagging of materials without prior knowledge of purpose. The consequence of this is that data is analysed and where patterns are detected, the sense making materials are used to contextualise, explain and reveal hidden truths which can be argued to be the grounding of theory of some sorts.

This characteristic of qualitative research has made it suitable for carrying out a narrative research which in turn is in line with the ontological position of constructionism and the epistemological position of interpretavism assumed in this research. For the interpretavist approach assumed in this research, the use of case studies will be employed. Bryman and Bell (2003) noted that with a case study, the case is an object of interest and the researcher aims to provide an in-depth elicitation of it. In particular, the use of a revelatory case study (which is further described below) will be very essential in an interpretative research approach.

3.3. Case study Approach

Yin (1993) argues that the case study method is appropriate when investigators desire to

a) Define topics broadly and not narrowly

b) Cover contextual conditions and not just the phenomenon of study and

c) Rely on multiple and not singular sources of evidence.

Stake (1995) notes that case study research is concerned with the complexity and particular nature of the case in question. Bryman and Bell (2007) observe that a case can be a single organisation or a single location of a person. Yin (2003) distinguishes three types of cases

1. *The Critical Case:* where the researcher has a clearly specified hypothesis, and a case is chosen on the grounds that it will allow a better understanding of the circumstances in which the hypothesis will and will not hold

2. *The Unique Case:* which Bryman and Bell (2007) describe as a common focus in clinical studies

3. *The Revelatory Case:* exists when an investigator has an opportunity to observe and analyse

> a phenomenon previously inaccessible to scientific investigation. Bryman and Bell (2007: 55) says that "revelatory case study is interesting, it seems unnecessary to restrict it solely to situations in which something has not previously been studied." They further explain that much qualitative case study research that is carried out with a predominantly inductive approach to theory treats single case studies as broadly 'revelatory'

Bryman and Bell (2007) continue to explain that research case study is not confined to the study of a single case; they explain that multiple case study designs have become increasingly common in business and management research. Bryman and Bell (2007) explain that multiple case study research is undertaken for the purpose of comparing the cases that are included in a multiple case study. In effect, it allows a researcher to compare and contrast the findings derived from each of the cases and would then encourage the researcher to consider what is unique and what is common across cases, and to frequently promote theoretical reflections on the findings. Yin (1993) explains multiple case study research as replication logic rather than sampling logic; he explains that two or more cases should be included within the same study because the investigator predicts a similar result or replication will be found. Yin (1993) considers that the development of consistent findings over multiple cases and multiple studies can be considered a very robust finding, which is the basis of selecting a multiple case study approach for this research. By using multiple cases, this research hopes to compare and contrast the findings from each case study and look for patterns or replication and thereby make a conclusion regarding problems associated with failed projects past and present.

3.4. Observatory Approach

It is claimed that one of the best methods of data collection in business and management research is participant observation. This is a part of qualitative research which entails a relatively prolonged immersion of the observer (or researcher) in a social setting where the researcher seeks to observe the behaviour of the particular social setting which can be a group, organisation, community or even project team. The researcher observes the behaviours also to elicit the meanings they attribute to their environment and behaviour. It is argued that in the process of participant observation, the researcher immerses him or herself in the group for an extended period of time, observing behaviours, listening to conversations and asking questions. In practice, participants may do a bit more than just observe, they may gather further data through interviews and through the collection of any relevant documents. Though observation can be structured where the researcher employs explicitly formulated rules for the processes employed in observation and the recording of behaviour, the rules here inform the observer about what

they should look for and to record the behaviours observed. The researchers involved here will observe under the same rules. Observation can also be non-participant; where the researcher observes but does not participate in what is going on in the social setting. Bryman and Bell (2003) express that structured observations are usually non-participant in that they are in the social setting being observed but rarely participate in what is happening. The non-participant observation is usually in connection with the unstructured observation which does not entail the use of an observation schedule or rule for the recording of behaviours but aims to record the behaviours of the group with as much detail as possible in order to provide a narrative account of the behaviour. They put forward that most participant observation is unstructured but the term unstructured observation is usually employed with non-participant observation. Other types of non-participant observation are put forward by Webb et al (1996) as the simple and the contrived observation. The simple observation is where the observer has no influence in the situation under observation while in the contrived observation; the observer actively alters the situation to observe the effects of an intervention.

3.5. Basis for selecting Industries

The industries selected as case studies for this research were mainly UK government projects, IT projects and a few other privately owned projects. The UK government projects especially the construction and engineering ones were project based and the construction industry has a rather knowledge-intensive nature. The choice of UK industries was deemed necessary due to the ongoing government projects in the last few decades. These projects were mainly in the construction and engineering sectors. Projects are always being undertaken and seemingly have the same problems of overrunning budget, time and expectations. Managers, stakeholders and project sponsors keep looking for methodologies and best practices to use to manage these projects to get the projects to meet the agreed stakeholder requirements and have the stipulated deliverables. The UK construction industry accounts for about 10% of the UK gross domestic product and is considered to be among the world's strongest, featuring amongst the world's top 10 (DTI, 2000). Though the industry is one of the United Kingdom's main strengths in income with the ever-growing property market, the industry suffered a recession in the mid-80s and early 1990s and according to King (1999) inefficient practices contributed to the decline of the industry. In the UK, disputes surrounding major projects such as Canary Wharf and the Channel Tunnel came to exemplify what many saw as the decline of a once magnificent industry which had built an Empire. The need for greater productivity in the industry has led to awareness and need for an improvement in the best practices in the industry. In the UK, the Office Government of Commerce (OGC) consequently introduced a new

methodology for managing projects; the Projects in Controlled Environments (PRINCE) became a popular project management methodology and was implemented by various organisations and industries in the UK

Other private and non-governmental UK projects have also been chosen for various reasons, some of which may include: differences and comparisons in the use of methodologies, organisational culture, social network analysis and information distribution, rate of project success for the organisations, knowledge databases, use of lessons learnt etc.

3.6. Research Access

Difficulty in gaining research access is a widely known fact and has been an issue faced by researchers with business organisations. The topic for the research focuses on project based organisation or project driven organisations. Organisations that have handled, sponsored, or have been involved as stakeholders in one way or another have been targeted for the research. Organisations with a good knowledge base and guidelines for best practices have been chosen for the research purpose as this research attempts to look into complexity issues in the context of project management. Organisations that are project driven would enable the researcher to look into methods with which the projects are managed and thereby establish any truth as stated in the hypothesis.

Target organisations include the Greater London Authority (GLA), Transport for London (TFL), and other contractors involved in the Jubilee Line extension.

For the Wembley stadium, target companies include GLA, Multiplex of Australia, and Symonds. For the ongoing project on the Department for Environment, food and rural affairs (DEFRA), the target organisations would be the DEFRA project teams and IBM.

The process of securing access began with the preparation of a research proposal tailored to suit the anticipated interests of business organisations. The proposal included an explanation and what the practical implications of the results would be for the participating organisations. The potential interests or gains of the participating organisations were also appraised in the proposal; providing a potential business case for the research topic.

In some organisations I identified key people that have been involved in project management for the organisations and they served as initial contacts for those organisations. For other organisations, a letter of

introduction along with a copy of my resume was sent. Organisations included were PWC, Accenture and IBM as they are organisations that get involved with major private and governmental projects. For organisations where I was not able to make initial contact directly, I got contact details for people over the internet, telephone and by word of mouth.

Other avenues that can be explored in gaining access might be the use of knowledge bodies such as London Knowledge Network (LKN), Knowledge Innovation Network (KIN), and Cognitive Edge. I also looked for any existing lists of potential organisations that have participated and assisted researchers in the past.

3.7. Data Collection techniques

To facilitate this research, the nature of data sought will essentially focus on the tailoring and execution of project management methodologies, interactions and relationships of staff and stakeholders, and relationships between participating organisations. This research would also work in retrospect in order to gain insight to past projects that have failed according to the definition of failure assumed by the researcher. Thus the primary source of data would be interviews with individuals in participating organisations and project managers involved in the implementation, tailoring and execution of project management methodologies. As highlighted above in section 1.2, qualitative research tends to emphasise words rather than figures used in quantitative analysis. Miles and Huberman (1994) argue that the strength of data collected by the qualitative approach lies in the ability to gain insight into the *meanings* individuals place on their lives, through emphasising their 'lived experience' and connecting such meanings to the social world. Therefore, this research takes a case-based qualitative approach, the research assumes an interpretative position and the main data collection technique that will be put to use is story-telling and narrative analysis. The sources of data will include items that categorise as stories. Marzec (2007) explained that everyone has a story to tell, stories can be seen in focus groups, anecdote circles, meetings, face-to-face interviews, informal discussions and even documentation of regular, ad-hoc and scheduled meetings.

3.8. Story Telling Over view

McKee (1997) presents stories as the creative conversion of life itself into a more powerful, clearer, more meaningful experience. They are the currency of human contact, Marzec (2007) says that just as everyone

has a story to tell, so do companies. She continues to say that every company is on an epic-like quest for results, a journey fraught with obstacles that takes the form of escalating competition, rising material costs, battles for talent, pressing stakeholder demands and increasing healthcare costs. Maya Angelou is said to have mentioned that there is no agony like bearing an untold story inside of you (Christensen, n.d.). Projects involve such epic journeys and so definitely have a story to tell. This would apply to both past and ongoing projects in organisations.

Organisations devote quality hours to planning and strategy, and at the end of the process leaders have a list of goals and a series of to-dos in the form of a plan but the plan packaged in an outline power point format often fails to reflect deep thoughts and also fails to inspire commitment Marzec (2007). (Shaw et al., 1998) argues that creating a plan allows planners to skip the thinking process and gives a tricky impression that there is coherence when all that exists is a list of good things to do. He suggests that the outline format of the plan allows for generalisation, it allows people to overlook key relationships and interdependencies, and leaves room for major assumptions, which results in failure to engage and connect organisational thinking and failure to engage the use of heads and hearts to execute against the plan. By contrast, the storytelling approach enables engagement and strategy execution by overlaying strategic planning with strategic thinking. This includes the ability to inspire a shift in thinking, tap into people's motivations, create a compelling vision and share organisational learning (Marzec 2007).

To understand and fully grasp the working knowledge of storytelling and how it can be used for data collection, a test workshop was done with a group known as SALT (the full details of this workshop are available in appendix 1). The workshop was performed as an anecdote circle and the two stage emergence process was undertaken. The purpose of this was to analyse stories and reveal preoccupations and hidden truths by extracting archetypes from the stories. This proved extremely insightful, revealing factors that may normally be overlooked, although they may have had considerable impact on a situation. The process also revealed relationships and interactions as you would see in the interaction of social systems. This method of story analysis was put to use in the analysis of three case studies and the archetype extractions proved to reveal hidden truths that affected the projects gravely although they were not considered when using known project management methodologies.

3.9. Ethical Considerations in Data Collection

Penzhorn (2002) notes that the dissatisfaction with the use of quantitative methods and techniques in

information needs research resulted in a gradual move towards the use of qualitative methods focusing on the users themselves in determining their information needs. She further explains that participatory research is a qualitative research methodology that challenges the principles and practices of objective, detached, quantitative research approaches. The use of participatory research methods in projects results in the identification of reliable and relevant information needs. These results, Penzhorn (2002) points out, can serve as an example for the increasing use of qualitative techniques in information needs research and affirm that participatory research methods can be a valuable alternative in the area of information needs research. Desai and Von Der Embse (2008) talk about the ethical perspective of managing business information. They describe the activity of how data collection is done with the ethical consideration being that data must be collected at the consent of the individual and that proper use of algorithms should be applied i.e. there should not be any bias that would favour one individual over the other. They highlighted the ethical issues of information management and data collection with regard to: what data to collect; how the data should be collected, processed and presented; the purpose for collecting the data; and the extent of the impact of the data collection and analysis. In the process of storytelling and narratives, information would be used to create the necessary anecdotes and stories and this information would be collated from interviews and brain storming sessions with managers, leaders, and other participants. Using these procedures for the purpose of research gives rise to a few ethical issues such as: confidentiality, truth telling, consent, and keeping promises. These issues have to be dealt with once research access has been granted with the organisations. The participants were given a sense of control for the initial interview process. And all promises made to the participants were kept; this implied that only promises that were within my capacity to keep were made. Reports of data analysis were made available to each participating organisation.

The data collected was for the purposes of research, to gain more information and knowledge of complexity issues in the context of project management. The main emphasis here is on the ethical issues that surround how the data is collected. Desai and Von Der Embse (2008) argue that some businesses collect data without the consent of individuals which violates the ethical standards. They explain that the use of a video camera or any other form of electronics which an individual may not be aware of may be illegal and ethically questionable. With regard to data processing, Desai and Von Der Embse (2008) say that data collected should be processed such that it does not distort the meaning of the data and that the data should be processed in proper context in order to maintain the purpose for which the data was collected. The above considerations were taken into perspective in the participatory research embarked on, and for the security of the organisations, pseudo names were used.

A further consideration was the use of a live project in which I participated as a consultant to the project team. The project was used since it displays some of the issues a project faces following a normal project management methodology (PRINCE 2) moving into a complex situation. However the fact that I was intimately involved in the project means that the observation and interpretation was more subject to my personal biases than in the other cases. I mitigated these biases by involving other project management professionals and providing them with some project documentations in the form of the project brief, the project requirement documents, meeting minutes, meeting logs (actions, risks, issues, changes etc), daily, weekly and quality review updates. These all served as project narratives and gave the outside project professionals some insight into the nature of the projects. The project management professionals took away copies of the project narratives and digested separately. The project management professionals then took part in an anecdote circle which I facilitated without being involved in the extraction exercise as recommended by the pre-hypothesis and archetype extraction processes (Please see Appendix 1 for archetype extraction processes). The exercise was used to carry out the two stage emergence process to reveal hidden truths about the project outside my position or personal thoughts on the project as a consultant who was involved in the project life cycle. As the facilitator my aim was to carry out the archetype extraction process and ensure the hidden truths about the project was revealed by only the participants of the anecdote circle. This limitation and the mitigating action were presented to the research ethics committee. There were no issues concerning research ethics identified and this was approved as a one-off case study approach while the other two cases would be conducted with internal members of the project.

This research is carried out via the investigation of three case studies. The first case investigates the review of a project in an IT environment within the insurance sector, the project was implemented with the use of the PRINCE2 project management methodology, the system was supposedly determinable and following in-depth requirement gathering and discovery phase, the project was approved, planned and underway to deliver the required changes and benefits to the organisation. Though the plan may have been implemented successfully and lead to the success of the project should the project have existed within a determinable, linear system. However, if the project was to be located within an undeterminable non-linear system the capability of the methodology to cope with factors within the systems will be in question. Tools for understanding complex systems were used to review the project and to enable the observation and identification of various factors that were at play but not visible or apparent via the PRINCE2 methodology.

The second case study reviews an IT project implemented for a media company. This case had some similarities with the previous case study as the project was implemented using PRINCE2 and some aspects of the PMP methodology. Again, the project may have been successful had the system been a linear determinable system but the existence of the project within a social system showed that there were factors outside the control of the methodology and sense making for the project was realised with the use of other tools and techniques that existed outside the project methodology. Again, the use of these tools identified various factors that impacted the viability and imminent success of the project.

The third case study reviewed a government project that was also implemented using the PRINCE2 methodology. The project involved the passing of governmental legislations which had dependencies on government meeting schedule and governmental decisions. The project that was quite unlike natural projects as we may know it, the nature of the project was to enforce a policy for the use of renewable transport fuel as an obligation for suppliers. The main aim of the project was to introduce a renewable transport fuel obligation that obligated transport fuel suppliers to ensure that a percentage of their sales were from a renewable source. The case study investigated the environment in which the project was being implemented and aimed to review it against the methodology which was more applicable to a determinable environment. The need for complementing the methodology with tools and techniques for understanding non-linear environments was further emphasised with this project.

4. Case Studies:

4.1.Case Study 1: Forte Insurance Netware to Active Directory Migration Project

4.1.1.Introduction:

This chapter introduces Forte Insurance Company's Netware to Active Directory (AD) migration project. The project requires the migration of large amounts of data from an existing computer network to a new one. As with many other projects such as the Jubilee line extension, the Wembley Stadium, the NHS IT project etc, the Netware to AD migration project has its issues and shortcomings, some of which are peculiar to the project and others which are rather generic to the project management world. Some issues were enough to be carried along with the project, while others led to a temporary stop to the project. This research looks into causes of project failure and attempts to understand the environment in which an organisation exists in order to further understand the cause and effect relationships that exists within the world of project management.

The Forte Insurance migration project was a project that was to migrate all the data of Forte Insurance across various sites from an existing Netware environment to a new Microsoft Active Directory (AD) environment. The project management methodology in use was the PRINCE2 methodology which like most UK projects, involves using a standard project management methodology, which is usually the best practice.

This research investigates the project within the social system in which it was implemented. It was observed that the success of the project was constantly in discussion in terms of the scope; the time required in delivering the granular tasks in relation to the time required in delivering the overall project; and the budget of the project. Other factors that could impact the project as a result of functions of an external social system were sparsely discussed within the project; however it is unclear if these factors were discussed within the organisation. The research looks into using complex theories to analyse project stories and attempts to search for hidden truths that might be responsible for the issues the project and possibly the methodology faced. These hidden truths also emerged as a result of factors external to the

project, though these were not directly known within the project, but were factors that related with the project in various other ways. Though the project was an I.T Infrastructure Migration project, it existed within a system that related the organisation that in turn had interaction with the wider world of insurance and had organisational priorities that may have been imposed on it due to the happenings on the system it belonged to. From the analysis of the case study, it was observed that many other factors other than those recognised within project terminologies were at play and were not fully recognised by the project team. This research further investigates the dynamics of methodologies and their implementation in respect to organisational existence as defined and described by Cynefin framework for organisational complexity. As popular with many projects, the project was implemented based on the PRINCE2 methodology. The approach to delivering the project was to identify the overall scope of the methodology, plan the project, put a system in place to ensure the project was being delivered against the plan and every issue that arose was dealt with in meetings with the aim of resolution.

4.1.2. Project Scope:

Forte Insurance currently used Netware systems for their networking and computer system management. As the Netware system is considered outdated, and to enable better end user efficiency, it was determined that there was a need to upgrade the systems to the Microsoft environment. This would entail upgrading the operating system of the servers and migrating all the data from the current Netware environment to a Microsoft Active Directory environment which was to facilitate easier management of data, user, login and better management of network infrastructure. Forte Insurance advertised for prospective organisations to bid for the project; a contract was to be awarded to an organisation to manage the project and deliver the requirements of Forte Insurance. The project was then titled “Forte Insurance Netware to AD Migration Project”.

The company that won the bid amongst others was Muse Consult. Muse Consult is a well-known independent provider of IT infrastructure services. They claim to help their customers maximise the value of IT by advising on IT strategy, deploying and integrating appropriate technologies, and managing elements of client infrastructures on their behalf.

As with normal project management endeavours, especially in the UK, Muse Consult chose the popular PRINCE2 Project Management methodology. The methodology breaks down projects into stages and phases for better management and helps in guiding the planning, defining, break down and scheduling of the various tasks that would be undertaken in the project.

Whelbourn (2003) explains the PRINCE2 processes as follows:

1. **Start Up**: The pre-project process which is designed to ensure that the prerequisites for initiating the project are in place. The process expects the existence of a project-mandate that defines in high-level terms, the reason for the project and what products/deliverables are required.

2. **Initiation:** A process which is meant to draw up a contract in the form of the Project Initiation Document (PID) between the Project Board and the Project Manager so that there is common understanding of:-

   - ☐ The key reasons for doing the project
   - ☐ What key products the project will deliver
   - ☐ How and when the deliverables will be delivered and at what cost
   - ☐ The scope of what is to be done and any constraints which apply to the deliverables and to the projects as a whole
   - ☐ Who is to be involved in the project decision making and how the project is controlled.
   - ☐ How the quality required will be achieved and
   - ☐ What risks are faced?

   A PID is a document whose purpose is to define all major aspects of the project and forms the basis for its management and the assessment of overall success of the project. The primary uses of the PID is to ensure that the project has a complete and sound basis before there is any major commitment to the project and to act as a base document against which the project can assess progress, change management issues, and ongoing viability questions (OCG, 2007).

3. **Controlling a Stage**: This drives the next point; managing product delivery. Its interfaces are the authorisation of a work package, any specific reports and the return of any required confirmation that the work package has been completed satisfactorily.

4. **Managing Project Delivery**: This phase allows a controlled break between the Project Manager and any Team Manager involved in the project, or between the Project Manager and product creation/provision by third party suppliers. It is said that this phase needs careful implementation to avoid being over-bureaucratic.

5. **Managing Stage Boundaries**: The objectives of this are to:

   - ☐ Assure the Project Board that all products in the current stage plan have been completed as defined
   - ☐ Prepare the next stage plan
   - ☐ Provide the information needed for the Project Board to assess the continuing viability of the project.
   - ☐ Obtain authorisation for the start of the next stage, together with its delegated tolerance margins
   - ☐ Record any information or lessons that can help the later stages of this project and/or other future projects

6. **Closing a Project**: The purpose of this process is to execute a controlled conclusion to the project. It covers the Project Manager's work to wrap up the project at its end or at a premature close. Most of the work here is to prepare input to the Project Board to obtain its confirmation that the project may be closed.

It can be seen from Whelbourn (2003) and the ILX Group (2008) that the above stages are controlled by two major processes which are the planning process and directing a project process. A representation of the processes of PRINCE2 is shown in figure 4.1: This methodology is well suited for a determinable environment without complexity as described in Chapter 2. As previously explained, the complicated situation is a situation where planning is found and, information for managing and directing are known by a particular group of experts though they may not be fully understood. With the Netware to AD migration project, the deliverables (also known as products, tasks, and work packages) were identified by a group of

consultants. These products and the time frame it was forecasted to complete were identified by the consultants and given to the Project Manager to inculcate in a project plan. The project plan produced by the Project Manager was then used as the driving force for the project and also the determinant for the projects overall time frame. This also dictated the budget and resource management of the project as a whole.

