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***The Development of a Stages of Growth Model for
Information Systems within Government Departments***

by

Finn de Brí

Thesis submitted in fulfillment of the

requirements for the degree

Doctor of Philosophy

in the

School of Computer Science and Statistics

at

Trinity College Dublin

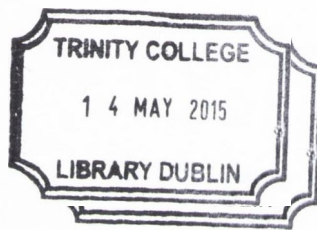
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Abstract

This dissertation proposes a stages of growth model for the use of information and communications technology/information systems in large government departments. The stages of growth model presented maps the changes through which information systems in organisations pass as they become more sophisticated and better able to meet and support the needs of the organisation as a whole.

This research is based on a detailed study of one government department over a 90-year period supported by confirmatory studies of four other government departments. It addresses several gaps and weaknesses in existing IS and e-government stage models, and proposes a new stage model outlining the stages of growth for information systems in government departments.

A review of the literature in the IS and e-government fields shows that of the many stages of growth models proposed/postulated over the last four decades only two of these are theoretical models. The model presented with this research is the first and only theoretical Enterprise Information Systems model produced in the IS and e-government fields since 1973. The model provides a unique set of theoretical insights into the process of growth and development of IS in government departments. The model is a descriptive and theoretical model and as such it offers some predictive elements that outline what may happen in the context of this organisation type. The research findings show that information systems within government departments evolve in a stage like fashion, through eight stages. The findings describe how these stages develop and importantly why they develop. The findings outline drivers and enablers for change along with key stage change mechanisms, which offer insight to how and why each stage emerges.

It is argued that the stage model presented in this dissertation could help management when formulating an ICT strategy, which in turn could help with organisational strategy, organisational investments and pursuit of its business objectives. The stage model presented here may also help managers describe and evaluate the organisation's maturity and sophistication as regards information systems and its use of ICT.

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Dedication

To my wife Orla and children Jeda and Cal

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Research Outputs

Conference and Journal papers are listed below:

- de Brí, Finn. 2009a. "An eGovernment Stages of Growth Model Based on Research within the Irish Revenue Offices." In European Conference on eGovernment, editor Professor Dan Remenyi London: Academic Conferences.
- de Brí, Finn. 2009b. "An eGovernment Stages of Growth Model Based on Research within the Irish Revenue Offices." *Electronic Journal of eGovernment* 7 (4)
- de Brí, Finn and Frank Bannister. 2010a. "Whole-of-Government: The Continuing Problem of Eliminating Silos." . In European Conference on eGovernment, editor Professor Dan Remenyi London: Academic Conferences.
- de Brí, Finn and Frank Bannister. 2010a. "Whole-of-Government: Beyond Silos and Toward 'Wicked Problems'." European Group for Public Administration. Toulouse, France

Chapter 1 – Introduction

1.1 Introduction

Many researchers describe the Information Systems (IS) field as being situated at the confluence of people, organisations and technology (Lee 2000; Hevner et al. 2004). Others add that technology is now inextricably integrated into the fibre of organisational processes or functions (Rockart 1988; Remenyi et al. 2007). This level of integration suggests a complex environment and one where extracting (or at least identifying) value from investments in technology is fraught with difficulty. In particular Remenyi et al. (2007) note the significant difficulties that arise while trying to measure the costs and benefits of a technology that is integrated into an organisation where that organisation is both evolving and adapting continuously to a changing environment. Lycett and Paul (1999) maintain that producing technology applications that do not account for the challenges of evolutionary complexity in an organisation can produce systems with, amongst other things, a shortened life-span, a reduced stream of benefits, lack of sustained use and sometimes a failed investment. One way to guard against these problems would be to assess how information systems evolve over time within organisations, to create a model of that evolution and to use that model as a template or guiding principle with which to assign appropriate technologies throughout the organisation, phasing investment accordingly.