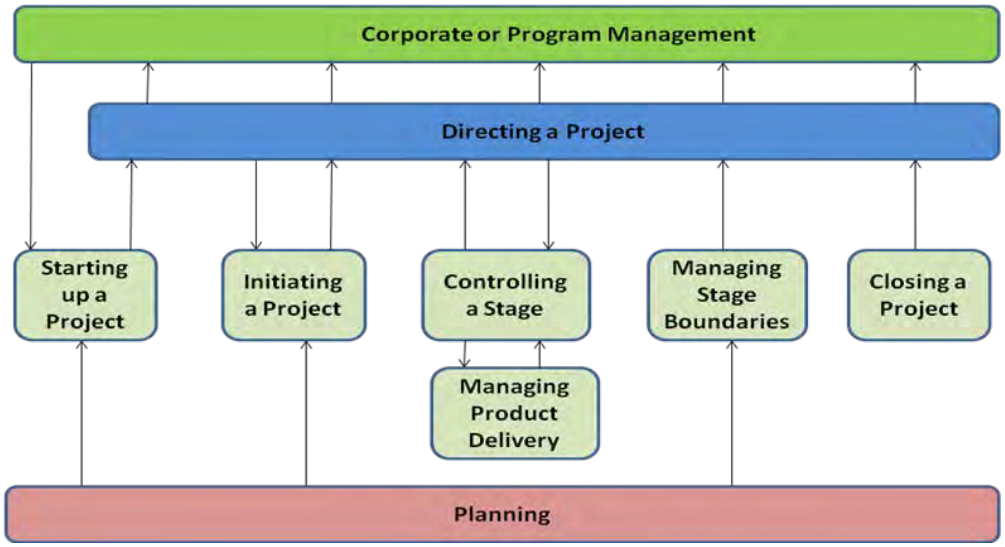


Figure 4.1, PRINCE2 Process Model (Source: ILX Group 2008)

The PRINCE2 methodology and other known project management methodology works best in conditions where best practices, planning, expert opinions or consultants are used for making organisational and managerial decisions. Environments that employ standard operating procedures, structured processes, structured techniques, stable cause and effect relationships will accommodate the use of methodologies such as PRINCE2 as a standard methodology in delivering projects. These environments are typical of the complicated and the simple domains as defined by the Cynefin framework for organisational complexity and are not normally located within complex environments that are categorised by emergence, social interaction, interdependence and possibly hidden factors as characterised by various authors including but not limited to (Kurtz and Snowden, 2003; Kauffman, 1993; Boisot, 2007; Cleland and King, 1968; Mitleton-Kelly, 2003).

As described in the first chapter, the planning phase can be described as one of the most vital assets in a project management implementation and has been identified as one of the critical success factors of the project. It is reported that high quality planning will increase the chances that the project will be properly executed and completed. The planning role in a project implementation lies mainly with the Project

Manager who will carry out the task, in line with the requirements and satisfaction of all relevant stakeholders. In some larger projects, the Project Manager may utilise the skill of an expert project planner who is brought on board solely for the purpose of planning the project with the help of the Project Manager and the relevant stakeholders; Zwikael and Globerson (2006) and Meredith and Mantel (1995). The importance of the planning process in project management implementation can also be seen from the diagram above as it spans across almost the entire PRINCE2 processes.

Kurtz and Snowden (2003) explain the four environments in which organisations exist. The first, **simple domain** is where repeatability allows for predictive models to be recreated and where the use of best practices is naturally allowed. This is the domain of process re-engineering, where knowledge is captured and embedded in structured process to ensure consistency. Here the focus is said to be on efficiency. They conclude that structured techniques are mandatory in this domain. The second, the **complicated domain,** contains cause and effect relationships. But in this domain, the relationships are not fully known or are known by a limited number of people, which could be consultants, experts, etc. Everything in this domain is capable of moving to the simple domain but the question is if the time and resources can be afforded to move from the knowable complicated domain to the known simple domain. The complicated domain is a domain of systems thinking, experiment, expert opinion, planning and methodology, which seeks to identify cause and effect relationships through the study properties which appear to be associated with quality. The other two domains are in the realm of "unorder", which are the domains of complexity and chaos. The complex domain is where the complex and adaptive systems exist. It seeks to look into hidden truths about the system by looking at its many interactive and independent parts, while the domain of chaos talks about a system in turbulence where there is no visibility of relationships between cause and effect and where there is hardly any time to think and learn, but rather the priority is to act. The existence of projects in the complex domain is further discussed in later sections.

It can be argued from the above that the PRINCE2 Project Management methodology and its practices are appropriate for the simple and the complicated domain. The PRINCE2 methodology follows procedures of best practice and scenario planning where experts' judgments are readily depended upon for the planning, scheduling, delivery, and management etc. of project deliverables. The methodology follows a linear pattern of operation and moves along the line stage to stage, and phase to phase from start up through to completion and the closing of the project. These conditions make the PRINCE2 methodology suitable for the simple and complicated domains. But according to Snowden (2002) Organisations may in part or whole be classified in each or several parts of four domains or environments. The complex

domain Kurtz and Snowden (2003) explain as a domain of complexity theory, which studies how patterns emerge through interaction of many agents. This is further described below.

The PRINCE2 methodology can be argued to fulfil some of the conditions of the simple domain which as described in Chapter 1 is the domain where standard operating procedures and proven relevant "best practice" might be safely used. The PRINCE2 methodology will therefore be well suited for a domain where knowledge may be captured and embedded within structural processes, within an overall organisational cultural context. A domain of systems thinking, the learning organisation and the adaptive enterprise where techniques such as scenario planning can often be found and stable cause and effect relationships can be categorised or known by only a particular group of experts who may not fully understand the relationships and how well does it fulfil the conditions of Chaos where the system is in turbulence, and there are no visible relationships between cause and effects, when there is no time to respond and investigate change or in particular. The question of how well do PRINCE2 methodology fulfil the conditions of a complex and un-ordered domain where complex adaptive systems and organisations are located and no cause and effect relationships between agents are obvious and the number of relationships defy categorisation and analytic techniques would then be raised. As described above, the PRINCE2 methodology was adapted by Muse Consult for the Netware to AD migration project. As required by the methodology, the stages of the project were broken down into Stage 0 (Initiation), Stage 1 (Planning) and Stage 2 (Migration).

The breakdown of the stages is described below:

Stage 0 (Initiation):

Stage 1 (Planning)

Stage 2 (Migration)

Stage	**Delivery time**	**Process**

Stage 0 – Initiation	o	o Project Initiation Document o Stage 1 Plan
Stage 1 – Planning	6.5 Months	o Design o Discovery o Proof of Concept o Applications
Stage 2 – Migration	11.5 Months	o Infrastructure and tool set preparation o Further Planning for Applications o Migration o Upgrade of other existing servers o Project Closure

Table 4.1 Migration Project Processes for 4.1 the Forte Insurance Company's Netware to Active Directory Migration Project

With regards to the Netware Decommissioning Project, the contract was awarded, the terms and conditions were agreed and project documents including the Statement of Work (SoW) and the Project Initiation Documents (PID) were agreed.

The mandate given to Muse Consult by Forte Insurance, which formed the scope of the project, which was to migrate 60 servers, 8 Terabytes of data and 50 applications. Muse Consult agreed to the scope, started

writing a PID and SoW to this effect and started the planning process of the project. Muse Consult's project management team and team of consultants, which included Technical Architects and Technical Consultants, determined what deliverables (also called products) would be delivered at each stage of the project. Using Microsoft Project, the time for each deliverable and the respective human resources for each deliverable were also determined and scheduled by the project management team and team of consultants. Stage 1 (initiation) aspect of the project was planned with as much detail as possible while the Stage 2 (migration) aspect of the project was planned at a higher level. Further planning for Stage 2 was scheduled to be done at the end of Stage 1 and start of Stage 2 when there would be more information regarding the project migration available.

Stage 0 (Initiation): The initiation phase of the project started on time, Muse Consult agreed to start the write up of the (PID) without a formal acceptance of the confirmation of a legal Statement of Work nor the Terms and Conditions for the project in the form of a signature. The first draft of the PID was prepared and sent to the client for reviewing. Upon reviewing the PID, the IT technicians pointed out that the backup servers had not been included in the migration of the project. For the client, it was a little change in the project and should only be included in a change management process in the course of the project. The backup servers comprised a total of 500 servers with multiple sites. Each application could not be treated as an application but as application instances. These were interpreted as, each application multiplied by the number of sites in which the application was used. This was thus interpreted as a total of approximately 150 applications as opposed to the 50 applications in the scope of the project. Muse Consult argued that this was completely out of the scope of the original Netware to Active Directory migration project, i.e. the migration of 60 servers, 8TB of data and 50 applications.

Stage 1 (Planning): The planning phase started with the Project Manager developing a high level project plan using Microsoft Project. The Project Manager then had a long day meeting with the senior technical analyst, a technical consultant and the project coordinator who acted as an assistant to the Project Manager. The technical analyst and the technical consultant had experience with implementing an infrastructure project. They knew what was to be done, when it was to be done and who was responsible for doing it. As agreed with the high level plan, they documented the processes required to carry out the discovery of Forte insurance's current Netware infrastructure, as it was proposed to be a like for like in the Active Directory infrastructure. Once they had completed the discovery phase, they documented processes required for designing the new network environment, and then the processes had to be followed to ensure that the design would work. They called this the proof of concept. The Microsoft Project plan

entered into the minute details for carrying out all the processes. They were referred to as products. Each product was assigned an owner, given a time frame and other products that depended on it or that it depended on were also shown in the Microsoft Project plan. The Project Manager further documented the time required by all resources as documented in the plan in a separate resource plan in Microsoft Excel. With the resource plan, the Project Manager worked out the time required for each human resource and their associated costs. Once the plan was fully drawn up it was distributed to the project sponsors who agreed to the time line and cost of project resources. Each product in the project plan was to be documented as proof that the work was carried out, the documents were to be shared with the project sponsors and relevant stakeholders, and once they read and agreed to the contents of the products documents, it was signed off as complete. The Project Manager then updated the project plan with each signed-off product, this helped him calculate the overall progress of the product and he was able to give some form of dashboard report of completed products, products in review and products outstanding. He also worked out an overall percentage complete and percentage outstanding for the progress of the project deliverables. This gave project owners and sponsors an instant view of the status at every given instance. In theory, the process was to ensure a smooth seamless transition of the migration project. Things were to run to plan and the project was to end at a proposed time.

Stage 2 (Implementation/Migration): The project was said to have been implemented under the PRINCE2 project management methodology, the plan was drawn and the progress of the project was tracked against the plan to show where the actual project was against that plan. As discussed, with the PMI methodology, the plan needed to be revisited when further information was available to document the lowest possible level activity in the plan. This was not fully catered for in the Forte insurance Netware to Active Directory migration project as the plan was drawn up and signed off and each product was further documented and signed off. The project implementation did not fully happen as planned; more information was gathered in the cause of the project, some of which were catered for by the change control process supported by the PRINCE2 methodology, and some others meant that the project ran into some issues, some minor and others major. Some of the major issues were “show stoppers” and ended up placing the project in exemption. In theory, the plan was clear enough to have been agreed on with the project owners, but after the planning phase and before the actual migration of the data began, some issues came to light.

4.1.3. Projects First Major Issue: Unidentified Servers out of Project Scope

Due to the issues highlighted above, the project was immediately placed in exception and a temporary stop was placed on the project, pending the time it took to sort out the misinterpretation and to come up with a reasonable solution that was viable and cost effective for both the client and for Muse Consult. In terms of the definition of failure for the purpose of this research, the project is classified as a failure as it was no longer going to meet its time deadline and it was costing both parties more human and monetary resources. In the Cynefin model for organisational complexity, this environment can be identified as existing in the complicated domain, where the decision model is to sense incoming data, analyse the data and in turn respond to the data in accordance with expert advice or interpretation of the data analysis. The question raised here is whether the decision making model for the complicated domain is capable enough for either preventing the project being thrown into exception, or handling the project after it was thrown into exception. The project being in exception automatically meant that the time frame of the project was extended by the length of time by which the project was stopped. Though this was agreed by the project sponsors it was seen as an adverse effect on the running of the project in terms of cost, budget and use of resources. This was an issue that was not fully catered for by the project management methodology in use. The senior Project Manager attempted to cope with the issue by having continuous dialogues with the project sponsors and also producing an exception report. The exception report mainly covered the issues, their causes, the options to move the project forward and also recommendations. This stage of the project was more of a brain storming session between the client and the Project Manager; it was a series of deliberations that was around the client's requirements and the scope of the project. Most project management methodologies, including PRINCE2 do not really cater for, nor have best practices or templates for steering such conversations between client and projects in rare situations such as projects being thrown into exception. Another question here is, whether the methodology in use could have avoided the project being thrown into exception in the first instance. Burgelman and Grove (2007) argue that companies operate in a stable industry structure and a decision making process geared towards coping with linear dynamics, but that at some point in their evolution they face non-linear strategic dynamics which overwhelm their strategy for decision making. A possible solution might be the identification of major critical issues that will define the failure or success of the project as pointed out by Gilb (1998). It can be argued that the identification of all the major and minor information from all relevant parties/stakeholders might have modified the entire project scope, and in turn reflected on the business case of the project and the authorisation of the project in the first instance.

After approximately one month, Muse Consult's IT consultants came up with options for carrying the project forward. The best option according to the client was to carry on with the migration and

decommissioning project and perform an upgrade of the environment that held the omitted 500 servers in question. With regard to the applications and application instances, Muse Consult agreed that the client should come up with a list of all applications and application instances, and this would be inculcated as part of the deliverables that make up the first phase of the project. This was also to be inculcated in the project plan. The decision to move the project forward by performing an upgrade on the environment that held the 500 servers came as a result of recommendations by experts. This established the situation being located in the complicated domain according to the Cynefin framework which works with expert knowledge, basing the decisions on analysis of data and responding to the analysis based on best practices, expert knowledge and recommendations.

Muse Consult's IT consultant and project management teams came up with approximately 115 deliverables/products (also referred to as products) to be carried out in the first phase of the project. Some of the products were to be delivered by the client, some by Muse Consult and some by a third party organisation that was to carry out the physical migration. Products were to have their descriptions written, reviewed by the client and approved with an authorised signature. In accordance with the practices of PRINCE2 project management methodology, the products were presented in the form of a report, following a technical workshop which explained the requirements of the work package in accordance with the infrastructure of the client's network. The reports were sent to the client and the technical teams on the client side reviewed the reports and if it was satisfactory, they would send an authorised copy back to Muse Consult. It was planned that this was done for all the products in all the phases of the project, the products were done to ensure that the migration of the entire data for the client goes according to plan and that the work of the client's staff was not negatively impacted after the migration had taken place. The whole process was also to be as transparent to the end user as possible.. Virtual and physical environments of the client's network was replicated in a stage called the Proof of Concept to ensure that all the work was tested and to guarantee that the migration would work and would not negatively impact the business of the client. At every meeting to discuss the products, any risks or issues that arise were documented. The probabilities and impact were measured and steps that needed to be taken to divert, mitigate or prepare for were documented. Actions for each resource were also noted and a time frame was given for each action and delivery of each work package.

Like most projects such as the current NHS Computer Project, the now completed Jubilee line extension, the Wembley Stadium etc, the Netware to AD project had its own unique issues, some of the issues faced by the project included: products not being delivered on time; further planning had to continue in the

course of the project, and thus the master plan was to be continually updated. Some specified products were deemed as no longer required, while some other products were introduced along the way, as their uses were identified. Every change had to go through a particular change control process where they were raised, issues, authorized and implemented. The process of change control was quite crucial to the project management team as it determined and justified the further need for resources and budget. With the current NetWare to AD migration project, two changes were made within the initiation phase, and the cost implications were still being measured. As discussed earlier, the work package reports have to be written by the contractor and sent to the client for reviewing. The client might have had a few changes to make before a formal acceptance in the form of an authorized signature at the end of the report was given. For this purpose, the PRINCE2 project management methodology emphasised the need for a configuration control. This was where all the versions of the documents that transcends between the contractor and the client were documented. This is meant to be particularly helpful as all parties involved in the project would ensure they had and worked with the same copies of documents and products at every point in time. Another issue the project suffered from was the availability of resources to carry out the products. The project hired resources on a contractual basis and had a daily rate for most of the human resources. The main resources used for the project were IT consultants who were assigned to the various products. It was not very cost beneficial for the project to have all the consultants on a full-time basis as various skill sets were required for various products. The consultants were therefore allowed to spend time on other projects that required their skills. Tracking the time spent on the project and ensuring the right money was paid to the right consultant on the right work package was another headache for the project management team. From the human resource point of view, the availability of consultants in terms of family commitment, holidays, sickness and other forms of absences were other issues for the project management team to deal with. Some of the products have had to be moved due to the unavailability of some of the consultants on certain dates. The issues might seem small, but moving the dates of the products would mean altering the project plans and at times raising a change request which might be cost implicative and also might impact the project in terms of completion time.

Having participated at some of the project meetings from an observatory paradigm, a few notes were made which did not prove problematic at the time, but was a potential issue for the future of the project. All the products were planned, given a completion time and assigned the necessary resources. It was noted that many of the products had some variance in the delivery dates. Some were delivered early with the highest being -4 days (i.e. 4 days earlier than the planned delivery dates), while some were delivered late with the highest being +47 days (i.e. 47 days later than the planned delivery dates). These delays are

managed as best as possible with the potential ones being processed through the change control processes. The PRINCE2 methodology has standard procedures for managing issues, but it can be seen that since the methodology is subject to execution by the project, there are some issues and problems that are inevitable. For each specified product, there was an associated time frame for the delivery but it was observed that much of the documentation prepared by experts and consultants took longer review time by the client's technical staff. As more details were available in the course of running the projects, some planned products were also deemed as not necessary. In contrast to the PRINCE2 methodology, the PMI methodology has a planning method where planning is only done with the available information and thus the planning phase is always revisited. The PRINCE2 methodology attempts to cater for this by involving the planning process in most part of the project life cycle and as the changes occur, as pointed out, a change request is raised and if approved the project is further planned with the new details. This can be said not to be the main issue of the project but is what has been seen to be one of the on-going problems faced by the project. What needs to be determined is whether the above issue is a problem with the methodology, the execution of the methodology or the working culture of the parties involved.

4.1.4. Project Second Major Issue: Clients' lack of readiness for Live Changes

Another issue that the project was faced with, as a recent development, was the lack of readiness of the client for a live migration process. Following the Project Management Methodology adopted by the project, the project was divided into phases and stages which as discussed above include: Stage 0, Stage 1 and Stage 2. All the stages are subdivided into various phases some of which were covered above. The second stage of the project; Stage Planning, Discovery, Design, Proof of Concept and Applications were delivered. This Stage was delivered with the inclusion of deliverables of all parties involved in the project; the client, the project team and the third party suppliers. As expected and as planned, the next stage of the project which was Stage 2 (migration) was scheduled to begin. It had been planned that the migration of the entire Network infrastructure of the client was to be migrated from Netware to Microsoft Active Directory. The migration process had been planned and was also tested in the stage called the" Proof of Concept".

The Stage 2 migration process was the physical migration of all clients' data from the Netware Environment to the new Microsoft Active Directory Environment. The overall time frame of the migration process was planned to have taken place over a six month period. It was also confirmed that data would be required to go through a data remediation process to correct any broken links or errors that were encountered during the migration. The main requirement of the process by the client was for the

entire migration process to be totally transparent to the end users and that it was not meant to disturb the daily business process in any way. The migration process was thus timed to take place out of working hours between 10pm to 6am Mondays to Fridays and also over the weekend; this plan was done so that the migration would not affect the overall working business of the client. Subscribing to the views of Gilb (1988), these requirements can be argued to be some of the critical attributes necessary for success. In line with Kurtz and Snowden (2003) this can also be argued that there would be some hidden truths that would not normally be highlighted as there should be with the use of normal processes, best practices or methodologies. These hidden truths can be referred to as elements that can potentially or explicitly affect the projects in various ways, but are not normally known as they have not been identified by any predefined process or methods. As implied in the name, the hidden truths would be more implicit than explicit.

Some of the major changes that were to happen as a result of the migration process include:

- ☐ Change of login scripts: this meant that the way the client would normally log in everyday would fundamentally change, a change that was known as one which would not be accommodated by the wider business, as the project was to be implemented seamlessly without little or no impact to organisational business operations.

- ☐ Rules around the firewalls: the same rules that governed Netware firewalls would change with the new windows environment which was a change that was not welcomed by the I.T department.

- ☐ Post migration issues: this issue was raised as the migration process was to be done over a six month period. The technical question was raised as to what happens if a user that had been migrated to the New AD environment was to attempt retrieving a file that had not been migrated and still existed in the old Netware Environment.

Migration windows: The migration window was planned to be between 10pm to 6am, but it was discovered that some departments work 22 hours a day which was to affect the overall plan and migration time. After the above issues were put into consideration, it was decided that the client were not ready for a live migration process as the migration would impact negatively on the everyday business of the client.

Due to these issues and major changes to the business that the migration was to bring, the project was

again placed on exception a second time. Burgess (2008) expressed that projects in exception are usually a result of misinformation and the mistrust that grows from it. He further expresses that during an exception; plans will have to be made to either bring the process back on track or to dissolve the project. The issues highlighted above were neither seen by the client nor the project team, but had the potential to terminate the project and caused the project to be placed in exception even though the project had been running in line with the requirements of the client.

Some of the reasons that were highlighted as responsible for the project issues include:

- ☐ Inadequate communication
- ☐ Identification and involvement of all relevant parties in the project plans
- ☐ Inadequate change and impact assessment of changes that would be introduced by the project implementation.

  Overall lack of client's readiness for live migration

It was noted that the inadequate communication and involvement of all the relevant parties were mainly from the client's angle. On approaching the live migration, the above issues were discussed and it was decided by the client that the business, the users and the organisations as a whole were not ready for the live migration process and it was concluded that the migration would impact negatively on the way the users work as well as the business negatively.

The project was forecast to cost approximately £1.5 million. The first two stages had used up over a third of the budget costing over £1 million. It can be argued that if all the right people had been identified and involved from the onset, then the project might not have begun in the first place. Gilb (1998) talked about the success of projects being based on the identification of critical attributes necessary for survival. He also pointed out that these critical attributes are not measureable, which in Cynefin terms can be said to be attributes that can only be perceived and not necessarily predicted. It can also be argued that there was a flaw with the selection of the stakeholders. A question being raised here is if the technique for understanding complex systems were would be of benefit in identifying major project attributes and project planning, or if they could be used to identify the viability of the project. This might have an impact on the way the business case of a project is determined and monitored and also in the selection of all the required stakeholders

4.1.5. Other Project Issues:

Some other issues being encountered in the project on a daily basis include communication, project actions and feedback, product delivery, PBS vs. WBS, and third party suppliers.

4.1.5.1. Communication: It was discovered that from the planning phase of the project the client, the project team and third party suppliers went into the project with limited information, which proved to be difficult in the long term. During most meetings and workshops, a lot of debate went into what was the scope of the project from the client's point of view, the project team's point of view and the third party supplier's point of view. As expected, most people would look to cover their angles at every meeting as most people would not want to take the responsibility of owning up to a lack of information provided, which would in turn lead to risks in the project. This is observed to be an on-going problem as the constant review of in-scope vs. out-scope by all parties posed a hindrance to decision making.

4.1.5.2. Actions and Feedback: One of the major ways tasks are assigned and delivered for the management of the projects was in meetings, workshops, conference calls etc. One of the major outcomes in every meeting is the assigning of actions to human resources, from observation; the action can be assigned to the client resources, a resource from the project team or a resource from the third party suppliers. All the actions are naturally given a deadline date and this is recorded in the minutes of the meeting and in turn the project log book. From observation of the records and the meeting logs, it was seen that the time frame to carry out each action varied according to the party that was responsible for the action. The project management team seemed to prioritise actions as top priorities; the third party suppliers also prioritised actions. It was observed that there were some delays in the delivery of actions from the client point of view. Some of the delay in turn had impact on the delivery of some of the products which in turn might have an impact on the time and cost deadline for the project though it has not been observed to be the case. At present, the total number of actions that has been assigned has been about 144 actions. These actions have been observed to be the driving force of the project without which most of the products would not have been deemed as complete. This issue can be said to have confirmed the thoughts of Frame

(2003) who talks about the surgical team approach in project delivery; he argued that the success of a project is not only dependent on **t**he practices it follow or the organisation delivering it, but largely on the project team responsible for executing the project. The inability to predict people and the fact that people's paradigms are subject to change can be argued to be some of the characteristics that make this issue a complex situation.

4.1.5.3. Product delivery: As noted above, the project is sub-divided into deliverables (also called products) and each product is given a time frame to complete, some are done in parallel. For products that have dependencies, it is recorded in the project plan which is naturally done using MS Project as the project planning tool. In the planning stage of the project or the stage, the products required for that stage have identified, the product descriptions are written and agreed by the client and then the product is assigned to a party to deliver, this again can either be the client, the project management team or the third party suppliers. Again the priorities placed on the deliveries of these products have been observed to be different depending on what party is responsible for the delivery of the product. It was also noted that the delivery of some products would depend on information from other parties. The availability of this information and the accessibility have also proven to be rather challenging in some cases. Being a technical project, some of this information depended on second and third parties requiring access to the network of the client. This proved difficult in many cases as the client had policies against giving user and administrative rights to external bodies.

4.1.5.4. PBS vs. WBS: One of the major differences in the two leading project management methodologies (PRINCE2 and PMI) is that the project is broken down into smaller more manageable packages for the delivery of the project. With PRINCE 2, the project is broken down into products and this is reflected in the product breakdown structure where, as discussed above, all the products are identified, inculcated into a project plan and a product description is written for each product which is approved by the client. According to the PRINCE2 Manual by OGC (2005) a product breakdown structure (PBS) is defined as "a hierarchical structure that breaks down a final product into its constituent sub-products. It helps the planner to think of what other products are needed to build the final product and to clarify and identify all necessary work for the creation of the final product." The product is then given a time frame and a resource is

attached to it. For the completion of the phase of project, each product is carried out and a detailed report is written, reviewed and approved. For some of the products, a workshop meeting is held between the client's technical team, the project management team and the third party supplier. Mostly, this is for the project management team and the third party supplier to understand the client's practices and infrastructure in the current environment and how they can be replicated and migrated into the new environment within the scope of the project. For the migration project, the stage one that comprises of the discovery, design, application, proof of concept and stage closure has approximately 115 products to be delivered. The PMI framework on the other hand uses a work break down structure (WBS) to deliver projects. Both approaches deal with breaking down projects into smaller more manageable sections. These approaches make use of best practices, expert knowledge and project management tools and techniques to determine the smaller manageable sections. They also make use of lessons learnt, logs and reports, which are used in the planning and delivery of future projects. This is typical of the complicated environment which is described by Kurts and Snowden (2003) as the environment where knowledge and causes and effects relationships may not be fully known but may be known by a limited group of people such as consultants, experts, managers etc.

4.1.5.5. Third Party Suppliers: The migration part of the project was subcontracted to a third party organisation. Their main responsibility was to carry out a remediation of all of the client's data after the migration phase of the project. The remediation was required as a correction to any errors or defects that occurred during the migration phase. And as with every other part of the migration, a testing of all the deliverables was required as part of the Proof of Concept (PoC) phase. It was observed that there were delays and lack of communication from the third party suppliers; it was also suspected that the third party suppliers did not have the relevant practical experience in the actual remediation of the data. It was also observed that the third party suppliers did not have the habit of working in retrospect as it was suspected that the suppliers had no relevant practical experience. This lack of experience proved to have little impact on the delivery of products to the client. This issue can also be argued to be in a complex situation. Wieck et al (2001) expressed that though organisations use traditional approaches such as planning and design, the greatest challenges we face are how to manage the

unexpected. Though the communication and tasks were planned in accordance with the PRINCE2 methodology, in practice, the actual situation proved to be slightly more different from what was planned; this is typical of a complex situation as it was noted that things really are not as they appear in reality, even though they have been predicted by other standard procedure.

4.1.6. Projects Existence in Complexity Models:

Based on the issues faced by the project, it became apparent that various other factors were at play aside from factors identified in PRINCE2, such as scope, budget and time. There were factors that interacted with the project that were not obvious in the project, and were beyond the methodology to capture and simply analyse. There was a lack of vital information in the inception. Debates arose as to why the information was not required by the contractors and also why it was not given by the client. Other factors at play included the dependence of the organisation in providing an insurance service to client which was not necessarily included as part of the scope of the project, as well as various internal organisational factors that were meant to be imperceptible to the project and were factors that affected the progress of the project. From the running of the project and its current situation, it can be seen that the project mainly exists in the complicated domain of the Cynefin model. The complicated domain as described is the domain of planning, analysis and systems thinking, where there exists a relationship between cause and effect and these relationships are known by experts. Working with a known methodology and expert knowledge where outcomes are either known or can be predicted or in the best case the use of standard operating procedures and best practices as specified in the simple domain of the Cynefin model, is always an ideal situation, but it can be seen that at some various milestones the use of expert knowledge, systems thinking, sensing categorising and responding to data for decision making did not fully cater for situations as the very best decision making models. The project being thrown into exception was neither to the advantage of the client nor to the advantage of the project team or any stakeholders involved. The exception process was a process that was not catered for by the methodology. It was resolved by the regular decision making models of a complicated domain. It can be said that the future of the project at the time of the issue could be perceived but not necessarily predicted. After these issues, the project has been faced with many more issues, some which were tackled by the methodology in use and some that placed the project in exception for a second time.

When we view the project from other lenses of organisational complexity, as proposed by Boisot (2007),

in the I-Space model and Kauffman (1993) using the NK model, we can establish a good level complexity or complex situation based on the interaction of many factors within the project, outside of the project, within the organisation and outside of it. From observation of the case study, we can identify and plot various factor interactions, enabling the emergence of new behaviours. It is quite apparent that though we do not have a simple linear network of interaction of K=0 providing a simple optimum, we also do not have a maximum number of interaction of K=N-1. If we see departments as factors, we will also look at individual persons as actors. Since we cannot fully and confidently establish that every department and every individual (within the project, the organisation, the suppliers, the insurance industry) have direct engagement and interaction that will confidently enable us confirm a K=N-1 situation. We conclude that we have a complex network of $0<K<N-1$. In a similar manner, we investigate the case study using the -space and identify that the project possesses some level of computational and relational complexity. This is typified by the level of interaction of different variables in terms of dimensionality and non-linearity while also looking from the view of dependence as being a function of input from one factor and output to another. Once we establish the fact that the project, the organisation and the social system we are working within exists and possesses a good level of complexity, we feel comfortable in analysing the situation with the use of storytelling, narrative analysis and archetypes which are tools that aid the explanation and understanding of a complex situation. We then further analyse the case study by carrying out a two stage emergence process to investigate factors that may exist but which may not be directly apparent when using only known project management methodologies, models or framework.

4.1.7. The Two Stage Emergence Process:

Since it was obvious that the project did not exist in a simple system where linear methods could simply cater for its needs, and had relationships with a social system and had the existence of factors that impacted it without being obvious, a tool of analysing organisational complexity was employed. As part of the project was considered as complex or having relationship with a complex system, it was deemed to be useful to use tools of complexity to examine some of the events that took place in the project. The two stage emergence process is ideally undertaken by the community involved. To carry out the two stage emergence process and archetype extraction process, an anecdote cycle of about six to eight participants is arranged. The participants are normally from a similar community and have factors such as the project in common. As this was not possible in this case, the researcher who has been trained in the two stage emergence process (see Appendix 1) has undertaken the analysis. While this is not ideal, and introduces bias, there is some mitigation, as the researcher was also a participant in the project. In place of stories that

would normally have been told in the anecdote circle, some project documents, mainly meeting notes, weekly updates, project status reports, risk and change analysis reports, logs of change requests, issues and actions which were reviewed within the project on a weekly basis, were reviewed; and a two-stage emergence process from the Cynefin methodology was attempted on the current narratives that were available. The two-stage emergence process looks into stories, narratives, anecdote circles etc. The first stage extracts stereotypes: these are the main characters identified in the stories. The negative and positive characters for each entity are determined. The next stage is to rearrange and group all the characters in clusters. All the clusters are then renamed. The process is followed through a second time; the negative and positive characters of each name is further determined, the characters are rearranged and clustered again. The clusters are then named to determine the newly emergent entities from the stories. These are called the archetypes. Snowden (2003) expresses archetypes as constructs of shared meaning that encapsulates and articulates social understandings about the way things really are for a community. He conveys that archetypes are not generally about things that people can talk easily about, but are things that cannot be well articulated in another way. The process of deriving, Snowden (2003) says, is a process of disclosure, discovery and understanding.

Details of the two stage emergence process, clusters, stereotypes and resulting archetypes are documented in appendix 2.

Following the two stage emergence process, the following archetypes were extracted and identified as hidden projects that were located in the complex system and were faced within the project.

☐ Information
☐ Education
☐ Prejudice
☐ Pessimist
☐ Escapist mentality
☐ Managing
☐ Supervision
☐ Unity/Disunity
☐ Help
☐ Time
☐ Stubbornness

Table 4.2 Archetypes

I hadn't seen the issues above arising in advance of this analysis as the project issues were normally pointed out to be issues that might cause delays in the project, technical issues, availability of resources, relevant skill sets, software licenses, end user changes etc. The discovery of these archetypes revealed other issues, which I see as major issues that could make or mar the project. These archetypes, as shown in table 3.5, are referred to as the hidden truths or preoccupations of the community. These can be argued to be the main reasons behind the troubles in the project. Looking at the project from this angle gives some further insight. Archetypes such as prejudice, pessimism, escapist mentality, disunity, education, managing, are seen to be issues that the project faced and were never really treated in any of the meetings. These also could not be catered for as an issue to be dealt with in accordance with the project management methodology in use. Dealing with people in the realm of decision-making who are prejudiced against the project or who do not believe in the success of the project, will hinder their positive contribution to the

success. This should be an issue the project manager should be aware of. Other issues that might need to be faced includes technical staff that have an escapist mentality, who go straight for the migration and attempt to fix any problems that arise, rather than spend most of their time planning and identifying risks before the actual migration process begins. These archetypes point us to the issues that are not normally addressed but will need to be addressed by the project team, the client and all project stakeholders. Though the obvious issues that the project were supposedly faced with as identified by the initial stereotypes were issues such as: scope, migration, options, disturbance, communication, out of hours working, documentation, IT rules, change control and change impact, however, the two stage emergence process revealed other "hidden" issues such as; information, education, prejudice, pessimism, escapist mentality, managing/supervision, unity/disunity, help, time and stubbornness which were impacting the project from various levels, somewhere identified to impact the project from within the boundaries of the projects, from within the organisation and possibly an outer social system. Details of the explanation of the archetypes are located in appendix 2.

4.1.8. Conclusion: Case Study 1

The project delays, such as late delivery of products and eventually the projects being in exception, proved to be manageable by the project methodology. But an accumulation of the delays, especially as it was recorded to be far greater than the earlier deliveries, caused the project to overrun its stipulated time, budget, and not meet specific requirements of the client and critical factors that were seen to affect the project. This would be classified as a failure in the context of this research.

PRINCE2 and PMI proved to be challenged when the project diverted from the original plan or when the plan needed to be updated too constantly, as requirements kept changing. This was particularly the case with non-linearity, for example, the issue of the 500 extra servers, the issue of the applications versus application instances and the issue of inevitable changes. If it was a software development project or a construction project, it can be argued that these issues may have been identified and resolved as models, such as the helical model, the spiral model, DSDM or RAD, as the models make use of prototypes and models that give the client a taste of what is to come and cater for late changes in requirements. This project was a migration project. The time and costing was based on the various stages as directed by the scope of the project, which implied that any changes made to the scope would effect a change in the project plan and would result in cost implications. It can be argued that a contingency should have been put in place to cater for such late requirement changes, but the question arises for the viability of the project if the contingency was to be more costly than the project itself. Other questions as to why these

requirements for a non-software development project seemed to change so rapidly and so constantly, as in theory the project was a mere data transfer and server upgrade project, which though initially perceived as simple became complex as a result of various other factors.

These are glaring issues that can be seen, as they directly affect the delivery of the project. Other issues might be hidden issues of personalities, identification of critical attributes, mind sets, business cultures etc. Identifying these relevant issues will have to be taken as priorities in the management of projects. Standard project management methodologies do not have standard processes for identifying these "hidden" issues if they exist. Though there is some room for raising and logging project issues, they are normally issues that are concerned with the project literarily, but not necessarily otherwise. But according to Snowden (2003) these are pre-occupations. It can be argued that they might not feel very important but might have a very large impact and hinder the overall success of the project.

Again the question of how well current project management methodologies deal with these issues and situations, and what possibilities of improvements there are with the introduction of organisational complexity theories, tools and techniques to complement the methodologies,

In the planning phase of a project, how well would the phenomenon of retrospective coherence improve planning? Would the concept of narrative analysis help uncover hidden truth from past projects and the present one, if there are any? The preliminary experiment on the Netware to AD project carried out, suggests there is some value in using complexity theories in the planning, management and implementation of projects. Other techniques such as future-backwards, use of archetypes, storytelling etc that are used in complexity theories, could potentially provide further insight. Do we manage projects with the mindset of time and cost overrun being the inevitable? Do we also tune the requirements of client to suit the projects because we are bound to face the inevitable?

Having seen the value of using some complexity theories in revealing "hidden" preoccupations but with potential major impact on the project, there was the need to complement the current project management methodologies to encapsulate these techniques in the overall delivery of projects. This also pointed as valuable in having the knowledge of such techniques as skill sets for Project Managers who are primarily responsible for the delivery of the project. As mentioned by Gilb (1998), the identification of critical attributes necessary for the success of the project will also have to be determined with the involvement of the Project Manager to ensure all parties work on the "same page" and hence guarantee the success of the project as defined by all parties.

4.2.Case Study 2: Katlegoafrica On-line Implementation Project

4.2.1. Introduction:

Katlegoafrica, an African based on-line media store had an aim of delivering a fast growing African media in form of music, video, magazines and on-line downloads to clients in Africa and the Diaspora. Katlegoafrica had observed that the media industry in Africa was growing considerably well in and the demand for the industry was also growing among Africans, home and away, while also gaining some popularity among non Africans.

To achieve their overall business aim, Katlegoafrica embarked on an IT project to create a backend database for the various libraries and a front end media for the client. The front end media also included the website design and implementation. A major requirement for the website was its compatibility with all major internet browsers. The website was also required to accept on-line payments of major debit and credit cards and also accept the use of PayPal (a safe and secure way of making payments online). The processing of the payments from the client's bank cards to Katlegoafrica's account was also to be handled by the backend of the system. A final requirement of Katlegoafrica was the hosting of its servers abroad. Katlegoafrica employed the skills of an IT consultant to assist in outlining all the necessary steps required to start up the project and eventually start the business.

4.2.2. Project Scope:

The scope of the project was to implement an on-line media store which will make African media available for purchase in Africa, Europe and America. For security, infrastructure and data integrity reasons, the servers hosting the databases were to be hosted on servers located in the UK or in America. The data integrity reasons are largely due to the inconsistence of electricity in Africa which has a big potential for crashing the servers and corrupting data. Katlegoafrica employed the services of a UK based web hosting company One.com. Payments to Katlegoafrica were to be made on-line on the website or via the popular PayPal secure payment system. Katlegoafrica was to accept payment from most credit and debit cards issued from various countries in Africa, Europe and America. All payments were to be made to Katlegoafrica's bank in the UK.

The project was to be jointly implemented by Katlegoafrica's business arm and IT department as the project sponsor and One.com, the third party supplier. For the Katlegoafrica on-line media project, the

PRINCE2 project management methodology was implemented and as a regular practice with project management methodologies, the major processes that were drivers for the project were the planning stage and directing a project stage. See section 3.2.

As described in section 3.2, the Katlegoafrica's on-line media implementation project was broken down to the initiation stage, the planning stage and the implementation stage. The planning stage was carried out by external consultants who were the project planners and part of the project management team. The planning was described as the backbone of the project and was done with information given by the technical team of Katlegoafrica. As discussed in section 3.2, the culture of planning and use of expert knowledge that may not be fully understood is associated with the complicated domain of the Cynefin framework for organisational complexity. The project plan was then given to the project manager to use for further planning such as resource allocation, budgeting, budget forecasting etc.

Project stages: The Katlegoafrica project was implemented mostly in line with the PRINCE2 project management methodology, but tailored to the specific needs of the project and the business. This was done as directed by the consultant on board. The processes outlined for the project are summarised in Table 4.1:

Stage 0

Stage 1

Stage 2

Stage	Delivery Time	Process
Stage 0		o Developing and Authorising the Project Initiation Document (PID) o Stage 1 Plan

Stage 1	1.5 Months	o Requirements Engineering (Discovery) o Design of back end systems o Design of front end systems o Design of backup and server hosting infrastructure o UAT Testing o Agreement and sign off for Stage 1
Stage 2	2 Months	o Infrastructure preparation. o Setup of back end infrastructure o Set-up of front end infrastructure o Implementation of back end and front end communication o Project handover and closure.

Table 4.2 Katlegoaftica Project Stages

The discovery stage was where Katlegoafrica got its technical team, the project team and the third party suppliers to discuss and understand the necessary requirements for the infrastructure needed to set-up the business. For the back end system the infrastructure included the specification, the build, setup and configuration of the servers. Where the databases were to be hosted by the third party suppliers, the server was to have a specific user capacity and was to handle simultaneous connections supporting up to 1000 users at every point. The back end system also included the design and population of the database to hold all the media files in a library; this was to be accessed via the website using very user friendly search criteria. A full access to the database was required by Katlegoafrica's IT team in Africa as well as the third party suppliers in the UK. Access to the database was agreed to be dependent on the Internet connection of the persons accessing the database. The front end of the infrastructure was the design and development of the Katlegoafrica's website. This was the client interaction point with the database.

With the details of the project process known and understood, the project initiation document (known as the PID) was written by the Katlegoafrica's project team. This was given to the business and circulated to the engineers, the third party suppliers and relevant sponsors of the project. The circulation of the PID was so done to ensure the whole team understood the agreed processes and stages to be followed during the course of the project. It also gave a clear description of the project scope, deliverables and who was responsible for the delivery of such deliverables and identified project phases and stages. The success criteria of the project was to deliver an infrastructure that was capable of supporting multiple users accessing the database from anywhere in the world. Each user was to have an on-line account and a respective profile on the servers. The infrastructure was to allow a pay–as-you-go account on a minimum profile and also a pre-paid account profile, where users would be able to download a reasonable amount of media based on a selected package. The gold package was to allow users download up to 50MB download, the silver package 20MB download and the bronze package would allow 10MB media download per day. The cost of each package and the pay–as-you-go rate was to be determined at a later date. The determination of the costing aspect of the business was out of scope for the project and it was not on a critical path for the overall delivery of the project. Wong (1964) explains the critical path concept, he puts forward that related jobs of a project are laid out in paths according to the order in which they must be performed. The time required for each job is determined; then these times are summed along each path in order to find the longest path(s), which gives the project duration. The longest path is known as the critical path. The job needs to be completed on schedule for the entire project to be on schedule. If a job on

the longest duration path is delayed by say, one day, then the entire project will be delayed by one day except that another job on the path can be accelerated by one day. This was not seen as an issue for the Katlegoafrica's project and all the work was decided to start simultaneously. It was noted all the same, that there might have been a slight dependence on some of the activities. If the payment questions had been answered, then it might have been arguably added as a website requirement. This might have given an inclination to the issue of banking relationships with the African countries, which was eventually Identified as the major issue faced by the project. Though the payment processes was to be determined and inculcated into the project plan, as it was part of the back end infrastructure, the issues of banking relationships with different countries were unknown and unattended to. Theoretically in terms of the technology, the process was satisfactory and possible, and was not identified as a risk to the business, but from the point of view of the banks abroad, it was a risk which the banks were not willing to take.

4.2.3. Project Issues:

The project plan was drawn based on the business case and project scope discussed in section 4.2. The plan involved detailed activities to set-up the back end infrastructure and the front end user application infrastructure. The necessary resources were identified for both activities; the dependencies and time scales were also identified. After the plan was agreed by all parties involved in the project, the design stages of both the back end and front end systems of the entire infrastructure began.

The design of the systems was provided, agreed and signed-off, which led to the implementation of both systems as planned. Prior to the design phase of the project, was the discovery phase. The discovery phase was the phase where the Katlegoafrica's technical team, the project team and the third party suppliers were supposed to understand all the infrastructure requirements for the business to run as specified by the project sponsors. The infrastructure requirement included the setup of the servers, the hosting of all the databases on the servers with full access for the database administrators, irrespective of geographical location worldwide. The requirements further required a backup infrastructure. The backup infrastructure was to be resilient and have a minimum down time of less than one hour in the situation of a server break down. The client/business requirement was simply the development of the website which was to serve as the front end to the servers and databases.

It was decided that all three areas of the infrastructure could be implemented simultaneously as there were no critical dependence or critical paths identified for the overall delivery of any of the infrastructure.

Vital information was missed from the discovery and requirement gathering stages which led to the 'emergency' stop of the project. It was discovered that the business could not be supported in some African countries. The main reason was the inability to process on-line payments from most African countries due to the world-wide known reputation of fraudulent activities and the lack of cooperation of Katlegoafrica's overseas bank in the processing of payments from most African countries.

Another issue that affected the implementation of the project was the realisation of the inefficient postal system that operated in many of Katlegoafrica's target African audiences. Part of Katlegoafrica's strategy was to store African media on-line and make it available to audiences via on-line download or via postage of such media to the audiences. The media was in the form of music, video, magazines, write-ups, literature, books and articles. It was decided that the ineffectiveness of the postal system would put a strain on the business operations of Katlegoafrica.

The discovery process in the project plan did not adequately capture the requirements for the payment processes. The unknown issues facing payments and monetary processes within the host country and the business were not captured. The reasons why the questions where not asked, why the processes were not discovered and why the project fell into so much trouble remains unknown at the initial point of contact with the project team. The issues facing the project required major changes that had not been foreseen. It was discovered during the course of the project that the clientele that was meant to be the major source of businesses would not be able to pay for the goods purchased, as the local banks were unable to process on-line payments and the international banks did not assume responsibility of processing on-line payments from the African countries where Katlegoafrica operated from. The current situation the business found itself in was an unusual one and they were in a position where they were about to fold up the project which in turn meant folding up the business and ending a passionate dream for the owners of the business. The issues they faced were more of an implicit one, being issues of reputation, un-accountable credit, security risk, control risk etc.

The chosen option was not to wrap up the business but to start it up by targeting the client in the USA and the UK with the hope of growing the business to other parts of the world and possibly to the African countries where the Katlegoafrica group operated from. A new process for operating the Katlegoafrica Media business was to be determined at a later time following the validity of the project and its processes. It was noted that expanding the business to the African countries might not be an on-line solution.