In setting out to create such a model of how information systems evolve within organisations it is important not to confuse the evolution of technology with the evolution of an organisation's information systems. Tracking the evolution of technology within an organisation may not give an accurate picture of how that organisation's information systems develop. Organisations engage with technologies for various reasons, many of which are not influenced by the underlying information systems that are developing within the organisation. According to Checkland and Howell (1998) it is important to distinguish the fundamental information system from the technology that is supporting it. Ward

and Peppard (2002) point out that technology solutions are put in place to support action in what they refer to as “the real world” and that before such a solution is put in place it is first necessary to conceptualise what it is that is to be supported. For that reason Ward and Peppard define the term IS so as to exclude the technology element. In the same vein this research separates technologies per se from organisational processes in order to lay bare the essence of the underlying organisation and its stages of growth. More specifically, this research seeks to identify the stages of growth for government departments and develop a model that describes and can be used to predict how these stages evolve over time.

1.2 The Research

The purpose of this research is to contribute to the field of information and communications technology (ICT) investment and information systems optimisation in government. More specifically this research sets out to develop a stages of growth model for government information systems and e-government¹. A model of this type/nature is useful for understanding the growth of ICT in government departments and can contribute to strategic ICT planning, ICT investment evaluation and benefits realisation.

A stages of growth model maps the changes through which information systems in organisations pass as they become more sophisticated and better able to meet and support the needs of the organisation as a whole. This research starts from the premise that for government departments in particular the existing models described in the literature are a poor fit. This premise will be explained and justified in chapter two. The research objective is to build a model that overcomes the shortcomings of current models. Such a model has the potential to provide a tool for government departments both to assess their current state

¹ The term e-government in this context is understood as the use of all ICT in government. Some scholars confine the concept of e-government to government’s use of the Internet and Web to communicate with the public. A broader definition is adopted in this dissertation.

of information systems maturity and to plan for the most effective development of those systems and the supporting ICT solutions going forward. This research addresses a practical requirement within government departments namely to help give direction and focus to ICT expenditure against a background of continuing demands for budgetary control and the efficient execution of public policy.

1.3 Significance of this Research

This dissertation investigates existing e-government stages of growth models and proposes a more refined and tractable model which is based on empirical observations taken from a number of government departments. The research reviews stages of growth models in the information systems and e-government fields, identifies the shortcomings in both and seeks to develop a model with a depth that reaches further into government organisations than any of the existing models.

The effective use of ICT underpins most modern organisations' ability to operate successfully. However investments in technology have not always realised the expected benefits. Organisations often invest in technology without sufficient thought about the return on such investments (Ward and Peppard 2002). Government is no exception. According to the OECD(2005) the approach to e-government has too often been driven by unfocused ICT solutions instead of user demand. While this has been effective for putting services online, it has led to a proliferation of websites, portals and electronic services that are incompatible, confusing and overlapping not to mention expensive (OECD 2005).

Stage models have been identified by Prananto et al (2003) as having four significant values for an organisation;

1. They provide guidance and direction in architecture development.

2. They provide a roadmap to reduce complexity, in this instance with e-government initiatives.
3. They articulate institutional and team identities while also communicating possible changes to the rest of the organisation which in turn enhance shared understanding of the organisation. These shared understandings may also serve as teaching tools to socialise individuals and teams. This type of institutional memory can help teams to articulate their identity to other significant constituencies within the organisation.
4. They provide milestones to evaluate ICT development architectures and so help to control cost.

Because investment in ICT is such a significant expense for organisations, it is important to be able to separate essential investments from ones that are discretionary, unnecessary or even counterproductive. As already noted, ICT investments in general and benefits realisation in particular are fraught with difficulty. ICT investment evaluation is often neither credible nor effective and current methodologies lack a clear conception of value, which in turn can lead to serious doubts about the usefulness of metrics designed to measure it (Remenyi et al. 2007). These issues are compounded in the public sector where further complications arise because the public value accruing from the provision of services such as education, health and justice is not easy to measure.

There is broad agreement that ICT/IS evaluation is problematic. One way to identify value is to look at systems and architectures that have worked successfully elsewhere and in particular at those that have remained in use for long periods. Stage models allow users to view the way other organisations have been considered to have evolved successfully. A stages of growth model that takes account of how an organisation develops its information systems along with significant organisational capabilities could allow users to observe how

capabilities are developed within organisations, see the sequence through which they are developed, gather insight into what benefits accrue from each stage and examine the key mechanisms that drive those changes and evolutions from one stage to the next. It is important to note, however, that while a model such as this is valuable for defining strategy, it does not overshadow the need for ICT investment evaluation in general and benefits realisation in particular. What it does offer is a further guide to help with a roadmap for ICT investment.