4.2.4. Major Changes:

The above issues required that Katlegoafrica revisited its business case and re-write the entire scope of the project. It was agreed that the business be made available to only clients in America and UK with plans to expand the business to Canada, Europe, Australia and the Caribbean islands in the pipeline, but depended on demand and the requirements for on-line payments. An existing infrastructure was already in place; servers to host the databases had been procured, installed and configured, the infrastructure was still to be used, it was agreed that PayPal would be the initial form of payment and the group will commence talks with the banks to enable them to receive and process card payments from their website. The business planned to generate most of its businesses from the major African countries it operated from, where the media it attempted to distribute was rather popular among the people via a unique, simple and arguably convenient way. The possibility of getting the business to the people was now unavailable via the chosen media which was one of its unique selling points. The business was now re-planned and hoped to thrive in new locations where their infrastructure could be used and supported.

4.2.5. Project's Existence in Complexity Models:

Again, with this case study, it became apparent that factors other than those that are normally concerned with project management methodologies such as scope, planning and time existed. Having viewed the situation of the project from a lens other than that of the project management methodology, and from an awareness of the existence of social systems and organisational complexity, and from the application of other tools and techniques, various other factors that had impacts on the projects were discovered. The existence of the project in a complex situation or interacting with a complex system was identified, and as discussed in 3.6, the use of methodologies, planning, use of expert knowledge and analysis are commonly associated with the complicated domain of the Cynefin framework for organisational complexity which

describes the complicated domain as a domain where an outcome can be categorised by cause and effect relationships, where data is sensed then categorised and then a response is determined based on the categorisation. This is a normal trend with the implementation of methodologies such as PRINCE2 or the PMI. A planning phase is done and the project is expected to go as planned. Reasons for such expectations can be argued to be that the planning is normally done with a "good" level of information from experts, with the PMI work breakdown structure as discussed in section 4.5.4. The project is broken down into smaller, more manageable sections. The sequencing of the breakdown normally gives rise to the project plan but this is done mostly by the level of information available at the time of planning, and further planning is required when more information regarding the work package becomes available (Project Management Institute, 2004). When activities do not go according to plan, the PRINCE2 methodology and the PMI methodology have change control processes to accommodate changes. This might mean authorising more funding, hiring additional resources, adding or subtracting more work packages. With the Katlegoafrica's on-line implementation project, the issues it faced could not be resolved by the normal change control processes in place. The issues were capable of terminating the project due to the inability of the project to deliver the product/business it was intended to deliver. It can be argued that the required information could have been gathered during the requirement gathering and discovery phases if they had the adequate persons on board. Gilb (1998) argues that it is necessary for a Project Manager to have the capacity of determining dangerous attribute areas and also the steps to manage them. This factor can be said to be an additional "soft skill" required for a Project Manager. In a complex environment, the use of planning is not very popular; data is not normally categorised, but probed and sensed. Though the researcher will not discard the use of planning in the Katlegoafrica's project, a different approach might have given insight into what data they were using and what information was available. Implementing a project is an aspect, but investigating the intentions behind the project, the motivations for the project and also the need to guide the project might have been looked into. The next section guides the researcher into looking at information and data available to the project on inception, it further identifies a new set of data which was not available to the project and the project team but should have been considered.

In a similar manner to the first case study, when we view the project from other lenses of organisational complexity, as proposed by Boisot (2007) in the I-Space model and Kauffman (1993), using the NK model, and we can establish a good level complexity or complex situation based on the interaction of many factors within the project, outside of the project within the organisation and entirely outside of the

organisation. From observation of the case study, we can identify and plot various factors' interaction, enabling the emergence of new behaviours. It is quite apparent that though we do not have a simple linear network of interaction of K=0 providing a simple optimum, we also do not have a maximum number of interaction of K=N-1. If we see departments as factors, we also will look at individual persons as actors. Since we cannot fully and confidently establish that every department and every individual (within the project, the organisation, the suppliers, the insurance industry) have direct engagement and interaction that will confidently enable us to confirm a K=N-1 situation, we conclude that we have a complex network of 0<K<N-1. In a similar manner, we investigate the case study using the I-Space and identify that the project possesses some level of computational and relational complexity. This is typified by the level of interaction of different variables in terms of dimensionality and non-linearity, while also looking from the view of dependence as being a function of input from one factor and output to another. Once we establish the fact that the project, the organisation and the social system we are working within exists and possesses a good level of complexity, we feel comfortable in analysing the situation with the use of storytelling, narrative analysis and archetypes which are tools that aid the explanation and understanding of a complex situation. We then further analyse the case study by carrying out a two stage emergence process to investigate factors that may exist but which may not be directly apparent when using only known project management methodologies, models or framework.

4.2.6. The Two Stage Emergence Process:

Again, as with the first case study, since it has become apparent that the project had interactions with social systems that did not necessarily subscribe to the processes and approach of project management methodologies, the two stage emergence process of storytelling which is used to reveal hidden truths and unknown factors was performed with the communities involved and also the available documentations of the project. This was due to the fact that the project had gone through the major issues it faced and the solution was done in retrospect. The stereotypes below we derived as key words from user engagements and also from keywords identified in the project documentations available to the researcher. The documentation was mainly meeting notes, workshops and telephone conference calls. Details of the two stage emergence process, the stereotypes, clusters and resulting archetypes can be found in appendix 3.

The final result of the two stage emergence exercise and the resulting archetypes are shown below:

Fears, unknown, feared, unpredictable, mishap = **accident**
Control, navigation = **drive**
Reliance, backup, trust = **Integrity**
Passion, ambition, encouragement = **strength**
Mentor, teach, educate, direction, guidance, counsellor = **Instructor**
Territory, boundary, range = **limits**
Fuel, reason, motivation = **teach, inspire,**
Clarify, resolve = **solution**, **solve**
Expectation, anticipated = **hope**
Keep, hoard, recovery = **save**
Route, path = **direction**
Motion =
Role =
Law = **Rules/regulation**
Standard =
Delivery=

Table 4.3 Archetypes

The exercise revealed the archetypes which are arguably the preoccupations of the project. The emergent characters at this point made a lot of sense to the researcher and in fact at the second stage of the two stage

emergence process; some characters emerged that gave some considerable insight into the disposition of the project and the teams implementing the project. It was noted from the initial stereotypes that the major items that were issues for discussions were items such as the scope of the project, what was in scope and what was out of scope; what was required by whom and who was to carry out which task; why the task and how the task was to be carried out. We had other items such as time; when do we need this by? When is our go live date, what do we need to deliver by the go live date? Who will tell us what we need to put in place to meet this go live date? Is there any activity or task on the critical path? The combination of various stereotypes such as time, scope, deadline, risk and dependence contributed to the development of the plan which in itself was identified as a stereotype. This form of discussion is a natural discussion with project management methodologies. The PRINCE2 methodology and the PMI methodology emphasise that the success of a project largely depends on time, budget and plan, this basically answers the questions, and how we do it; how much will it cost and how long will it take? These basic discussions do not tie in well with the arguments of Gilb (1998) as discussed in section 1.1.4; he argues the need for the identification of critical factors that are necessary for a project's success. This was a similar experience with the Muse Consult project, it was noted that the initial pre-occupations identified in the discussions of the project team, the sponsors and the third party suppliers were rather different from the identified pre-occupations as discovered in the archetypes. Another stereotype was justification, which can be referred to as a business case in a project management environment. In section 1.1.3 the business case was defined as a description of the reason and the justification for undertaking the project, based on the estimated cost, the risk and the expected business benefits and saving.

Comparing the case studies, I realised that a common stereotype identified in the discussions was the scope of both projects. We also see that this emerges into different characters as we carry out the two stage emergence exercised. The question then arose as to whether the word 'scope' should be treated uniquely, or whether it should be ignored and the researcher inclined only to findings based on emergent archetypes. This might be a critical decision in concluding a way forward for projects according to this research. Conclusions are usually based on discussion of archetypes that emerged from the two stage emergence. The discussion around 'scope' being identified as a content stereotype is still under investigation and a final case study might give a good insight as to how it should be treated.

The archetypes that were extracted from the exercise gave a good inclination of what should have been addressed at different points on the course of the project. Some of the archetypes could have given inclination to the troubles faced but were not given due attention. Again, as with the previous case study, the obvious issues which were identified as causes of the project failures include; Scope, time, deadline, implement, delivery, possibility, consultants, delegate, hosting, dependence, solution, justification, plan, pros & cons, control, risks. Following the two stage emergence process, issues that were revealed included accident, drive, integrity, strength, instructor, limits, teach, inspire, solution, hope, save, direction. These were not identified by either the methodology in use or by the experts or consultants that were part of the project and were only revealed with the use of tools and techniques which are used in understanding complex situations.

4.2.7. Conclusion: Case Study 2

The main issues faced by the project which formed the discussions in many of the formal and informal meetings, workshops and circles were identified as stereotypes. It was not unusual for stereotypes to emerge from such discussions; as such issues are natural to project meetings. But issues such as the possible recklessness of the project because it was owned by people who had potential, self drive and belief, which made them rather accident prone as they did not have the right guidance. They had a good knowledge of where they were but not where they needed to be, and they also depended on theoretical knowledge to implement a potential IT project across the other side of the globe. This led them to authorising and implementing a project which cost thousands of pounds but with the inability to deliver because of factors that could not have been considered with the use of standard project management methodologies such as PRINCE2 or PMI. The realisation of being accident prone might have given the proclivity to look at what could possibly go wrong. Another Cynefin method called the 'Future Backward' might have been a good tool to use in the initial stages. This might have possibly identified the disaster the project could have faced and could have been catered for in the scope of the project.

The project eventually had the issues as discussed and the entire business case and project plan had to be rewritten. They eventually changed the nature of the business as they were unable to access the main clientele as intended. There was one of two options; they were faced with terminating the project and working with a total loss or they could use the infrastructure they had in place and tailor their business

around it. They went for the latter. The business is now up and running but not on the level and scale that was intended.

This case again points to the fact that a project management methodology lives and works well in a linear world but when there are interactions with systems outside the controls of the project, the interactions are not necessarily predictable and the project could be located within a socially complex environment since it had to relate to a system outside its local settings and across a long geographical domain. This meant there were issues hidden and unknown that could impact the project outside the remit of time, cost and scope.

Case Study Four

4.3.Case Study 3: Renewable Transport Fuel Obligation (RTFO) Programme

4.3.1. *Introduction*

The Renewable Transport Fuel Obligation (RTFO) Programme was a third case study I analysed and as expected, it was no stranger to its own issues. The case study further emphasised the fact that projects have relationships with outer environments that are governed by social factors and defy the categorisation of project management methodologies. In 2000 the UK Government launched its Climate Change Programme in response to the UK's Kyoto agreement responsibilities, which included measures to reduce CO_2 emissions. The increased use of bio fuels is considered as one way to contribute to the achievement of these targets. The EU, recognising such benefits, passed Directive (2003/30/EC) ("the Bio fuels Directive"), which was also aimed at reducing EU reliance on external fuel sources.

By 2004, the Government had consulted on the ways in which it might support the use of bio fuels in the transport sector, and on the targets it might set under the Bio fuels Directive. An Obligation was one of the policy options considered, and it received considerable support from stakeholders. The primary powers enabling the Government to introduce a Renewable Transport Fuel Obligation were contained in the Energy Act in 2004. As a result, the Government announced in its 2004 Pre-Budget Report that it would undertake a detailed Feasibility Study into the prospects for a Renewable Transport Fuel Obligation (RTFO), to require obligated transport fuel suppliers to ensure that a percentage of their sales was from a renewable source. The Feasibility Study was published in November 2005, and the Government announced at that point that it would introduce an Obligation and that the level of the Obligation would reach 5% by 2010. The Chancellor of the Exchequer confirmed in Budget 2006 that the Obligation would begin in April 2008, and that the level of the Obligation in 2008/9 would be 2.5% of transport fuel sales. It was noted by the project team, some of who were participants in the anecdote circle held, that the Government repeated this commitment in the Climate Change Programme and Energy Reviews. The project team confirmed that the Change Programme and Energy Reviews were both published during 2006.

It was suggested that the RTFO was expected to reduce UK carbon emissions by approximately 1 million tonnes per annum. A feasibility study was carried out and the outcome considered 4 main options. The options were: to take no action at all; to increase the fuel duty incentive; to seek a voluntary agreement with industry; or to introduce an Obligation (Renewable Transport Fuel Obligation), that would require transport fuel suppliers to supply a fixed percentage of their fuel from a renewable resource.

The conclusion was that the introduction of the RTFO represented the strongest option on balance to provide the greatest certainty of achieving the objective of increasing bio fuel sales for road transport and the highest amount of carbon savings. It is acknowledged that bio fuels cost more than fossil fuels, but that environmental, climatic and social benefits justify these costs.

The RTFO Scheme was to be enabled by the bespoke development of an IT system which would be hosted by a third party. In order to assist the Administrator in monitoring and running the RTFO, the IT system was required to enable the monitoring and gathering of statistics, calculation of the buy-out fund and Carbon and Sustainability (C&S) reporting, and scheme reporting. The cost was about £331,000; payments were staged over the delivery of the product. The system was to be procured from Triad, who was said to have completed early deliverables on time. Final development and roll-out were to be phased over the introduction of the RTFO with priorities tailored to the needs of the programme.

The new services rules in operations placed clear restrictions on the expenditure that could be incurred by the Administrator before the RTFO Order was made (planned for November 2007). Following HM Treasury's advice and with the approval of the National Audit Office, the IT contract was split into two:

IT Design Contract. The first contract was to deal exclusively with IT design. This contract was awarded on 30 April 07 with its final delivery on 31 August 07.

IT Implementation Contract. This contract was for the development, implementation and support of the RTFO IT system. This contract was not to be awarded until after the RTFO Order had been made.

4.3.2. Business Need for the Project

The business need for the project arose from the recommendation of an evaluation of the options that would enable compliance with the EU Bio Fuels Directive, which aims at reducing EU reliance on external fuel sources through the increased use of bio fuels.

The evaluation concluded that an Obligation would provide the greatest certainty of achieving the objective of increasing bio fuel sales, the highest amount of carbon savings, and provide a sound platform for private sector investment in renewable fuels infrastructure and technology.

4.3.3. Scope

The RTFO Scheme involves the establishment of a Scheme Administrator to monitor the performance of obligated suppliers and to issue certificates as evidence of the delivery of renewable fuels. The scope of the RTFO Programme is restricted to the design and implementation of the Administrator processes, including the procurement of the enabling capabilities, ICT infrastructure and management processes. The processes outside of the scope of the RTFO Programme include: setting policy, operating an RTF Trading Scheme and establishing a charging scheme for the RTFO Administrator.

4.3.4. Programme Objectives

The key work streams established for the programme are to:

- ☐ Ensure the development of a scheme that will enable companies to provide assurance on the carbon balance and sustainability of their bio fuel supplies
- ☐ Finalise the Scheme's design with stakeholder involvement
- ☐ Instruct lawyers to draft the secondary legislation (RTF Order)

- ☐ Conduct a statutory consultation
- ☐ Have an RTF Order made
- ☐ Establish the Renewable Fuels Agency (RFA) - the office of the Administrator which includes:
    a. Securing the Grant- In-Aid for the first three years of operation
    b. Identification and appointing an administrator to run the Scheme
    c. Procurement of an IT system to support the scheme

4.3.5. Key Dates and Deliverables

The Programme had the responsibility for the key deliverables, including the procurement of the IT infrastructure required to operate the Scheme.

The high level architecture for the programme was designed around the critical dates and key deliverables as set out in the Programme Stage and Step plans.

	Deliverable	**Date**	**DELIVERED**
1	Programme Office established	May 06	Yes
2	Request for Proposals for the provision of ICT systems Issued	Nov 06	Yes

3	ICT System Design Contract Awarded	April 07	Yes
4	Consultation on Secondary Legislation concluded	May 07	Yes
5	Administrator strategic options resolved	Jun 07	Yes
6	C&S Consultation commences.	Jun 07	Yes
7	C&S Consultation concluded	Sep 07	
8	RTF Order made	Nov 07	
9	IT Delivery contract awarded.	Dec 07	
10	C&S Technical Guidance issued.	Dec 07	
11	Implementation	Jan-Mar 08	
12	Go Live	1 April 08	
13	Programme Close	30 June 08	
14	Benefits Review	May 09	

Table 4.4 (Key Deliverables and Dates)

4.3.6. Strategic Benefits

The strategic benefits of the RTFO Programme are related to providing the greatest certainty of achieving the objective of increased carbon savings. An Obligation rate of 5% of transport fuels being from renewable sources is the equivalent of a reduction in carbon dioxide emissions of 1 million tonnes of

carbon, equivalent to taking one million cars off the road, without stopping people from travelling.

4.3.7. Programme Objectives

The RTFO Programme was managed in accordance with PRINCE2 and Managing Successful Programme (MSP) disciplines, with objectives to deliver an effective Administrator's office by April 2008, and for it to manage a robust and efficient RTFO scheme in a manner that exceeds stakeholder expectations.

The objectives of the RTFO Programme included the development of a plan, design and implementation of the RTFO scheme. The implementation of the RTFO scheme was underway since 11 November 05 and was due to go live on 15 April 08. The Programme was to close by June 08 following monitoring of the implementation of the RTFO Scheme administrator function and the supporting systems and processes.

A Programme team had been established within the DFT to oversee the design of the RTFO scheme and to ensure it was implemented successfully by April 2008. The scheme would have a significant impact on oil suppliers and those who supply bio-fuels. To manage the impact, extensive consultations and workshops were undertaken and were to form a key part of the Programme's activities going forward.

In line with the Programme objectives, key deliverables were identified under the Programme implementation. The key objectives were to: ensure the development of a scheme that will enable companies to provide assurance on the carbon balance and sustainability of their bio fuel supplies to finalise the Scheme's design with stakeholder involvement, to instruct lawyers to draft the secondary legislation (RTF Order), to conduct a Statutory Consultation, to have an RTF Order made, to establish the Renewable Fuels Agency (RFA) – the office of the Administrator, to secure the Grant–In–Aid for the first three years of operation to identify and appoint an Administrator to run the scheme and also to procure an IT system to support the scheme

4.3.8. Programme Dependencies

4.3.8.1. RTFO Order

The Administrator's office could not be formally established until the RTFO Order was made in November 2007. Laying the Order in October 2007 was itself dependent upon a successful (non-contentious) completion of the consultation period on 17 May 2007.

The RTFO team dedicated resources to the active management of the consultation process in order to raise the prospects of a successful conclusion. Equally, the necessary RTFO and legal resources were identified and programmed to complete the post-consultation work to meet the October 2007 deadline for laying the Order.

4.3.8.2. New Services Rules

Under the New Services Rules, expenditure on the RTFO Administrator's office could not be incurred until the RTFO Order was made. This represented a risk to the Programme. However, in consultation with HMT, NAO and Cabinet Office, the Programme was to:

☐ Take on a shadow Chair and Board in October 07; this was to radically reduce the time to start other activities, once the Order had been made.

☐ Split the IT contract into two.

☐ Not require dedicated back-office systems.

☐ Place the RTFO Administrator in open plan offices at Ashdown House.

4.3.8.3. Programme Governance, Organisation, Structure and Roles

4.3.9. The Executive Committee

The Executive Committee is responsible for ensuring that the RTFO is delivered to the required standards, and that the programme was well managed. The Executive Committee approved all expenditure, plans and programme deliverables. It had particular responsibility for ensuring that issues were resolved and risks managed.

4.3.10. RTFO Programme Board

The RTFO Programme Board members bring an understanding of the specific requirements of the RTFO and how it relates to the wider Climate Change agenda. The Programme Board comprises stakeholder representatives from the Devolved Administrations, Other Government Department (OGD) and Department for Transport. The senior responsible owner chaired the Programme Board, which meets monthly.

4.3.11. Project Boards

There were project boards for the Carbon, Sustainability and IT projects. These were all constituted in accordance with PRINCE2, and were chaired by the Programme Director. The C&S boards had a planned schedule of meetings. The IT Board had met twice at the time while future meetings were scheduled and ran on a monthly basis.

There was a close inter-relationship between the Administrator (establishing the Administrator's office), the legal and the RTFO scheme design work streams. Progress and deliverables were reported at weekly team meetings, and a consolidated report given to an Executive Committee.

4.3.12. Programme Plan

As discussed, the programme was planned under the PRINCE2 project management methodology and Managing Successful Programme (MSP) methodologies. A high level diagram of the plan is shown below:

Stage 1&2	**Stage 3 Detailed Design Aug'07 – Aug'07**	**Stage 4 Pilot & Develop Changes Sept'07 – Mar'08**	**Stage 5 Implementation Apr'08 – Jul'09**				

Planning & Discovery Stages	Step 2 Preparation Oct – Dec '06	Step 2 Consultation Jan – Apr '07	Step 3 Confirmation May – Aug'07	Step 4 Activation Sep – Dec'07	Step 5 Implementation Jan - Apr'08	Step 5 Programme Closure Apr - Jul'08	Step 7 Benefits & Assessment May'09

Fig 4.2 RTFO Programme Plan. (Source: RTFO Business case document)

The programme was planned as projects and work-streams which were responsible for deliverables assigned in Step Plans. A high level Programme Plan is shown in figure 1.0. At the end of each stage, step and end-stage, a Step Report is produced and a next stage/step plan is written for approval by the Executive Committee. The project plan was created and the progress was monitored with MS Project. Then in the detailed project plans, the tasks were linked with identified dependencies with other project activities. In addition the project's MS Project plans are linked to a common RTFO resource pool for more efficient management.

4.3.13. Resource Planning

The RTFO Budget was secure for the Programme Lifecycle as part of a governmental divisional budget, (The Grant in Aid for the Administrator for 2008 - 2011 was identified as a pressure on the budget that was to be resolved during Comprehensive Spending Review (CSR) 07).

The HR resource requirement was also planned for the Programme lifecycle. The HR plan was to be derived from the step plan assigned deliverables and the MS project plans for delivery. The plan was reviewed with each step plan and approved by the Programme Director and SRO.

4.3.14. Project/Programme's Issues

The programme had various dependencies which had to be met with stringent deadlines before the Obligation could be implemented. As discussed, the Programme was designed around the critical dates and key deliverables as set out in the Programme Stage and Step plans. Though the Programme was run using the PRINCE2 methodology, some of the dependencies of the project plan were not particularly

within the control of the project/Programme. Some activities were required by legal and government bodies in order to carry out the Obligation for the use of Renewable Transport fuel.

The issues faced by the programme were mainly around time, cost, available and relevant information at planning stages, available resources and reputation. Some of the issues which will be discussed in more details can be said to be regular project issues. When projects are relatively large and become programmes, they have a tendency to have various work streams which will inevitably have deliverable dependencies on each other. If for example we take a programme that is to build a new office complex for a large organisation and then move users from one staff to the other, the programme will have various work streams such as the construction work stream, which will be broken down into the physical building, the plumbing, the plastering, painting, electrical fittings, floors and roof. The technology work stream will be to design the network, implement the network (local area network and wide area network), the telephony network, the network cabling of the entire building, the set-upset-up of the servers and communications rooms and other IT equipment's. There will also be a work stream to plan the logistics of moving staff from the old location to the new location, the move of their physical belongings, their I.T equipment, decommissioning the users at one location and commissioning them in the new location. An objective of the entire programme may be to have the building ready in a given time frame, while ensuring that the migration of users from one location to the other is so smooth, that it is seamless to the user and has minimum or no impact on regular everyday business. The RFTO programme was one of such large projects that can comfortably be referred to as a programme with various work streams where the deliverables of the work streams had inevitable dependencies on another work stream. A major issue to point out is that the programme had some dependencies that were not particularly under the control of the programme. There may be a significant difference if all the work streams and dependencies are under the same management body (or programme in our case), even if the work stream was to be delivered by a third party supplier or a vendor, it normally would be under contractual basis which would come under the management of the programme. If the deliverable was to slip, in time or budget, under the PRINCE2 or PMI methodology, the slip would be covered by the change control processes. Some of the main issues faced by the RFTO programme were:

1. **Legislation Dependency on the House of Lords**: This was a dependency that was based on time and it was also a dependency that was not particularly in control of the programme or project team. In order to ensure that RTFO Obligation was achieved, the programme required the House of Commons to pass the Obligation as legislation for the use of bio fuels. The legislation was to ensure that oil

producing organisations produce renewable fuel as part of its production. A public announcement had been made by a senior public officer that the Renewable Transport Fuel Obligation (RTFO) would be in place by April 2008. On receiving the proposal for the Obligation, the primary and secondary legislation had to be passed by the House of Commons. The next meeting for the House of Commons at that time was in November 2007 which meant the Programme had 5 months to set-up the Administrator and the IT required to support the Administrator. This also included the planning of the project, the identification and engagement of the stakeholders which included the various oil producing organisations, the government, the House of Commons, the department for transport, environmental interest groups, bio fuel groups, the general public, the implementation, monitoring, controlling, a successful completion and the closure of the project. An in-depth consultation with the various stakeholders had to be performed before the Obligation proposal was to be sent to the House of Commons for the legislation to be passed. The consultation on the RTFO was done by the use of questionnaires to the stakeholders; their feedback, which was a response to the consultation, was used by the consultants for the proposal of the RTFO.

According to the Programme participants, the time available for the implementation of the project was not sufficient. This was based on the scale of the stakeholder engagement required. The stakeholders were vast and they all had to be engaged at the levels applicable to them. The oil producing companies had to be engaged in order to understand the impacts of producing bio fuels as part of their production. The environmentalist groups had to be engaged in order for them to realise the benefits of the use of RTFO. The government had to be engaged in order for them to pass the Obligation as legislation and the general public had to be informed of the benefits.

A further complication to the issue was the fact that there was no 100% assurance that the legislation would be passed by the House of Commons. The time dependence and the lack of assurance led to another major issue faced by the programme:

2. **New Services Rule**: The programme was unaware of the existence of a new service scheme that prevented the set-up of the administrator and also the set-up of the I.T that was required to run and support the administrator

a. Set-up of the Administrator: The set-up of the Administrator was required to facilitate and decide the body to run the RTFO. The decision was to run the body as an executive agency, a non-governmental organisation (NGO), or a Non Departmental Public Body (NDPB). Eventually, as a work stream of the Programme, the Administrator was set-up as an NDPB. The role of Administrator was to administer the compliance of the Obligation once the programme was implemented by ensuring that the oil producing companies were producing fuel and bio fuels in the right percentages and that they also had the records to show for it. Upon implementation of the Programme, the Programme team was to hand over to the Administrator as post implementation. The oil producing companies were to deal with the administrator directly post programme implantation.

b. Set-up of I.T: The set-up of I.T was to design and implement an I.T system to support the administrator. The I.T system was to assist the administrator in tracking, monitoring and reporting of the compliance of the oil producers in the production of the bio fuels in the required percentages.

Under the new services rule, the Administrator could not be set-up ahead of achieving the legislation of the Obligation. This also could not justify the setting up of the I.T required to run and support the Administrator. This caused some complications to the programme as the Administrator was a requirement for the running of the Obligation. The hope was for the legislation to be passed in November 2008, this would have allowed for only 5 months for the set-up of the Administrator and the required I.T, in order to meet the April 2008 go-live date. As the options were weighed, it was decided that it was a risk to wait and race against time following the passing of the legislation, and a shadow board was set-up to carry out the implementation. This shadow board began the process of setting up the Administrator and also allowed for the design of the I.T system but not its implantation, it was mentioned that the implementation was only allowed to begin post legislation.

3. **Information and Resources**: The Programme identified the various project team members required to run the project; the project managers for each work stream, the Programme managers, the consultants and other experts, but failed to identify and recruit a legal personnel as a team member to advise the team on the legal requirements that should have been performed by the Programme as a whole. Since passing of the legislation was a requirement and a dependency of the Obligation, some legal issues had to be tackled and some legal requirements had to be met. The Programme did not have any in-house legal resource to assist in the identification and addressing of such legal issues. When the

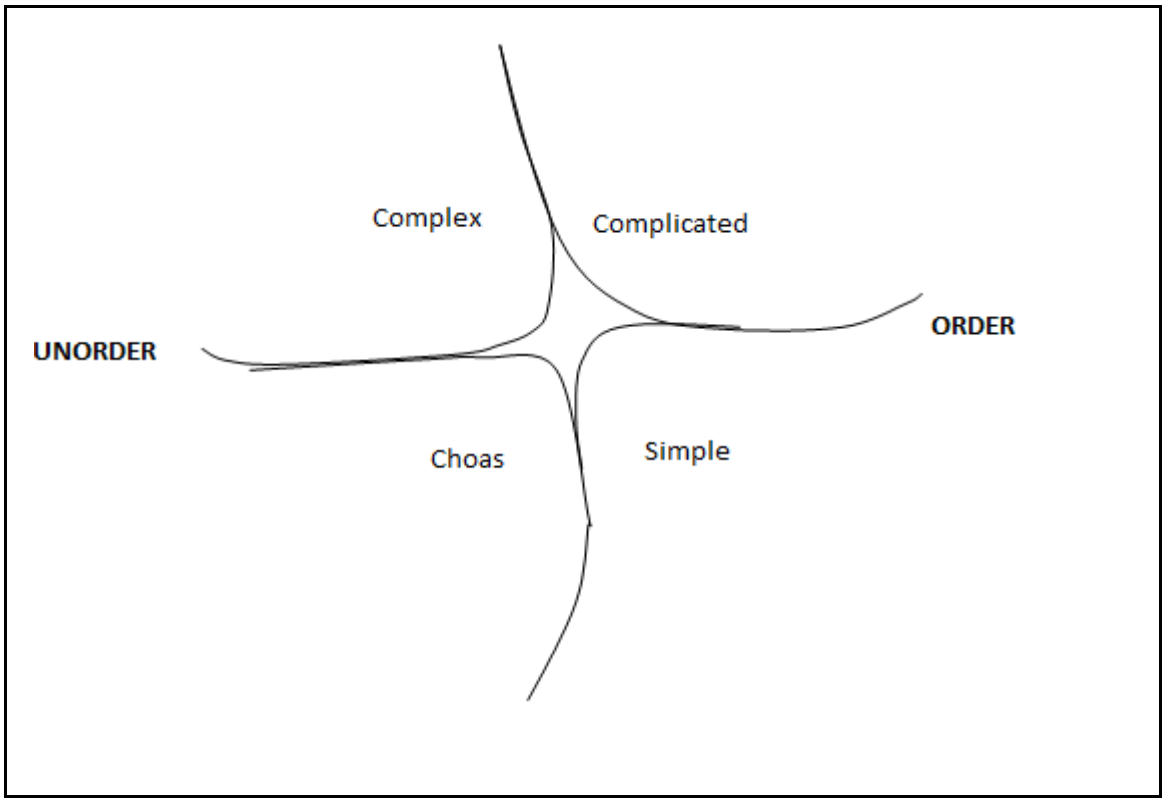
Programme identified the need for a legal resource, there was no budget in plan for such a resource and the work had to be undertaken by other Programme team members. This increased the time and scope of the consultation performed by the project team members.

4.3.15. Projects Existence in the Cynefin Domain

The project was implemented with the use of the PRINCE2 project management methodology, referring to the Cynefin model for organisational complexity; we have identified that project management methodologies are more likely to exist in the simple and complicated domains where we have a direct relationship between cause and effect in the simple domain. In the complicated domain, we understand that the relationship exists but may not be as direct as it exists in the simple domain, the cause and effect relationship in a complicated domain is understood by a select few who understand how to analyse data to determine the relationships between the cause and effects. The RTFO was a similar project that engaged the use of project management methodologies to implement its project deliverables. Though we can see some relationships between the cause and effects, we do not necessarily see a way to control the effects. The issues faced by the Programme concerned time. The project was described as a backward re-engineering, a rat race against time, would be perfect if there was more time available for the project implementation. The Programme also faced issues of uncertainty and lack of information, as there was no awareness of a new services rule in place and the presence of legal personnel to give insight into the legal requirements was also lacking. We can look at the programme in hindsight, look through the lessons learned and understand how to run a similar project or Programme in a better way if given the opportunity to in the future. It can be argued that the project faced issues and these were resolved using regular tools and techniques of both “common sense” and project management methodologies.

Though it was not fully established that the Programme totally existed in a complex domain according to the Cynefin model for organisational complexity, but by making use of the complexity tools and techniques, we were able to view the Programme from a different position. The narrative analysis technique and anecdote circle enabled us to view the Programme from a complex position; this helped us identify some preoccupations and mindsets of some of the Programme team members.

Looking at the Cynefin model, I have tried to achieve with the case study by viewing the Programme from a complex position, with the complex tools and techniques and by explaining the Programme using storytelling and narrative analysis; we seemed to have moved within domains to search out any hidden truths and preoccupations that may exist.



|factors that added overall value to the organisation.

The concern with time, scope and cost remain a limitation in the scope of projects and the lack of consideration of external factors that impacts them directly or otherwise as factors that contribute to the fact that project implementations will be limited to the scope of project management methodologies, while there were many more factors and variables that ought to be considered during the implementation of the projects. The broken lines in figure 5.2 show interactions that were not necessarily captured and considered during the project implementations, though they were considered at the time of inception. The broken lines also points to interactions that should have existed and be constantly considered in the life cycle of these projects while the solid arrows points to known and existing interactions.

With all cases, there was the existence of complexity as the projects were located within social environments. The understanding and consideration of the presence of interactions, learning and adapting to such complex systems within a project environment provided valuable benefits to the project and invariably to the organisation. Though known methodologies which although they may have worked and performed well and unaided in the delivery of construction or software development projects but may not necessarily have processes for capturing interactions within complex systems though they have direct or

indirect impact on a project and may need to be further complemented by tools and techniques from other models or other concepts such as organisational complexity tools and techniques when implemented within such complex systems. By adapting complexity tools and techniques to known project methodologies, the projects did not only consider interactions within the project and its business case but interactions with the overall business value, the business or organisational goals and the external factors that impact the organisation and invariably impact the project.

Many factors within the methodology that will normally cater for a linear progressive project were identified in the cases while factors that would aid the systems awareness and interaction of various characters within an "ecosystem" were predominantly absent from all cases. Though the methodologies in use attempted to cater for the rigid requirement and non-iterative milestone nature of the Traditional Waterfall model, they were still linear in their approaches. While these methodologies attempted to be iterative in requirement gathering and scope definition, the viewpoint was limited to the walls of the project with the exception of the RFTO programme which had to capture requirements from within and outside of the walls of its programme. The methodologies did not consider various factors that could have been initially involved as drivers to the project and had the potential of deciding its viability and critical success on completion. These factors could determine the true success of the project irrespective of the project being delivered within time, scope and cost.

In an attempt to understand complexity and identify pointers that will determine the existence of complexity in a system or if a system was in a complex environment, a few characteristics of complexity was drawn up from various authors. The characteristics include but are not limited to the following;

Principles of complexity		Presence of Traits in Case Study		
Author		Case Study 1	Case Study 2	Case Study 3
Campbell-Hunt	Systems at the edge of Chaos	✓	✓	✓
	self-organised criticality			
Davies, Lynn	Self organised criticality			
	non-linear	✓	✓	✓
	Emergence	✓	✓	
	Interconnected and Interdependent elements and dimensions	✓	✓	✓
	Self Organisation			
	Sensitive dependence on initial conditions			
Mitleton-Kelly	Self Organised Characteristics			
	Co-evolution			
	dissipative structures;			
	Emergence	✓	✓	✓
	Feedback loop within the system			
	Non Linearity	✓	✓	✓
	Space of possibilities			
Ramalingam et al,	Adapative Agents			
	Co-evolution			
	Complex adaptive systems			
	Emergenct patterns	✓	✓	✓
	Interdependence	✓	✓	✓
	path - Dependence	✓	✓	✓
	self-organization.			
	Sensitive to initial conditions			
Snowden	Equilirium			
	catastrophe			
	Connectivity			
	Self Organisation			
Walter C Clements	agent-based systems			
	Co-Evolution			
	Emergent patterns	✓	✓	✓
	Historicity & time			
	Retrospective Coherence	✓	✓	✓
	Self Organization			
	Self-Organised			
	Far From Equilirbium	✓	✓	

Fig 5.1 PMM Application Matrix

Further research may be required to establish all the traits of complexity within the case studies but the traits marked were quite apparent in the environments within which the projects' case studies were located in, as it was observed that there were traits of complexity encountered while implementing projects. The methodologies as we know them were therefore unable to cater for the situations and environments the projects were located within. The utilising of tools and techniques from other areas of study were therefore employed to better understand the environments and the projects located within them. Projects

are simply varied in nature; they are interrelating and interact with a holistic system that has the potential of dictating their course and affecting their viability. There are tools and techniques that have proven only that the situation needs not only to be to controlled but to be learnt and adapted to. The models and methodologies that are most commonly used to manage project implementations require the awareness of this holistic approach, how they can be understood and considered in project implantation and how they can be complemented by the tools and techniques that are used to learn these systems. Though there may be a temptation to adapt non-linear approaches of narrative analysis and storytelling at various milestones in the life cycle of a project in order to capture the impacts of these interaction and to constantly be aware of the overall holistic system, we must be careful not to end up following the methodology to the detail and introduce these techniques at milestones or we fall into the same trap of implementing the project within its linearity. The tools and techniques can however be introduced at various decision points within the life cycle of the project, these decision points do not necessarily have to tie up with gates and milestones but can constantly be engaged when major decisions are required in order to check against factors outside of the project, any hidden truths, factors that are located between the abstract and the concrete and would not have been captured by the methodology alone. The evidence suggests that utilising complexity theories at various "decision points" in the life cycle of a project will complement the model or methodology and will enable the project to have visibility and understanding of external factors beyond the control of the methodology and will provide the benefits of aiming for an overall organisational goal which is beyond the successful delivery of the project. The mastery of the decision points to where these tools and techniques to complement the known methodologies will be employed and may neither be concrete nor coded but may need to be learned depending on the nature of the project the system it is being implemented in and also factors it interacts with. The probe, sense and respond approach of the Cynefin Framework for organisational complexity may therefore come into play.

Fig 5.2 Adapted PMM Methodology (Figure is an adaptation of Porter's Value chain: Porter 1985 and Traditional water fall: Ainger 1995, Scacchi 2001)

In order to complement the project methodologies with complexity tools and techniques such as story-telling, narrative analysis and archetypes as described above, the tools will need to be utilised at various times which we refer to as decision points ("D" in fig 5.2 above) within the life cycle of the project. The decision points take into account all factors that may exist in the social system and may have been a contributing factor in the inception of the project since it deals with the understanding of the "whole". The decision points further feed into the processes and phases of the project implementation by helping the business know what factors may have changed since the inception of the project as well as changes that may need to be done within the project during its lifecycle. The use of these decision points

will not be a one way traffic where we expect only factors external to the project to impact the project and further drive its viability, but capture factors from within the project that can possibly stir up some changes within the organisation and possibly have a knock on effect of effecting changes within the "ecosystem".

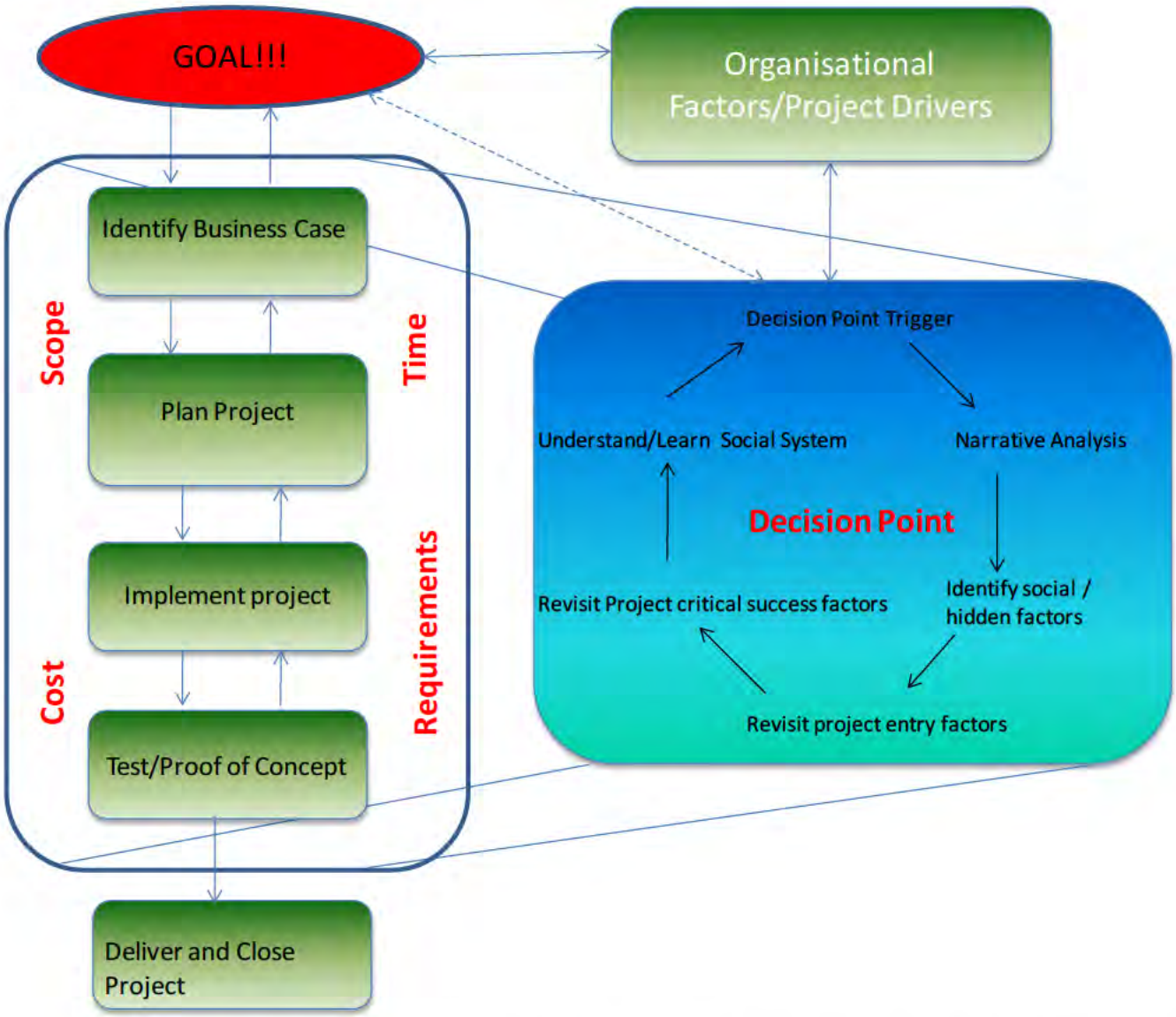


Fig 5.3 Decision Points within Project Life Cycle (Figure is an adaptation of the Traditional water fall: Ainger 1995, Scacchi 2001)

Fig 5.3 puts the concept of decision point into perspective. The utilisation of the decision point can be described as random and can be carried out at any point within the project implementation without being

necessarily linked with any major project milestones or gateway. The decision point simply aims to help the project understand and capture any factors that have the potential of impacting the project though they may not exist anywhere within the immediate environment of the project. This can be argued by some as risk analysis but understanding interactions, interrelationships, emergence, concept of a whole, and so on would not normally fall into the categorisation and will have to be learned rather than controlled by risk transfer or mitigating factors. By utilising the decision points, the exercise takes us through a cycle of narrative analysis where we aim to seek out interactions (random and fixed) from organisational factors, project inception/entry criteria, organisational goals, project implementation processes and any hidden factors we may not know but may need to consider. The drivers for the decision point can be anything ranging from information, a need to reflect on the project, the on-going business goals, and the nature of the project or a previous decision point. No drivers for the decision points are set in stone, but being a tool of learning a complex system, they will be used to probe a system, to understand what emerges and then further identify how the project can respond to the obligations of the whole system.

As we have previously identified that these projects exist within social systems, we may not necessarily know what would trigger us to make use of these tools and at what point we would need to use them, we therefore have to realise that there must be an element of learning the system and adapting to it so that we understand it and know when it would be necessary to utilise tools from outside the project methodology to enable them to work within a social system in a more suitable way. It will be suggested that these tools are utilised at the start of the project (during the determination of the business case, the project initiation, requirement gathering and resource selection) and also at the end of the project. The project however within its life cycle will need to consider the changes and factors in the ecosystem at some decision points. The use and application of these decision points may be determined by a deeper understanding of the social system which may have been born from an expertise of probing a system and adapting to its emergent behaviours. The question is when and where to apply the decision points, but being a complex environment with behaviours that are not necessarily predictable, the decision points will have to be adapted to the complex social system where the project is located. Within the confinement of these decision points, the project pauses and carries out a narrative analysis and or archetype extraction from the story-telling technique to truly understand where the project is at, how it is impacted by social systems factors, capture any hidden truths and revisit project and business priorities. Once satisfied, and all questions from a complexity exercise have been considered and answered, the project can safely continue in its course while reviewing critical success factors and aim for an overall project delivery and organisational benefit.

As Frame (2003) who puts forward the surgical team approach, the people responsible for implementing these projects also need to acquire these skill sets of complementing and adapting methodologies to understand and consider holistic factor at various decision points when delivering projects. As a surgical team, they will also gain maturity in delivering linear projects with non-linear approach and master the decision points where these tools need to be introduced.

The cases analysed have proven that projects should not only be subject to being implemented by the use of expert knowledge or best practice methodologies and models as the case may be, but that these projects are products of factors that are dictated from a system which is larger than the project and may not be understood by the techniques of project implementation alone. Organisational complexity techniques have proven to be able to help us understand these systems, how they relate to our projects and how our projects should relate to them.

I discovered that the three case studies have some similarities as they all attempted to implement standard project management methodologies. PRINCE2 is becoming a very popular project implementation management methodology and was common among all three case studies though it can be argued that the methodology was not followed to the detail and was tailored to the respective projects. The results of each of the projects have been varied. The reasons for the variations can be said to agree with authors such as Frame (2003) who argue that a project implementation is largely dependent on the project team responsible for executing it which has proven to be true in terms of the case studies reviewed.