1.4 Research Questions

This research begins from the premise that as information systems in government departments such growth can be divided into distinct and identifiable stages.

From this premise the following research questions are posited:

- What is the sequence of stages through which information systems in government departments develop?
- What advantages/benefits accrue to government organisations as they reach each stage?
- Why do information systems in government develop through these stages and what factors enhance or inhibit progression through the stages?

This research was carried out in two phases. The first phase was a single case study. The second phase comprised four secondary case studies in which the findings of phase one were assessed and validated. The methodology and the justification are discussed in detail in chapter three. A brief overview of the cases follows.

For the initial, primary case study, it was necessary to identify a government department with a long history of organisation development coupled with extensive usage of ICT. A number of government departments match this picture, the Irish Revenue Commissioners, the Irish national tax authority, being one. The research in this dissertation is built around the latter for a number of reasons

including accessibility, availability of data and its long history of experience with ICT.

The Office of the Revenue Commissioners, also known as Revenue, was established by Government Order in 1923. The Order provided for a Board of Commissioners that comprises a Chairman and two Commissioners, all of whom carry the rank of Secretary General. At the time of writing there are over 100 Revenue offices countrywide with a staff complement of over 5700.

Revenue's core business is the assessment and collection of taxes and duties. Revenue's mandate derives from obligations created by statute and by Government and as a result of Ireland's membership of the European Union. Revenue has two broad functions, one of which includes assessing, collecting and managing taxes and duties that account for over 93% of Exchequer Revenue. The other function refers to the administration of the customs regime for the control of imports and exports and collection of duties and levies on behalf of the EU. This function includes working in co-operation with other state agencies in the fight against drugs and in other cross-departmental initiatives. Some other minor functions are included in the remit of Revenue, namely the collection of Pay Related Social Insurance (PRSI) for the Department of Social Protection and the collection of the Environmental Levy for the Department of Environment.

The second phase of the research involved choosing appropriate government departments to validate the findings of the single case study and the stages of growth model. The departments were chosen carefully in order to maximise every opportunity to obtain critical comments and to verify or invalidate the model which emerged from the first phase. Four departments/organisations were selected. Two of these, the Department of Social Protection and the Department of Agriculture Food and the Marine were chosen because they are large operational departments, i.e. departments that, like Revenue, have extensive dealings with the public and which have staffing levels similar to Revenue. The third department, the Department of Transport, was chosen as representative of smaller departments with a policy focus. The final organisation

selected was a division of the Department of Public Enterprise and Reform that has overall responsibility for ICT across the civil service and was therefore expected to have a wide overview of ICT in the sector.

1.5 Some Definitions of Terms

The following sections define some terms that are used throughout the dissertation.

1.5.1 Stages of Growth, Organisational Learning, Vertical Growth and Horizontal Growth

The development of an organisation over time is known variously as organisational learning, stages of growth or organisational maturity (Toulmin 1972; van Parijs 1981; King and Kraemer 1984). Two types of growth or learning are described in the literature, vertical growth also understood as conceptual learning and horizontal growth also referred to as operational learning (Kim 1993; Chen et al. 2003). Vertical growth or conceptual learning occurs when members of the organisation challenge the organisation's underlying assumptions, values and procedures, attempting to replace them with new ones. According to Chen et al (2003), vertical growth requires that the organisation change its pattern of thinking and that it question its operating principles. Horizontal growth uses existing conceptual models held within the organisation to create efficiencies. This type of learning or growth is concerned with detecting performance deviations from standards and goals and reducing the level of divergence through systematic problem solving. Organisations typically engage with both types of learning or growth. Vertical growth is mapped using distinct stages of development whereby the organisation understands its environment differently and develops aptitudes, understandings, methods or capabilities to deal with it.