The need to define project success across a larger system gives a further argument of interaction and interconnectivity. The interactions and interdependence of many parts as they form a whole which were unpredictable, resulting in surprising outcomes or ones that give access to a considerable body of theory on the emergent orders that may arise from social practice and on the evolution of social order over time where a number of more-or-less related phenomena: dissipative structures; catastrophe; chaos; self-organised criticality; and self-organisation all serve as some bases for a complex system (Cleland and King, 1968, Mitleton-Kelly, 2003, Campbell-Hunt 1968) . The complexity phenomena share a set of common properties where systems are made up of a very large number of autonomous elements: grains of

sand in a sand pile, or snowflakes on a mountainside. The concept of emergence and self organisation is also used by Kurtz and Snowden (2003) to explain organisational complexity. These were traits that were identified outside of the projects but with possible impacts of the projects that established the projects in some form of complexity which further established the need to complement the methodologies used for implementation.

From the case studies analysed in this research, we look at how effective the methodologies have performed with the implementation of the projects.

4.4. Netware to AD Migration Project

The Netware to AD migration project was implemented using the PRINCE2 project management methodology. It followed the steps documented by the methodology and attempted to deliver the project by breaking the deliverables into start-up, initiation, controlling a stage, managing product delivery, managing a stage and closing the project. Tailoring the PRINCE2 methodology, the stages were broken down into Initiation; Project Initiation Document and the Stage 1 plan, the Stage 2; Design, Discovery, Proof of Concept and Applications and Stage 3; Infrastructure and tool set preparation, further applications planning, migration, upgrade of existing servers and finally the project closure.

Some hidden factors that impacted the project negatively or otherwise were identified using complexity techniques, but there were some other factors that may have affected the project but may not have been given due consideration. Questions that should have been asked include:

4.4.1. What larger system (eco-system) was the Forte Insurance Company a part of? It has become apparent that an organisation is part of a larger system and certain factors at play within the system could affect decisions made by the organisation, the direction which the organisation steers towards and possibly some of the strategic objectives of the organisation.

4.4.2. Delivering a project in light of the larger system may affect major decisions of the project as the success of the project will not only be in terms of the project domain of factors such as scope, cost and time but also in terms of a world domain in terms of factors such as innovation, profit, savings, competitive advantages and so on. The question is thus asked if the success criteria of the project cater for the requirements of the projects as well as the

requirements of the organisation and that of an overall world system.

The Netware to AD project case study was being implemented within a system that was not fully determinable and there were factors within the overall social system at play which had impacts on the project. No clear critical success factors outside the project environment were observed or documented. Project factors such as scope, time, budget, requirement, business operations, smooth transition, change impact, change management and risks were mentioned and constantly discussed as factors that needed consideration within the confinement of the project. From the analysis of the projects using complexity tools and techniques, some hidden factors that were not considered were identified to be responsible for the outcome of the projects. The absence of these critical success criteria across board can also be said to be partly responsible for the projects ending up in a troubled state. The shortcomings of the project thus emphasised the fact that projects are often located within social systems that are more complex than initially anticipated and using methodologies that are more suited for determinable systems would not aid the success of a project implemented within a complex system.

The project was initiated; the scope was determined and the project initiation document which included the project plan was developed. The documents were agreed with the client, the budget and resource requirements were agreed and the project was initiated. Once these factors were in place and the project had started, the main concerns for the project team were delivering the project against the plan. The project deliverables were broken down into activities referred to as a product which is a common practice with the product breakdown structure of the PRINCE2 methodology. The timescale required for the completion of each product was determined with the help of experts and consultant which is part of the practice of a complicated domain as put forward in the Cynefin model for organisational complexity (Snowden 2003). In the product breakdown structure, over 120 products were identified for Stage zero (Project initiation document and Stage 1 plan) and Stage one (Design, Discovery, proof of concept and applications). The dependence of the products and the sequencing of their delivery were also determined and included as part of the project plan. With the details of the dependencies and sequence of deliveries documented in the project plan, products that could be given some time buffer in their deliveries were identified and projects that were part of a critical path were also identified. As earlier stated, it was observed that the main discussions surrounded the delivery of the products within time lines and for products that had dependencies, the need to complete them in order to begin other products were often raised in meetings and documented as actions, concerns, issues or raised as risks. A normal practice was to identify risks that may prevent parties from completing a product within its allocated time schedule, these

risks were discussed constantly, documented and any actions to mitigate the risks were also taken. In some cases, owning the risks and transferring them within project parties and stakeholders were often a bone of contention.

The question of a different outcome for the project if other models such as the Spiral model, the Helical model and the Traditional Waterfall models were used to implement the Netware to AD migration project can also be put forward. The answer is not too far off as it lies in the nature of the project and the issues that were encountered with the implementation. The Spiral model and the Helical model consider risks factors that may threaten the project at various points of the project. Both models also ensure that developers and client stay close together during development to ensure that there are no late changes that may have grave cost implications to the project. This is also one of the advantages of using the Dynamic Systems Development Methodology (DSDM) as well as the Rapid Applications Development (RAD) Methodology.

Though the Netware to AD Migration project was an I.T project, it was far from being a software development project. Other I.T skills other than those required for application development were required. Skill sets required for the I.T consultants were skills which included: technical architecture, network design, application analysis, windows active directory (AD) server administration, Novel Netware server administration, data remediation and data storage and back up. These skills sets among others were identified as technical skills required for the migration of the data across the domain, as well as upgrading an existing infrastructure from NetWare to active directory. The nature of the project implied that there was no need for models or prototypes to be developed before the actual implementation as it was not a project that required coding or software development. The nature of this project therefore implied that models such as the traditional model, the concurrent engineering model, the spiral model, the helical model, DSDM and RAD may not be applicable for implementing projects of this nature.

No surprises that the PRINCE2 methodology was chosen as a preferred method for the project implementation, though there are no records of other models or methodologies that were considered and why PRINCE2 was chosen above them. The PRINCE2 methodology may have been suitable for the nature of the project but it was also observed from the analysis of the case study that the methodology somewhat fell short in catering for situations where the project had issues and also failed in identifying

some hidden truths and critical success factors that should have governed the project. Details of how the PRINCE2 and PMI methodologies catered for the issues are also documented in appendix 2

4.5. The KATLEGOAfrica Project

The issues highlighted above are applicable to the Katlego Africa project as it was another project that did not interact with an outside world or system that existed and had the potential to influence the project by influencing their organisation. The Katlego project proved that a methodology will only provide guidance for implanting a project from start to finish and not necessarily prepare one for how interaction with a social system should be done. It can be argued from the case studies that a methodology may tell you what to do without saying how it should be done and what to look out for. It can also be argued that experience can tell us how to do what we need to do, but the Katlegoafrica case was a case of a new and upcoming organisation that was attempting to break into a promising market without fully understanding the system; social and otherwise that influenced that market it was attempting to break into. The issue faced by Katlegoafrica eventually changed the course of the project with a rather large cost implication to the organisation.

Again we look back in retrospect and perceive if things could have turned out differently if another methodology or model had been implemented. Like in the case of the Netware to AD migration project, the Katlegoafrica project was not a software development model and would not have used techniques such as prototypes and models in use with the Traditional Waterfall model, the Spiral model and the Helical Model. The risk analysis of the Spiral model and the Helical model that is implemented within different iterations could have proved useful as it may (emphasis on MAY) have helped the organisations understand any potential risks in time before it became an actual issue.

Viewing the project from a lens of organisational complexity, a need for interaction with a social system would have been identified and the project would have been examined not only within the context of the project, but within the context of the system the organisation operated in and also within the context of the system the organisation intended to expand its operations to.

Tools and techniques of complexity were also used and some hidden realities were drawn out. From the two stage emergence process, some of the archetypes that were extracted were labelled as: drive, accident, and hope. Others were direction, instructor and limits. These archetypes instantly gave insight to the factors that should have been considered. When there is a drive and ambition without instruction and understanding of limits, it could end up as an accident. This was true in the case of the Katlego Africa on-line media Implementation Project. This is another case where we can argue that the methodologies in use need tools and techniques from other models and from other concepts such as organisational complexity to complement them during project implementation.

4.6.Renewable for Transport Fuel Obligation (RTFO) Programme

The RTFO programme is a project that is unlike natural projects as we may know it. Though it was not a construction project or a software development project, the project used the techniques of PRINCE2 to manage its implementation. The nature of the project was to enforce a policy for the use of renewable transport fuel as an obligation for suppliers. The main aim of the project was to introduce a renewable transport fuel obligation that obligated transport fuel suppliers to ensure that a percentage of their sales was from a renewable source. Though this project was analysed, it also implemented the PRINCE2 project management methodology, it was faced with different issues compared with the NetWare to AD migration project and the Katlego Africa on-line media Implementation Project. The project was planned in accordance with PRINCE2 practices but the main issues faced were outside the control of the project team implementing it and also outside the control of the organisation where it was being implemented. The complexity of this project arose from the context of complexity as a phenomenon of interaction and interrelations with an overall system which had the potential of influencing the project. These interactions could possibly defy the practices of methodologies and agrees with the arguments of complexity put forward by Kurtz and Snowden (2003) that a complex situation defies categorisation and situations have to be learned and adapted to.

The project objectives included the development of a plan, design and implementation of the RTFO scheme but there were major dependencies that included government decisions which had a major impact on the timelines for the delivery of the project. It was identified that the project was embarked as a UK government initiative, though it may have been recognised as an EU directive and was a programme that

would reduce the carbon emission and improve environmental friendliness, it had major dependencies that were not initially identified and caused the project to enter a race against time.

The project was analysed in hindsight and it was revealed that topics, potentials and characteristics that should be considered during planning were not known or identified. Though there were inputs from expert knowledge in term of the planning, it became apparent that factors could remain hidden if the right techniques to search such factors were not employed as part of the implementation skill sets required for the project. In the anecdote circle for this case study, one of the participants enquired about the possibility of using story telling tools such as archetype extraction in requirement gathering process as the insight and results provided by the technique proved useful to the parties.

The techniques put to use may not depose other techniques such as workshops, risk analysis, discovery and so on, but may help project teams dig deeper into the truth about the project, it may reveal factors that would not normally come to light by using the known methodologies, models or best practices so as to be more aware of potential issues, recognise them as they arise and have measures of adapting to them if they are issues that would be beyond the control of the project team. It is arguable that by adapting to situations, we may be able to control them better than attempting to resolve them using the wrong tools. This may be the big difference between the success of a project in relation to the product or service it is set to produce or provide and also in relation to the ecosystem(s) it relates and interacts with.

It has also become apparent that projects, especially the non-software development projects, may not only require controlling (tracking and monitoring) but the awareness of hidden factors that control them and also the awareness of a system larger than it or the organisation that owns it. The awareness will lead to a new way of defining its requirements, defining the success and defining the skill sets required for implementing and managing it. Though this may mean some additional time in planning these types of project, it may be the thin line between a project succeeding in term of scope, cost and time and succeeding in terms of its overall viability and long term existence of the product or service produced.

As identified with the first case study, the Katelgoafrica project and RTFO programme had interconnections located within the project, outside the project and with a social system, there were also factors at play which were hidden but had diverse impact on the project. The methodology used for project implementation though were adequate for the project in theory but proved otherwise in practice, had shortcomings and contributed to the overall shortcomings of the project/programme. But by utilising the

tools that aid the understanding of complex adaptive systems, the hidden factors, the socially dependent factors and the various interconnectivities that may exist between the project and the social system would be searched, understood and adapted which would aid the overall success of the project/programme.

Chapter Six

5. Conclusion and Recommendation

Many recent academic and practitioner models for managing projects are known to have come out of the need to cater for the shortcomings of the traditional Waterfall model. This resulted in the development of models such as the Spiral model, the Concurrent Engineering model, the Helical Model, the Dynamic Systems Development Model (DSDM) and the Rapid Application Development (RAD) model. These models were all tailored to the improvement of information systems development and may have proven extremely successful in their time of innovation. Projects today appear in various forms as many organisations attempt to achieve their goals and objectives by driving their organisations through projects. Projects in recent times have been observed to come in the form of integration of systems as organisations go through merger and acquisition programmes, transformation of entire technological infrastructure, network infrastructure upgrade, data migration, system consolidation, databases, business process re-engineering, enterprise relationship planning, customer relationship management and portal implantation etc. This is in the world of information communication technology (ICT) and other people have made projects from sectors and situations concerning marketing, promotion, book publishing, events management, communications, testing, weddings, holidays, and new business and so on.

The need for the projects are also known to emerge due to some business needs that can be monetary or non-monetary, but we are clear from our learning about ecosystems that businesses operate in sectors and sectors operate in other social systems and since they interact with each other, they impact each other. The origin of a project may therefore not be known to the project team or even clear to the organisation implementing it but is undertaken to achieve a goal which will be of business benefit to the organisation and possibly put the organisation in better stead to survive or compete within the social system.

These projects such as the projects analysed as case studies are birthed from various types of requirements and business needs and need the right tools and techniques to manage their journey from the inception of their projects to the realisation of an intended goal. Projects should not be delivered with caveats and conditions and be classified as successful as advised by experts, but intentions should be sought out,

criteria should be clear and an overall business goal should be achieved. An example is an organisation that has been due to update the operating systems of its personal computers (PC) as more business compatible applications are being released on newer models of operating system. If the organisation, after procrastinating about the upgrade due to X or Y reasons such as budget, finally decides to embark on a PC upgrade project, and in the middle of the project implementation a new operating system which aims to provide and support more business applications is released, there will be an organisation versus project question of ending this project, counting the cost and investigating the new operating system, or completing the current project and bearing the risk of having its systems obsolete within a short period of time. The project may be on course for being completed in time, within cost and based on the identified requirements, but will not meet an external criteria as there would have been changes in the system outside the organisation and the project.

These insights into project management methodologies, project management models, organisational complexity and complexity theories have been used to understand three case studies, with the aim of investigating how effective known methodologies used to manage project implementation can be in managing projects with emphasis on non-software implementation projects and how well the methodologies can cope when these projects fall into troubled times. The option of using these tools to complement project models in managing software development projects should also not be neglected as these tools have proven to be very useful in searching out hidden factors. Gilb (1998) argues the need for the identification of clear specifications and determination of critical success factors for the project. The capability of these methodologies helping organisations and projects define and determine these success criteria and critical success factors, that will discover any unknown requirements and guarantee real projects success which may be success as defined within the project management world, the organisation and also within the larger system that may directly or indirectly control the organisation is therefore a challenge for such methodologies. This argument further emphasises the argument put forward by Morris et al. (2006) that methodologies such as the PMI emphasises its methodology on project execution and is silent on strategy, business objectives, value management, governance, stakeholder relationships and leadership as a whole. Instead the context of the methodology focuses on managing integration, scope, time, cost, quality, human resources, communications, risks and procurement which may be good in terms of executing the project, but will have shortcomings in terms of an overall strategic objective in relation to organisational views as directly or indirectly dictated by a larger world system (Pryke and Smith, 2006). The projects in the cases utilised the PRINCE2 methodology mainly while some adapted some processes from the PMI methodology however major traces of the traditional waterfall model were

seen in all the cases as they utilised milestones and gateways which were signed-off before moving to the next milestone. The methodologies and models used in all cases just did not work 100%. Some projects were terminated before their due completion time, some were delivered either with major changes that meant business overall or with a lot of turbulence within the project. These projects would likely have been more successful had the environments they were delivered in been straightforward, linear, determinable environments. However, all the projects in the case study pointed to the fact that there are socially complex environments that govern many businesses due to interactions, emergence and the likes. Factors from these social settings invariably interact with projects within the organisations which makes the projects in turn demand management methodologies that are suitable to the linear needs of the project as well as social needs of the system. By reviewing the projects in hindsight, it became apparent that there would have been benefits to the project and the organisations should the management methodologies have been complemented with tools and techniques from other areas of learning.

The questions posed at the start of this research that, when projects fail, this is often because the social situation is more complex than anticipated. If project teams complement their methodologies by utilising tools designed to interpret complex situations at key points, these projects are more likely to succeed. The study of project management, the models and methodologies used in implementing them and the complexities of social organisation that governs businesses have proved that there are tools and techniques that are used in understanding these social complexities and will be beneficial if such tools and techniques are used to complement project management methodologies when implementing projects.

The first case study investigated a project which implemented PRINCE2 in planning a huge migration task for a large insurance company, the main driver for birthing the project was not known but could be pinned to technological and possibly economical reasons. On further investigation of the project and its environment from a complexity lens, it became visible that various other factors were identified to be at play within that particular system which highlighted a shift from a linear system to a non-linear one. PRINCE2, the project management methodology chosen for the project though had the capability of planning and monitoring but was incapable of learning the social system factors which impacted the project directly or otherwise. The second project was the on-line media implementation project for a media company, the project owners also had knowledge of their immediate system and embarked on a project to meet certain organisational needs. PRINCE2 again was chosen as a methodology for implementation, though it was not followed to the details as the project owners were open to ideas from other methodologies such as PMI. The project ran into situations that the methodologies were unable to

cater for and had to be investigated with complexity theories and its tools. From investigation, the system showed traits of complexity and the standard methodologies designed for determinable systems were unable to cope with such traits. Using the anecdote circle, narrative analysis and archetype extraction techniques, various factors were revealed and considered which directed the course of the project. The third case study was a project which clearly was not located in a simple determinable environment, the project team however attempted to use PRICE2 with some techniques from the PMI methodology. However the methodologies were emphasised as tools designed for a determinable system and had various challenges in coping with factors associated with complexity. Using the tools for understanding and adapting to non-linear complex systems, factors which were hidden but had impact on the project and were meant to be considered were identified.

The projects in the case study further emphasise the fact that many projects are implemented in environments that are presumed or perceived as linear and possibly simple or complicated according to Kurtz and Snowden (2003) but in actual fact, by viewing the projects from the viewpoint of complexity theory, the environments were identified as non-linear and non-determinable and therefore proved challenging for the methodologies to cope with. The realities of both the projects and the environments they were located in were only visible once viewed through another lens; the lens of organisational complexity that hidden factors were revealed and it became apparent that the methodologies and models were somewhat incapable of dealing with behaviours, emergent patterns, interconnectivities, interactions and associations that exist within the complex systems. Fig 2.5 provides a comparison of various project management models and methodologies to identify what seems to be missing in the ability to work in a complex environment. While Fig 5.1 gives a comparison of most of the same methodologies and their usability with the case studies, the conclusion is similar as both point to the fact that projects are easily located within complex social systems and most methodologies are not adapted to work with complex systems as they are adapted to more linear systems and will need to be complemented for better results.

Without being carried away with the new world of project management adapted to complex social systems, though are now in a better position to define initial requirements due to the fact that projects can now be approached from an overall holistic view and we have the capability to capture hidden requirements before implementation, hidden factors during implementations and the capture of social interactions and emergence that may impact the project, these adapted methodologies may require a project to have an open system. There has to be room for probing a system which may have to be done

multiple times in order to adapt to it, there may be cost implications as requirements may no longer be allowed to be "set in stone" as the social settings can introduce changes that may change the entire course of the project. This may be hard to swallow, however, there is the overall success and organisational benefits which may be sought after by the organisation even if it may be conflicting with the "traditional" success of the project. The adapted methodology may therefore go against fundamental project success criteria as flexibility in terms of time, human resource and cost may be required though the potential for overall business success and on-going viability of project within a system is huge and should not be overlooked.

Many bodies of knowledge exist and have developed project management methodologies for project implementation as the use of projects to achieve business goals is fast becoming popular. Academics with intentions of breaking into the project management world or students undertaking management courses should be encouraged to learn about these project management models and methodologies as well as the understanding of socially complex environment and organisational complexity in order to gain meaningful knowledge of both systems and learn how to personally adapt the tools and techniques from both systems to complement each other for use in any kind of project they may encounter. This research therefore provides an avenue for project managers and businesses to have greater visibility and understanding of the environment a project is located in; if a project is identified in a complex environment, the use of tools and techniques for understanding such environments are further used in complementing the chosen methodology of implementation to further ensure project success in context of the project and in context of the business goals. The complementing of such methodologies is not limited to methodologies such as PRINE2, PMI or the waterfall methodology as it is not methodology driven but driven by business environments. These tools can thus be adapted to any project management model or methodology where a project has been located within a complex environment or is in a complex situation. In order to have the required visibility of an overall and over arching ecosystem, business and project managers would require the lens of complexity to use also in viewing their project. This research has proven storytelling, narrative analysis and the anecdote circle to be valuable tool as in understanding a complex system as well as giving various signposts of complexity. Businesses and project managers, project sponsors and project leaders would therefore need to have the understanding with which they will use to understand their environments better and ensure success for their projects.

There is still room for more research in this area of study. Project types are constantly increasing as many more business tasks are being classified and delivered as projects. This research also utilised storytelling,

narrative analysis and archetype extraction as tools to understand complex systems. Other tools and techniques used to understand complex systems should be further investigated and further investigations should still be conducted in using such tools to understand project management and to complement their methodologies. Boisot (2007) provides insight into how the i-space can be better understood research should be furthered to identify and further establish linear systems such as project management within the i-space and further complement their methodologies with the i-space analysis proposed by Boisot.

This research carried out investigation of project management located within organisations in complex systems; further research can be conducted for process management for organisations located in socially complex systems. It can be argued that these are also embedded within linear systems but can have similar improvement if the processes are investigated from the lens of complexity or their management approach complemented with similar complexity tools and techniques.

Other open areas of research include the area of the research methodology; storytelling was utilised in understanding complex environments and proved effective. The use of archetype extraction via an anecdote circle was also employed. However, in the course of this research; archetypes were extracted without the use of an official anecdote circle but via alternative means which created a virtual anecdote circle. The archetypes were extracted and the analysis arrived at similar conclusions to the archetypes from an official anecdote circle. This points to the fact that there can and are alternative means of archetype extraction which should be further investigated.

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Appendix 1

Test a story-telling workshop with a volunteer audience: The exercise below is based on Cynefin's Story-telling and archetype extraction techniques

History of SALT:

SALT which stands for single and living today is a department of a local Pentecostal church (House on the Rock) in North London. The department aims to bring the unmarried people in the church together for fellowship and effectiveness; they aim to help single people enjoy a single and purposeful life before getting married and starting another chapter of their life. The group normally gets together via social events, seminars, fellowship sessions and away trips intermittently. For a while the group has suffered from lack of support from the people. They have changed committee thrice in two years and are looking for a way forward in the management of SALT. The participants of the anecdote circle have been selected from a vast audience of single people in the church; some have been involved with management at some stage and others are with the current management committee, some were part of the singles and are now married, some have not been really involved as they were never really too keen on the activities of SALT.

According to a Cynefin (2006) specification of anecdote circles, an anecdote is a naturally occurring story, as found in the "wild" conversational discourse; anecdotes are naturally short and are about a single incident or situation. Anecdotes are not purposeful stories but are more unguarded and truthful and are more about the teller's experiences. (Cynefin 2006) has it that when people talk about their experiences, some social negotiations take place which create some conditions that to some extent give the feeling of being in "the field under fire" or in a state of "needing to know" This will enable hidden knowledge surface in a way that it would not normally do. The anecdote circle started with a group of 8 participants who represented part or had been part of the single community of a local church.

The "ditting" process gets people to talk about things they might not have talked about otherwise because it brings out, to the extreme of experience , areas that are less safe, which is where some of the most important issues will surface, started with the facilitators asking the group to tell stories of their best or

worst travel experiences. Using this sort of question would help to create boundaries of experiences and not mid-points; also we knew from experience and fact that most people have a story to tell about a trip that went very well or that was totally wrong. People at times just want to share their experiences about where they have been to and where/what they enjoyed and so the stories started. The stories about the travelling experiences were not really part of the stories to be used for the exercise, it was just to get people talking in order to loosen up and relax. At this point, the facilitators asked the questions and stepped back to allow the participants get along with themselves without any form of interactions with the facilitators. We the facilitators used this opportunity to talk more about the questions we would like to ask next. After a few minutes, about 4 out of the 8 people had shared their stories and the tempo was beginning to slow down. We went again and asked the people to share stories about weddings. The stories about the weddings went in diverse ways, some wanted to talk about the ceremony and others about the planning and stress involved in organising a wedding. One of the participants took the floor as she had a lot to say and people just got more interested in listening to her. We then intervened at this stage and asked her how the couple she'd been talking about met, allowed her to talk a little bit more and then asked people if they had any good stories of how people met. A married person amongst the participants started talking of how he met his wife and at this point, we felt the stories were coming home and began to record. Luckily the participants did not get distracted and over conscious at the start of the recording. When the tempo began to die down again, we then asked them to talk about their best and worst times at their universities. Most of the questions used in the anecdote circle were questions that made the participants talk about extremes, events, experiences and emotions.

After the stories had been told and we had run out of questions to ask, we asked the participants to take a 10 minute break.

After the break, we divided the participants into two groups and gave them all a pen and a lot of post-it-notes. We then asked them to write out any major points they think they had talked about in the stories, i.e. we asked them to identify/recollect the major themes of their stories. For the purpose of directions, we gave them examples of themes we thought they had identified and asked if they could write them down on the post-it-notes as it comes to their heads. The participants did this for about 10 minutes, during this time, we were giving various deadlines just to enable them to have last minute thoughts and write out more themes on the post-it-notes.

When they had done this and had come up with loads of themes, we asked them to cluster the themes in a way that made sense to them. Naturally, they asked how and what to cluster and we answered ‘in a way that makes sense to you’. This was because we as the facilitators did not want to get too involved and give biased directions; we wanted them to cluster the themes in a way that made sense to them. This is a practice of pre-hypothesis research, where the researcher minimises their involvement but allows the participants cluster and identify characteristics in a way that makes sense to them (Cynefin 2006). This is very similar to the processes of grounded theory, with which Goulding (1998) explains the coding process of grounded theory. The process involves coding strategies; the process of breaking down the data, most commonly putting interviews and/or observations, into distinct units of meaning which are labelled to generate concepts. These concepts are initially clustered into descriptive categories and are then re-evaluated for their interrelationships and through a series of analytical steps are gradually subsumed into higher order categories, or one underlying core category, which indicates an emergent theory.

After the process of clustering the themes, the participants started to name the clusters; this was very interesting because normally the facilitators would have asked the participants to name the clusters but with this anecdote circle, it was done without the instruction of the facilitators. The group named the clusters with names such as “holiday destinations, flights, embarrassing stories, relationships, future trips, weddings and holiday experiences”. At this point, the aim of the exercise was for the main facilitator to show the researcher how to run an anecdote circle and get participants to share stories that would lead to analysis and extraction of archetypes. The process; how the stories would be analysed and the purpose of the exercise were then explained to the participants.

Exercise continued.

According to the process of pre-hypothesis and archetype extractions, the names that were given to the clusters are referred to as the common stereotypes extracted from the stories. Stereotypes according to Cynefin are said to be a mindset. They are explicit, obvious and identifiable stereotypes based on

experience and in the Cynefin framework for organisational complexity, stereotypes will come under the simple domain. In the Cynefin framework, the simple domain is a domain; according to Johnson et al (2005) “it is the domain where standard operating procedures and proven relevant, “best practice” might be safely used, where knowledge may be captured and embedded within structural processes, within an overall organisational cultural context.”

Stereotypes are not particularly explicit and like questionnaires, they do not really uncover the hidden truth in a situation. What would do a better job to uncover hidden truth would be the use of archetypes. Archetypes as discussed by (Cynefin 2006) are constructs of shared meaning that encapsulate and articulate social understandings about "the way things are" for a community. Archetypes are not generally about things everyone can easily talk about, but are usually about things that are not well articulated in any other way.

To extract archetypes from the names given to the clusters above, the named clusters would be arranged and then participants would be asked to write out positives and negative characteristics of the named cluster, again in a way that makes sense to them. As usual, the researcher/facilitators would not get involved in the writing/extracting of the negative and positive characteristics. After this is done, the positive and negative characteristics would be clustered again in a way that makes sense to the participants. As before, these new clusters are named, this according to the process of pre-hypothesis is the two stage emergence process. The named characteristics are then rearranged once more, the positive and negative characteristics of the named characteristics are extracted, these again would be clustered in a way that makes sense to the participants. The participants now name the new clusters and according to the process of archetype creation they come up with named archetypes. Archetypes according to Snowden (2003) and Cynefin (2006) are complex; they are organic, they are pre-occupations and they exist in the complex domain according to the Cynefin framework for organisational complexity. Snowden (2003) argues that if anecdotes are captured about an organization, then the archetypes represent the culture of the organisation as perceived by those who thought of the anecdotes and those who engaged in the emergent process that produced the anecdote.

Figure 2.2 Cynefin Framework for Organisational Complexity (Reproduced from Snowden and Boone 2007).

The next stage is left for participants to take the known archetypes and compare with the stories, revealing what archetypes are relevant to what stories and in a matrix format and the archetypes would be mapped against the stories told in the anecdote circle. In this case, however, the participants were unable to continue the exercise to this point, and the researcher's own analysis is substituted, introducing some external bias and limiting the 'pre-hypothesis' nature of the research.

	Archetype 1 Fears of Relationships	Archetype 2 Travel issues	Archetype 3 Help Cry	Archetype 4 Pleasure	Archetype 5 Relationships	Archetype 6 Success	Archetype 7 Weaknesses
Story 1							

Story2		X		X			
Story 3		X					
Story 4							
Story5		X					
Story 6							
Story 7		X		X			
Story 8							
Story 9							

Table 2.1

After mapping the archetypes and the stories, we can tell what is most relevant to the current scenario of SALT; we can also work in retrospect to see where things went wrong and what issues would need to be tackled the most. This process of story-telling, archetype extraction and mapping of stories with archetypes would show how data emerges and would point out what issues should be most pressing; in

essence this process would help to eliminate waste and would enable the allocation of resources to relevant issues.

From the above, most of the stories the people told had two major archetypes in common, pleasure and travelling issues, travelling pleasure included characters such as: sight-seeing, adventures, trying new things, leaving UK and experiencing new locations etc, the issues of travelling included characters such as: planning, on-time payments, cultural issues and taking each other for granted. Some told stories of how it is easy to plan holidays with work colleagues and how it is a real task to plan with church people.

The above findings were presented to the leadership of SALT who currently believe that people want to get into relationships and need to know more about who they are and how to handle issues in relationships that will eventually lead to marriage. From the above findings, the SALT members can be seen as very interested in getting into relationships, but would also like to have a stress free holiday where they can leave the structure and work life and meet with people in a more neutral way. People will actually like to get into relationships with others that are equally fun-loving and with people they would have met and dealt with in another scenario apart from the normal work and church life.

Next Step:

Using the methods above I was able to uncover some hidden truth in the Forte Insurance Netware to AD migration project and also the Katlegoafrica on-line media project. I looked at participants that were involved with the above projects in any way, such as project management roles, project planners, stake holders, contractors, consultants etc. I had some of the participants in an anecdote circle and using the same method above, I was able to uncover hidden truths from the past, and current ways of managing projects. Also by reviewing first hand project documentations such as meeting notes, project libraries, project reports, milestone schedules and also by participating in project workshops, meetings and telephone conference calls, I was able to identify stereotypes which enabled me to carry out the two stage emergent process with other project management professionals from various sectors. Following the two stage emergence process, I was then able to identify relevant archetypes in the projects which gave some good insights into the hidden truths of these projects. Looking at the projects in retrospect and analysing the archetypes gave a lot of insight into why the projects were troubled and the reasons

responsible for the troubles. These techniques of complexity enabled me to enable me move a scenario from a simple domain to a complex domain in order to seek the hidden truths and assist in decision-making, placing emphasis on the most relevant issues and thus leading to making better decisions in project management. Eventually I hope to be able to come up with a new idea or ways of best practices for project management methodologies. I suspect that the above method can help modify and make more effective project management methodologies especially in the areas of planning and execution.

Appendix 2

Two stage emergence process for the Muse Consult Netware to AD migration project.

Below are the details of the two stage emergence process. In the immediate table below the characters in bold fonts were the initial stereotypes identified, while the italicised fonts were the negative and positive characters of the fonts extracted. Following the first stage, the characters (in italics) were scattered across the white board, reclustered and named. The names given to the clusters are shown in bold fonts in table 3.2. Again, the positive and negative characters of each were drawn for each of the new characters (cluster names) and are shown in table 3.2 by the words in italics. Table 3.3 shows the final stage of the two stage emergence process where the positive and negative characters of table 3.2 are again re-arranged across the white board and then clustered once again. The final clusters are then renamed to reveal the archetypes.

For the Netware to AD migration project, the available narratives in form of minutes, logs, weekly reports and updates were distributed to project management professionals who reviewed them and determined some key characters that were obvious in the project. These obvious characters identified by the researcher and other project professionals represented the stereotypes that the projects were faced with. Some of the stereotypes that were extracted from the available narratives of the project included: scope, migration, investigate options, shut down servers, server communications, documentation, overnight processes, firewalls, safety, DNS (Domain Name Servers), change control and impact of change. The positive and negative characters of the stereotypes were extracted as shown in Table 3.1. Having identified the stereotypes, we sought to conduct the two stage emergence exercise and reveal the archetypes by following the processes and stages described in Appendix 1. In the second stage the identified characteristics also known as the stereotypes, were clustered and renamed as shown in Table 3.2 (Appendix 2). There were no real determinants of the clusters, in a natural anecdote circle. Participants are told to simply cluster the stereotypes and naturally, they group the written stereotypes into clusters according to their similarities. From experience, this happens naturally when people are told to cluster stereotypes. This is usually the first stage of the two stage emergence. In the same manner, the project

management professionals came up with the clusters. They were then asked to name each cluster. With a bit of debate and analysis in manners that made sense to them, the clusters were named with the titles (bold font characters in Table 3.2). In the second stage of the two stage emergence process the new characters that are determined by the naming of the initial clusters are further analysed by having participants determine their positive and negative characteristics or characters. This is written down and re-arranged to give a more flexible opening for a final stage of clustering. In the case study, the project management professionals further analysed the second stage of the emergent process, by identifying the positive and negative characters of each of the titles, (see |Table 3.3). The positive and negative characters were written on post-it-notes and scattered on white boards. In re-clustering these, (Table 3.4) the participants were then asked to repeat the same process in the first stage. Once the clusters were determined, they were again renamed. The new names that emerged gave immediate insights of factors that were not obvious, yet were important to the project, to the project professionals, the researcher and the participants who were involved in the actual project (Appendix 2 |Table 3.5). This process of clustering stereotypes and undergoing the two stage emergence process to reveal archetypes abstracts from the categorisation and stereotypical labelling of phenomena aim to bring out the underlying collective preoccupations of a social group (Johnson et al 2005).

Scope: *rigid, restricted, boarders, limitations, boundaries, control, specified work, quality,*

Migration: *changes, move, new life, chaos, effectiveness, efficiency, compatibility, compliance,*

Investigate options: *way forward, advice, expert opinion,*

Shut down servers: *disturbance, sudden/immediate impact, obstruction to business,*

Server communication:

Overnight and weekend processes: *Access, support, monitoring,*

Documentation: *configuration, communication, consistency, reporting, publication, requirements,*

Firewall rules: *safety, security, corruption, compromise,*

DNS (Domain Name Server):

Change control: *quality, scope creep,*

Change: *transformation, implementation,*

Required change:

Impact of changes: *business disturbance, loss of data, improved services, project success, project failure,*

Table 3.1 Stereotypes and following characters

- ☐ Rigid, = **dogged**
- ☐ Boarders, limitation, restricted, boundaries, obstruction to business, control, access, specified work, = **Hindrance**
- ☐ Project failure, loss of data = **unsatisfactory**
- ☐ Corruption, compromise, business disturbance = **lawlessness**
- ☐ Safety, security, quality = **Standards**
- ☐ Advice, expert opinion = **mentorship**
- ☐ Move, new life, way forward=**change**
- ☐ Disturbance, chaos= **trouble**
- ☐ Configuration, publication, consistency = **steadiness**
- ☐ Effectiveness, efficiency = **capability**
- ☐ Change, transformation, implementation, improved services, sudden/immediate impact = **growth**
- ☐ Requirements, compliance, compatibility, project success = **standards**
- ☐ Communication, reporting = **news**
- ☐ Scope creep, monitoring = **supervision**
- ☐ Support = **aid**

Table 3.2 First Cluster Names

Dogged = *Resolute, Determined*

Hindrance = *Alternative*

Unsatisfactory = *Easily passed, Sub-standard, Unfair*

Lawlessness = *Freedom, Chaos, Anarchy*

Standards = *Results, Failure, Achievements, Unacceptable*

Mentorship = *Training, Bias, Accountability, influence*

Change = *Flexible, dissonance*

Capability = *Strong, limited*

Growth = *Development, responsibility, Acceptance*

Standards = *Precise, defined, Measurable, rigid*

News = *Awareness, Rumour, Educate, Propaganda*

Supervision = *Control, Monitoring*

Aid = *Assist*

Steadiness = *Unstable*

Table 3.3 Extracted Characteristics

- ☐ Training, educate, development, awareness = **Information**
- ☐ Failure, result, achievement = **Education**
- ☐ Rumour, propaganda = **Prejudice**
- ☐ Unfair, Biased = **Pessimist**
- ☐ Dissonance, Alternative, Flexible = **Escapist mentality**
- ☐ Accountability, Responsibility = **Managing**
- ☐ Control, Monitoring, = **Supervision**
- ☐ Chaos, Anarchy, Unacceptable = **unity/Disunity**
- ☐ Assist, Influence, = **Help**
- ☐ Limited, Unstoppable = **Time**
- ☐ Resolute, Determined, Strong, Rigid = **Stubbornness**

4.1 Explanation of Archetypes:

4.1.1 Information: This involves the gathering and dissemination of IT project information. Many of the issues the project suffered were caused by the fact that information was not available when it was needed. The issue of whether the information was known at the time and not communicated would have to be looked into. Ignorance vs. bad communication will also have to be looked into for the current project and for any future projects. Information regarding the 500 extra servers in another existing domain led to the first exception, and information regarding the overall readiness of the organisation for a live migration process led to the second exception. Available information: who has it, who needs it, when and how it is disseminated, should be an issue to be looked at and if possible, an issue where changes have to be made to ensure the success of the current and future projects.

4.1.2 Education: This has to do with the ability to make informed decisions; it ties in well with the issues of information, but it could also have to do with the requirements of future training on the new AD environment. Though the changes made were required to be transparent to the end users, as with the point of prejudice, and unity, there might be some reservations with a few people and a few departments on embracing the changes that were ahead.

4.1.3 Prejudice: This has to do with the fact that not all departments were in support of the project. As with one of the problems with information, not all the relevant people were considered before the start of the project. As discussed in section 3.4, the migration window was initially planned to be between the hours of 10pm and 6am weekdays and over the weekend. This formed the basis of the project plan, but it was noticed that some other departments worked a 22 hour shift. Some people mentioned that the entire project was bad for the business, in the sense that it had very wrong timing, and if they were consulted before it began, they would not have given their consent. The issue of prejudice could also be dealing with people that were used to a set way of working and who doubted the fact that the project would bring unwanted changes to their known tradition. From the technical and IT point of view, some jobs might have been lost as the Netware skill set might no longer be required. This was never really mentioned, but can represent the fear of some people, especially with regards to technology support services. This might be a possible issue as to why the devoted support of many was not available.

4.1.4 Pessimism: This points to people who have many reservations about the project and will not give full commitment in their participation to the project. This archetype is very similar to the Prejudice archetype, but also involves a personality more than a mentality. How these characters will be identified and treated would be a task for the client, the project team, and the Project Manager in particular. If these people are vital to the project, convincing them on the use of the project and the addition to the overall business will have to be done, for their support to be guaranteed.

4.1.5 Escape Mentality: This might be pointing out to some people that are very “hands on” in nature.

People that are not too keen on spending valuable time on planning, but would rather start work with a “fix as you go” mentality.

4.1.6 Managing: This deals with the management cultures of each party; the selection of appropriate managers with the relevant skill sets. Managing also talks about people’s ability to manage each person, the processes and business requirement.

4.1.7 Supervision: As with the above issues with management, this has to do with direct supervision of the project. An issue that might be noted here is the fact that the Project Manager on the client’s side was changed three times and the Project Manager on the third party suppliers’ side was also changed once. This meant extra time and effort in getting the people up to speed with the requirements and current state of things on the project.

4.1.8 Unity vs. Disunity: This deals with all parties having a single voice with regards to the project. Definitions were different, requirements were different, and so were priorities, recommendations etc. IT also noted that not all the relevant departments were consulted before the start of the project and so were not on the same page with people that were more interested with driving the project forward. Identifying and dealing with people that were not really interested in the success of the project might seem quite vague, but from research it shows that it might be an issue to be considered if the project is to succeed. This might also prove useful to future projects.

4.1.9 Help: This might be a typical representation of a “cry for help”. When is it time to cry for help; who cries for the help, and who is in a position to help. In terms of skill sets, time, resource availability etc, the project was broken into various tasks or products as discussed above in section 3.3. The various products were specified as deliverables for the client, the project team or the third party suppliers. It was noted that many of the deliverables by the client and the third party suppliers were not delivered on time. This had adverse effects on the overall timeframe of the project as some of the deliverables were in the critical path of the project. Many reasons could have been responsible for the lack of delivery: inexperience, lack of relevant skill sets, etc. These issues were normally covered up in the meetings and the delivery dates were repeatedly revised. A cry for help might have been the owning up to the short comings and the need to hire more resources with the skill set, carry out more research into new developments to help with the work and also recommendations of experienced personnel.

4.1.10 Time: As with major projects, there is usually a time frame in which it is expected to be delivered. Most of the issues that occurred, especially with the issues that led the project into exception, increased the time frame for the overall delivery of the project. For the project management team, time was of the very essence and they were more interested in making sure that all the products were delivered on time and that any changes were through a change control process. This would then be reflected in the initial plan. It can be argued that the emphasis and importance of time, varied from party to party and there was no actual definition of what the importance of time should be. This also meant that the definition of the project success might have varied from party to party.

4.1.11 Stubbornness: This will have to be another set of people that will need to be treated with a lot of care. They might be part of, or in support of, the people that have been categorised under pessimism and prejudice. For reasons known or unknown, they might be people who are very used to a particular culture and set ways of working and not necessarily supporting the need for change. They may share mentalities such as "if it's not broken, don't fix it with the pessimists". Again this is another set of people that will have to be convinced of the need for the project and how the project will be more of a back end change than a front end/end user change. If these people exist in the decision-making realm of the organisation, then convincing them will have to be done to gain support for the project.

Performance of PRINCE2 and PMI methodology in Netware to AD migration project

Looking at the issues that faced the Netware to AD migration project, we investigate how the PRINCE2 or PMI methodology could have catered for the issues or avoided them in the first instance

1.1 7 Unidentified Servers out of Project Scope: This issue was mainly documented as a missed information issue. Though there was a discovery phase included in the project plan, this information was not documented. The contractors confirmed that the inclusion of the servers in the

project would change the entire scope of the project and would invariably impact the delivery time line and associated cost. As earlier mentioned, the project was temporarily stopped until a way forward was agreed for these servers that were not included in the scope of the project. Eventually, it was agreed that the data in the servers would not be migrated to the new active directory domain but that the servers would be upgraded in order to be compatible with the new system. Though this issue was resolved, there are arguments as to why it came up in the first place. It can also be further argued that if it were a software development model, then models such as the Spiral model and the Helical model may have identified it earlier as the models ensure that the developers (in this case the technical team) and the client are always in touch to ensure that the requirements are being met. The risk analysis of the spiral model may also have identified the issue. But this was not a software development project and the issue was not identified during requirement gathering or discovery phase. This goes to buttress the argument that methodologies such as PRINCE2 that was put to use are still open to techniques of other models in complementing it to make it a more robust methodology which should be able to cater for a wider social situation.

1.2 Clients' lack of readiness for live changes: This was the main issue that finally put an end to the project before its completion. We can argue that PRINCE2 and PMI could have catered for this issue in terms of its stakeholder engagement processes of PRINCE2 or the intensive communications plan of PMI. The contractors did work with the client to identify its stakeholders and areas of business that would be impacted. As with normal PRINCE2 practice, a change impact was documented and the progress of the project was constantly communicated with the business. Eventually, towards the end of the project, it was decided that the client was not ready to undergo such a major change, the reasons being that the lack of readiness was still unknown but the project was finally stopped even though it had used up over a third of its overall budget. This was an issue that was not resolved by the methodology implemented and again questions are raised as to if the issue could have been resolved or totally prevented if another model or methodology had been implemented? From the extraction of the archetypes, it was realised that some hidden factors were at play within the organisation which affected the course of the project. These hidden factors were not open to the project team and were never documented as part of the issues that the project faced. Though the project had used up over a third of its overall budget, this was an issue that was not resolved by the methodology implemented and again questions are raised as to if the issue could

have been resolved or totally prevented if another model or methodology had been implemented? From the extraction of the archetypes, it was realised that some hidden factors were at play within the organisation which affected the course of the project. Though the project team could have been prioritising and discussing factors such as completion of products, scope, time line etc, it can be argued that other discussions were going on within the organisation that may have been in the light of other factors but were to invariably affect the project. Introducing tools such as archetype extraction, narrative analysis and storytelling as well as factors such as interaction, interconnectivity with a larger system, emergence and self organisations to these methodologies have shown to be rather capable of providing insightful information that would not normally be obvious. These tools have also shown to be able to refocus priorities and prevent situations going from bad to worse. One of the advantages of the process of archetype extractions is that it is capable of taking the obvious information and creating stereotypes, then undergoing a two stage emergence process to reveal the archetypes. The archetypes as earlier mentioned are also referred to as hidden truths. Some other authors have also argued that complexity is a lens through which a situation can be perceived Fitzgerald and Eijnatten (2002). This means that though we use the methodologies to plan and implement these projects, there are other ways we may need to perceive this project in order to sense catastrophe before it happens. This is not just a risk analysis process, though it can be used to aid the process of risk analysis, it is a process whereby we attempt to investigate what would normally not have been investigated and therefore end up in a position whereby the unexpected is managed and controlled.