At each stage of development a particular capability or set of capabilities is attained by an organisation. Once attained, a capability may be used to solve problems in different contexts from that in which it was originally developed and to further the organisation's strategic purposes even when the organisation has

moved to subsequent stages. While stages of growth models typically map vertical organisational learning, horizontal learning continues to spread and disseminate the methods and understandings of earlier vertical learning throughout the organisation. A move from one stage to the next does not mean that the capability added in a previous stage is redundant, rather while the next stage will enable new understanding and perspectives, the previous stages are still relevant for dealing with those aspects of the existing environment that persist to impact on the organisation.

Despite the fact that there is no one agreed prescription or format for stages of growth models, some conventions or tendencies have emerged. Typically, stages of growth models do not describe the complete life-cycle of an organisation in that they do not follow the organisation beyond maturity, toward the decline and death of the organisation. Furthermore, while some stages of growth models describe stages with detailed observable components, few describe stage change mechanisms or drivers that precipitate those changes identified. The latter are both addressed in this research.

1.5.2 Maturity

The term “maturity” is used extensively in the stage modeling literature. Although the term is inherently normative it has some value beyond the overtones of subjectivity and preferential positions. The term maturity is variously used to describe, for example, the most advanced stage of psychological development, physical development, sexual development, stellar development, geological development, organisational development and technological development. Maturity for each of these fields or domains is determined as an agreement on what is a ‘best state’ or in some sense is perceived as providing increased benefits or affordances, relative to ‘less mature’ stages, for that domain. Given that the term maturity is a social construct and that both the domain itself and the values and understandings of the social constructors are changing, it is reasonable to understand ‘maturity’ as a moving target for each of

these domains. Therefore, while maturity can be an agreed position *pro tem*, it may also be regarded as having a dynamic quality.

1.5.3 Stages of Growth Modelling

Stages of growth modelling had already been used in many fields prior to its use in IS (Information Systems) for example in psychology (Piaget 1937; Maslow 1943; Kohlberg 1973) and in organisation theory (Anthony 1965; Churchill 1969; Greiner 1972) - both fields in which it has made a significant impact. The first usage of stages of growth modelling in the IS field was by Nolan in the 1970's.

Stages of growth models, maturity models and evolutionary models are synonymous terms for a conceptual framework which is used to describe how organisations, aspects of organisations or disciplines evolve over time (Rosemann and de Bruin 2005). Maturity models also provide a conceptual framework to outline anticipated, typical, logical and desired evolutionary paths toward maturity (Becker et al. 2010). Maturity models assume that predictable patterns exist in the evolution of organisations or disciplines (Kazanjian and Drazin 1989; Gottschalk 2009) and that these can be conceptualised in terms of evolutionary stages. Stages, which are described as sequential in nature, occur as a progression that is not easily reversed. These stages lead to a broad range of organisational activities and structures (Gottschalk 2009).

Maturity models have been criticised for having a poor theoretical basis (Biberoglu and Haddad 2002). De Bruin and Rosemann (2005) suggest that maturity modelling in general lacks rigour and discipline in terms of design and that the models have had insufficient emphasis on testing in terms of validity or reliability². Becker et al (2010) suggest that studies of maturity models seldom

² Although De Bruin and Rosemann use these terms, the concepts of validity and reliability can be misleading in qualitative research. In qualitative research the terms transferability and dependability are more appropriate (Hoepfl, Marie C. 1997. "Choosing Qualitative Research: A Primer for Technology Education Researchers." *Journal of Technology Education* Vol. 9 (No. 1, Fall):47-63.).

refer to theories or theoretical statements of relationships (i.e. causal explanations or testable propositions). While interest in the field has increased, the concept of maturity modelling has been the subject of little if any reflective research. Becker et al (2010) suggest that research on or using maturity models is of growing interest, but that the notions of maturity and stages of growth and maturity models have rarely been conceptualised in any detail. The purpose of this research is to reflect on stage modelling, observe how its usage has progressed in the IS and e-government fields and to construct a new theoretical stage model.

1.5.4 Two Categories for Stages of Growth Models

Hevner et al (2004) described two paradigms which characterise much of the research in the Information Systems discipline: behavioral science and design science. Stages of growth models may also be categorised using Hevner et al's research categorisations. In many ways these categories match the 'Evolutionary' and 'Evolutionist' categories used elsewhere (Toulmin 1972; van Parijs 1981; King and Kraemer 1984). The behavioural science paradigm seeks to develop and verify theories that explain or predict human or organisational behaviour. Behavioural science models describe stage change in terms of how the organisation, for example, has been observed in the past, describing how change has occurred and sometimes why changes have emerged. Evolutionary models are akin to the behavioural science paradigm.