.1.3 Other Project Issues: The Netware to AD migration project also faced other issues such as communication, actions, feedback, product delivery/timeline, third party suppliers/vendors which have been discussed above. Singling out the issues of feedback among the issues listed, this issue was understood according to the project team to be mere updates on the progress made on the completion of the products, especially the ones that were to be delivered by the client themselves and the third party contractors. There was no knowledge of feedback in terms of a system that could be self organising.

Though priorities for all parties (client, contractors and third party suppliers) seemed to be the successful completion of the project, it was observed that several other factors were at play within each camp. Contractors and third party suppliers were naturally concerned about the reputation of

their organisation, the ownership of changes were constantly debated, risks were transferred among parties and all parties ensured they did not bear more costs than planned. An overall success in light of an external system was not identified and discussed i.e. the project was an I.T infrastructure migration and upgrade project for a large insurance organisation and should have had to measure its success against some other I.T criteria and also against some competitive criteria in the insurance company e.g. how will the implementation of the project affect the organisation when competing with other insurance organisations? Will the implementation of the project aid advertisement? Marketing? Secure more client? Assist in processing insurance claims? The list goes on. If these were organisational questions to be answered for instance, the questions were not relayed to the project team in order for them to measure the success criteria in respect of these organisational questions as well as in respect of project success factors.

Many factors can be identified for the reasons for the short comings of the project, some within the boundary of the project and others outside it, some within the organisation and others possibly outside and within an indeterminable “social system”. This would subscribe to Gharajedaghi (1999) who describes a system as having three levels of interconnectivity, people, an organisation, and a society. The project in the case study was no different and had such interconnections that were not addressed by the project. Using the tools for complexity identified some of these factors and relationships- but I believe that more factors were at play and should the project methodology had been complemented with the right tools in the lifetime of the project, more would have been achieved together with overall success of the project within all levels of interconnectivity.

Appendix 3

Two stage emergence process for Katlegoafrica on-line media implementation p

project.

The initial stereotypes identified are shown below:

- ☐ **Scope**: goal, boundary, scale, limits,
- ☐ **Time**: deadline, past, irreplaceable,
- ☐ **Deadline**: goal, limit, target, produce, aim, objective,
- ☐ **Implement**: make happen, put to action, operation, make, act, put to practice,
- ☐ **Delivery**: competent, ability, make happen,
- ☐ **Possibility**: chance, odds, option, alternative,
- ☐ **Consultant:** expert, knowledgeable, solution provider,
- ☐ **Delegate**: assign, task, request,
- ☐ **Hosting**: source, location, harbour,
- ☐ **Dependence**: trust, confidence, reliant,
- ☐ **Solution**: answer, way forward, resolve,
- ☐ **Justification**: reason, proof, purpose, business case,
- ☐ **Plan:** time, deadline, task, timeline, strategy, milestone,
- ☐ **Pros and Cons:** odds, advantage,
- ☐ **Control**: monitor, governance, observe,
- ☐ **Risk**: uncertain, fearful, careful, make-or-mar,

Table 4.1 Initial Stereotypes

The users were asked to identify both negative and positive characters of the stereotypes; this was done in an informal meeting with users from the Katlegoafrica group and other project management personals that were outside the Katlegoafrica group. The characters of these stereotypes were initially written besides the words which lead to the next stage. For the second stage, the users were asked to remove the initial stereotypes and rearrange the words in a scattered manner. They were then asked to cluster the words in a way that made sense to them. The cluster of the words was left totally to the discretion of the users and the researcher took a "back seat'" at this point. When the clustering was complete, the users were asked to give all the different clusters a name. This was to give the 1st stage of the emergence. The users clustered and named the characters as follows;

- ☐ uncertain, fearful, make-or-mar, odds, careful, irreplaceable, past = **future**
- ☐ monitor, governance, observe = **regulation**
- ☐ produce, goal, target, aim, objective = **drive**
- ☐ time, deadline, milestone, timeline, strategy = **course**
- ☐ reason, proof, purpose, business case = **explanation**
- ☐ answer, way forward, resolve, advantage = **solution**
- ☐ trust, confidence, reliant, = d**ependence**
- ☐ source, location, harbour = **store**
- ☐ assign, task, request = **duties**
- ☐ expert, knowledgeable, solution provider, competent, able, = **advisor**
- ☐ boundary, scale, limits = **parameters**
- ☐ chance, option, alternative = **contingency**
- ☐ put to action, operation, make, make happen, make happen, act, put to practice = **performance**

Table 4.2 First Cluster and associated names

The above clusters gave rise to a new set of stereotypes and the exercise was performed all over again. Positive and negative characters for the new stereotypes were again extracted as shown below:

☐ **Future:** unknown, anticipated, feared, unpredictable,

☐ **Regulation:** law, control, guidance, standard,

☐ **Drive:** passion, fuel, motivation, encouragement, ambition

☐ **Course:** path, direction, route, navigation, motion

☐ **Explanation:** reason, clarify, teach, educate,

☐ **Solution:** resolve,

☐ **Dependence:** reliance, trust,

☐ **Store:** keep, hoard,

☐ **Duties:** role, expectation,

☐ **Advisor:** counsellor, mentor,

☐ **Parameters:** territory, range, boundary,

☐ **Contingency:** recovery, backup, fears, mishap,

☐ **Performance**: Delivery

,

Table 4.3 Positive and negative characters

The process continued as the users were asked to rearrange the words and cluster them in any sensible way and then name the clusters.

4.7 Archetypes and Explanations of Archetypes

4.7.1 **Accident**: This refers to unfortunate incidents that are never really planned; Incidents that are arguably prone to people on the "fast lane" without due care. In most countries, a lot of effort is put into preventing accidents on the road, at home, while flying and possibly in life, but people end up having accidents daily due to various reasons which could be shared carelessness, impaired judgement, inexperience, or simple genuine mistakes. Though accidents happen in their hundreds or possibly thousands on a daily basis, it can be argued that some are more accident prone than others. Other archetypes that emerged from the Katlegoafrica's project could give a good inclination as to why the project was rather accident prone. Weick et al (2001) explains that a person or a unit has an intention, takes action, misunderstands the world; actual events fail to coincide with the intended sequence, and there is an unexpected outcome. This can be argued to have been the case with the Katlegoafrica's on-line media implementation project.

4.7.2 **Drive**: This archetype ties in well with **Strength.** Some characters that derived these archetypes include passion and motivation. This gives us an inclination to the disposition of the drivers and sponsors of the project. We can see or at least guess at this point that there could have been a drive to embark on the project; complete the project and start up the business. Strength here can be said, from the Katlegoafrica's point of view, to be more of personality or character than the disposition of a person. Drive and strength as archetypes help explain the choleric nature of the owners of the business and the need to deliver a project to start up a business.

4.7.3 **Instructor**: This combines well with other archetypes: teach**, inspire.** It points to a vital attribute that seems to be missing from the project. This might give us a clue into the mentality of the people involved: a group of young, talented and driven people that are quite passionate about what they do and what they aim to achieve. They realised the growth and the growth potential of the media. From a known circle, they were able to identify the relevant participants of the project: the Project Manager, the technical manager, the business analyst etc. but did they have the necessary experience? Did they engage people who had been involved in such projects or businesses in times

past? This archetype gives us insight into some sort of disposition of the project owners and how some of the archetypes tie in with other archetypes.

4.7.4 **Limits**: This was an archetype that spun from characters such as boundaries and territories, it gives an inclination to the fact that different laws apply in different territories. This can be virtual and geographical, so when going beyond a particular limit and into a new territory, it can be argued that it may be a time to learn the laws (rules/regulation) that govern the territory that exists beyond the current boundaries. The Katlegoafrica's on-line media project targeted clients from their known territory and clients abroad (UK and the USA). They planned to implement a process which involved the use of banks abroad to process payments on their African based website. They also implemented IT infrastructure abroad. The decisions made to implement and involve processes abroad were made for very good reasons. Banks in the UK and USA are able to process card payments; individuals can link their UK and US bank accounts to services from PayPal. For the infrastructure, a reduced risk of server crashes due to power failure was assumed; this was to guarantee the integrity of the data owned by Katlegoafrica. The physical security of the servers was also assumed to be better guaranteed.

4.7.5 **Direction**: This generally refers to the way the project, the people involved in the project and the overall business was heading, and not just the way they were heading but how they planned to get there. They had dreams and hopes and knew they wanted to break into a new exciting and thriving market, they planned to be a good distribution source for media and eventually be a good advertising media following the growth of the organisation.

4.7.6 **Rules/Regulation**: As discussed in 'limits', this refers to the awareness of the rules that apply when operating out of your disposition, your domain and your locality. It was observed that the owners of the Katlegoafrica group came from various backgrounds. They were not IT experts, neither were they project management experts; they just employed the services of people they deemed competent, based on some selection criteria of the group. Were standards followed in the selection criteria; is a question to be asked and an issue to be investigated".. As the project was

owned and led by a close-knit circle selection was based by word of mouth advert and by recommendation. This can be said to contradict the surgical team approach, which Frame (2003) puts forward. The archetype of rules/regulation also talks about the difference in banking culture in some African countries and in the UK or the USA. It was assumed that payments would not be an issue for Katlegoafrica's client but it can be argued and seem that it was a one sided judgement.

4.7.7 **Hope**: This archetype is particularly interesting as it gives some paradigm position of the people on the project. It possibly refers to the wishes of the people in a nutshell. They wanted to develop a business, they had an idea of how to go about it and they hoped it would all work out.

4.7.8 **Save**: Time to call for help, time to know when the limits had been reached and possibly exceeded. This cry for help might possible have been avoided if they had the right direction and guidance, and if they realised the predisposition to accident.

Appendix 4.

Two stage emergence process for the renewable fuel transport obligation programme.

The Two Stage Emergence Process: 5.8.1 The initial stereotypes (characters which were discussed) identified were:

Organisation

Structure

Leadership

Quality

Personality

Buy-in

Meeting

Contingency

Public sector

Extensive engagement

Effective change management

Order

Budget

Hospitals

Planning

Mitigation

Risks

Issues

Dependencies

Bureaucracy

Public office

Health systems

Legal systems

Insufficient planning

5.8.2 The First cluster names:

The participants were asked to cluster the stereotypes in a way that made sense to them, as I expected, the participants grouped the stereotypes in terms of their similarities. Once this was done, they were asked to label the clusters that were named, the results is as shown below:

Organisation, structure, leadership, quality, personality = **Strategy**

Buy-in, meetings, stakeholder management, change management, order = **Engagement/Communications**

Budget, planning, mitigation, risk, issues, dependency, contingency, insufficient planning = **Project Methodologies**

Health systems, hospitals = **NHS/Control**

Public sector, public office = **Bureaucracy**

Legal systems = **Legal Systems**

5.8.3 Extracted characters:

The participants were again asked to draw out the negative and positive characteristics from the cluster names. The results were:

Knowledge	Extensive
Research	Lengthy
Communication	Cumbersome
Understanding	Bureaucracy
People’s attention	Hindrance
Buy-in	Deferring opinion
Delivery	Views
Direction	People’s attention
Vision	Knowledge
Accessible	Measurement
Forecast	Direction
Financial management	
KPI (Key Performance Indicators)	
Measurement	
Views	
Common grounds	
Governance	
Critical success factors	
Business goals	
Shared services	

Structure	

5.8.4 The extracted characters were rearranged, re-clustered and the second clusters were named to reveal the archetypes as:

Lack of integrity, dirty, abuse of power, power = **Tyranny**
Reusability, qualified staff, infrastructure, productivity, improvement = **Systems**
Communications, research, knowledge, training, understanding = **Business intelligence**
Delivery, assessable, shared services, forecast, finance management = **Governance**
Vision, stability, growth, economics, = **Good leadership**
Direction, vision, delivery, integrity, lack of good staff = **People vs. Leaders**

5.9 Archetypes and Explanations of Archetypes

Unlike the previous case studies, this was not particularly straight forward, as the archetypes did not make all the sense I required them to make. With the previous cases, the archetypes that emerged gave me some valuable insight into what I believed to have been the hidden issues the projects may have been facing. A possibility is that though this was a project that had its issues and restrictions, the project/Programme teams were able to identify a particular action plan that eventually helped the Programme achieve its target of meeting the April 2008 deadline. The Programme realised the need to intensify their stakeholder engagement plan to understand all the requirements needed for the implementation of the obligation and the running of the Obligation post project implementation. The project was delivered in time but faced some uncertainties. The solutions to the issues faced by the project I cannot particularly attribute to the use of the project management methodology PRINCE 2 engaged. I do not fully understand how the

methodology was implemented for a programme such as the RTFO. The plans were drawn and an action plan was taken but the implementation of the plan was neither in the hands of the project or Programme team.

The archetypes that emerged from the two stage emergence process gave some insight into what could have been the preoccupations of people. This can be said to be the hidden truths behind what the project team members and other project practitioners really thought were responsible for the issues the project faced. As discussed in section 1.1.5, projects could be said to have failed if they do not meet certain critical requirements that govern its viability. These requirements many times concerned the project failing to deliver in time, within budget and in line with stakeholder requirements. If this was the case, then the RFTO project would have been said to have succeeded. On the "flip side of the coin" many of the Programme team members that I spoke with and that participated in the anecdote circle regarded the project as one that had many issues they had to deal with. It was a project that raced against time. The time line of the Programme was set before the inception of the project and from the first day of the project, it was described by the participants as a "fire fighting" project.

Explanation of archetypes:

5.9.1 Tyranny:

This archetype was generally agreed by the participants as a responsibility for the time restrictions the Programme faced. The main reason for the April 2008 deadline was attributed by one of the participants to a senior public official who made a public announcement on the commencement of the use of bio-fuel on April 2008. The participant expressed that the project "was a mix between a political agenda and governmental decisions". The motive behind the announcement was unknown, but the details of the implementation were not clear at the time of the announcement, and some of the participants suspected that it might have been a deliberate attempt to bypass some of the bureaucracies they might have faced to implement the Obligation, but making a public

announcement would have meant that implementing the Obligation would be tackled in a slightly different way. The fact that there was no consultation, full planning and implementation strategy before such an announcement was made which put the Programme under immense pressure was seen by the participant as an act of tyranny. Though they had to work on this condition, they realised that it was a simple case of working with a decision made at the top without the input of the actual resources that would be responsible for implementing the Programme. The project team expressed that the project would have been delivered in a better manner had there been proper consultation and had there been more time. How it would have been delivered better was however still an unanswered question but it was generally agreed that the senior government official who made the announcement should have assembled the project team earlier and initially ensured they had captured all that was required to set the Programme running before making the announcement and enforcing a race against time.

5.9.2 Systems:

This archetype helped the participants in recognising the need to identify all the systems in place for the implementation of the Programme. The Programme had to interact with systems internally and externally. Externally they required inputs from the House of Commons, the government, the new services rule, the oil producing companies and environmentalist groups. The Programme did not have experts and experienced persons to deal with all the systems they needed to deal with. The Programme internally had to set up the Administrator and the I.T systems which were identified as different work streams. Many of the systems they had to deal with had dependencies on other systems whose processes and policies were not fully understood and whose controls the Programme did not have any control over. If the Programme was to be done again a second time, this was something the participants said would be recognised early in the initial stages, it would identify, resource and plan for the inputs of all the required systems.

5.9.3 Business Intelligence:

To implement such a Programme, the team had to think out of the box. Though it was said to have implemented the PRINCE2 project management methodology, I would suspect that some of the solutions were down to the brainstorming, flexible and attentive approach given by some of the project decision makers. The Programme understood the need to convince many people about the need for the project and the obligation it fought. Though it can arguably be referred to as intense stakeholder engagement, I could see that the people that had to take up the role required some soft skills that were similar to the skills of salespersons. This would not normally be a required skill set of a project team member, but based on the level of dependence on other systems and the urgent need to have everyone's buy-in; it became a required skill for the Programme implementation. This was an archetype that explained how the programme had to temporarily step out of a methodology to think out of the box and take corrective actions where necessary.

5.9.4 Governance:

This archetype could be responsible for pointing us to the decision makers of the projects. Bhasa (2004) helps us understand that majority owners or stakeholders, in our case of a system, sometimes take decisions on behalf of minority owners or stakeholders and in some other systems, which are characterised by manager control, the managers make decisions that are supposed to be beneficial to other stakeholders at large. There are also other systems where the financial aspects of the system involve themselves highly in the decision making of the system. The decision to embark on the RTFO was attributed by the participants to the public announcement made by a senior public official. It can be argued that in respect of the EU's recognition of the benefits of such a Programme and the UK Kyoto agreement responsibilities, the project would have proceeded in the future. The issue faced was the backward engineering and race against time that had to be tackled based on such an announcement from the majority (leadership) of the stakeholders.

5.9.5 Good Leadership:

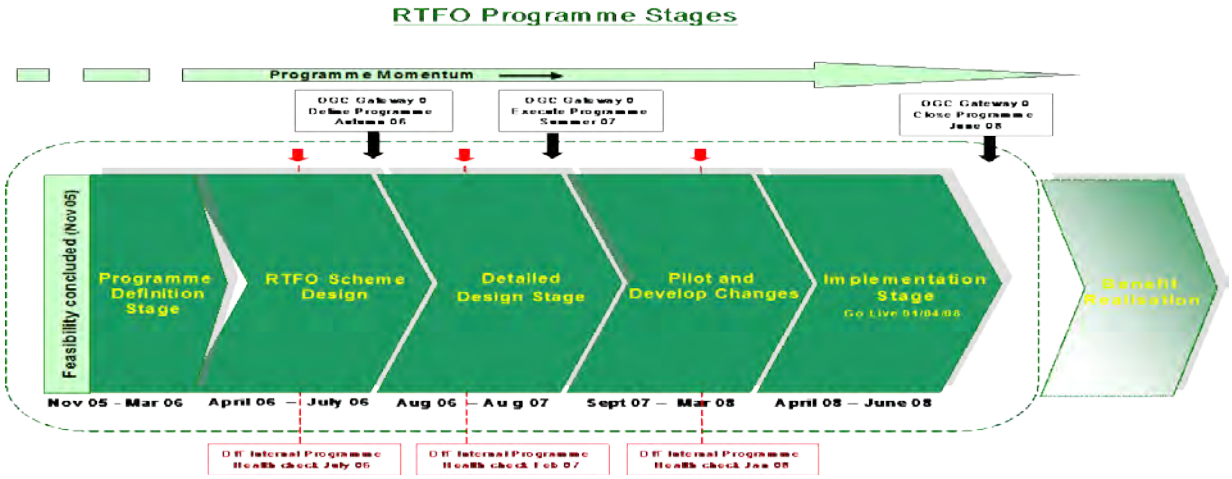
Though some blame was apportioned to the decision makers of the Programme for embarking on such a Programme without full consultation of the middle and lower level stakeholders and project team which would be responsible for implementing the lower level details of the Programme, some accolade was given to the Programme board and project managers for looking out of the box and recognising where to focus the energy of the project and Programme team as required. The project decision makers were able to focus their attention on intense stakeholder's engagement which was both within the implemented methodology and outside of it. They also worked their way around the new services rule by setting up a shadow body for the Administrator and also getting approval to implement the design stages of the IT systems designed to support the Administrator. If another team was responsible for implementing the RTFO Programme, it remains a guess if they would have taken the same approach by the team and what sort of results they would have achieved.

5.9.6 People vs. Leaders:

This was similar to the tyranny archetype. The Programme became a clear case of a team running around horizontally because a decision and an announcement had been made at a top level without full consultation of the intricate requirements of the project. Though the team realised they had a job to do and a deadline to meet, they also identified that the leaders may have placed the cart before the horse. Top level persons are always accused of making decisions when they do not necessarily understand how they will be carried out by the middle and lower level people. As discussed, the reasons and full rationale of why the decision and announcement, can only be left to our suspicions at this point.

Appendix 5

Fig 5.1 RTFO Programme Stages



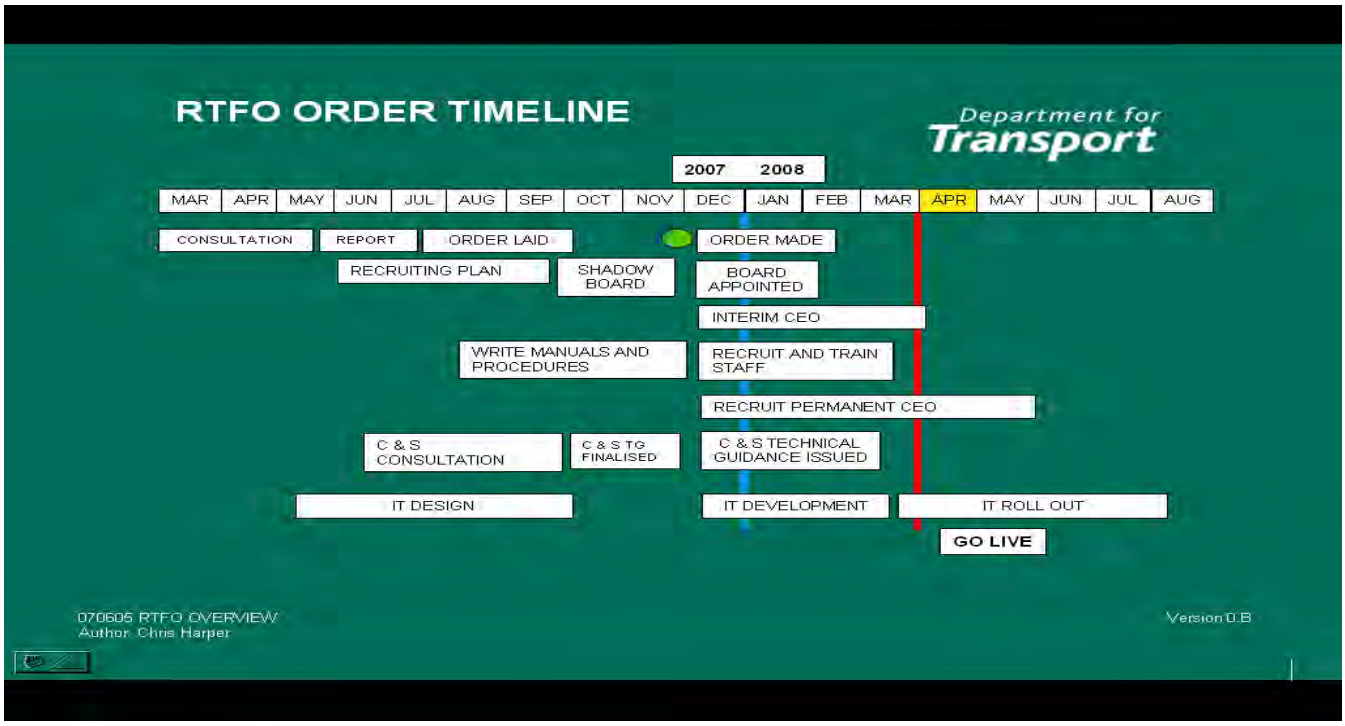


Fig 5.2 Programme High Level Plan