In contrast, the design-science paradigm seeks to create what is effective by designing new and innovative artifacts. The term design science is applied here to stages of growth models as a description and categorisation because it offers more traction by way of understanding than the older categorisation - Evolutionist. Design science models describe change in terms of directions and aspirations.

A design science stage model typically outlines stages of development as stepping-stones toward a progressively more complex or perfect version of itself. This type of model defines the desired endpoint and the maturity scale and is therefore a model from design, i.e. teleological. Such theories embody a clear concept of the direction of change and the destination of change. Models such as this explain the course of change in terms of its progress toward the final endpoint or maturity. A significant number of maturity models as described by de Bruin and Rosemann (2005), including the Capability Maturity Model Integrated (CMMI), can be categorised as design science. Like design science research, the stages of growth models associated with this paradigm tend to be perishable (Hevner et al. 2004). According to Hevner et al *“rapid advances in technology can invalidate design-science research results before they are implemented effectively in the business environment.”* (2004 p. 99)

Behavioural science stage models, by contrast, are agnostic about the direction of change or the final stage of development. Behavioural science stage models focus on observed change, the features of the new stages of development along with descriptions of the mechanisms that precipitate change (van Parijs 1981). According to King and Kraemer (1984) these models trace *“mechanisms of local optimization in which features of an entity change and in which the new features are preferable to the old features in aiding survival of the entity or improving its chances of satisfaction”* (1984 p. 473).

The model presented in this research is a behavioural science stages of growth model.

1.6 Summary of Chapters

This section provides a brief overview of the chapters that follow.

Chapter 2

Chapter 2 reviews the maturity models and stages of growth models that were published in both the IS and e-government fields since 1973. The models are reviewed and categorised by their subject matter and academic contribution. On

the basis of this review, a narrative is proposed that describes the provenance and emergence of stages of growth models. The review displays some gaps in the literature and identifies opportunities with both the subject matter and level of academic contribution both of which warrant further research.

Chapter 3 – Research Method and Methodology

Chapter 3 sets out the research epistemologies and the research strategy. It describes the methodology as being a single case study combined with historiography. It explains why the research was interpretive. This chapter describes hermeneutics as the interpretive process for this research.

Chapter 4 – Research Description and Data Analysis

The research was conducted in two phases, all of which are described in Chapter 4. This chapter outlines the research question and the research strategy including the steps and procedures that were carried out as part of each of the phases. It explains why the case study was chosen and what evidence collection methods were used. It describes how the interviews were conducted and how the data was analysed. Finally, this chapter sets out how the model was validated against other government departments.

Chapter 5 – Research Findings

Chapter 5 presents the research findings in the form of a stages of growth model. The eight-stage model is presented stage by stage with supporting evidence. An overall change mechanism is presented as a primary driver for change within government organisations. The benefits associated with each stage are presented alongside the stage change mechanisms.

Chapter 6 – Discussion

Chapter 6 summarises the eight stage model and discusses each of the stages. The stage change mechanisms and enablers for change are also summarised and discussed in this chapter. Some candidate stages that emerged during the course of the research are described. The model exhibits two distinct phases through

which government organisations progress. Some issues relating to these are also discussed.

Chapter 7 – Conclusions

Chapter 7 concludes the research by reflecting on the significance of the research's theoretical contributions. The chapter also describes the implications for practice both in government departments and the wider Whole-of-Government (WofG) context. The limitations of the study are presented followed by opportunities for further research and finally some reflections on the research process.

Chapter 2 - Literature Review

2.1 Introduction

Business computing began in the early 1950's and was characterised by large, expensive machines with rudimentary software and limited application (Connolly 1986). In the early 1960's mainframe computers brought improved software, making data processing viable and valuable for business organisations. While computing offered competitive advantages for business organisations it also introduced many novel questions across a spectrum of academic fields - questions that organisations tackled while trying to gain efficiencies and competitive advantage from computing and technology. The IS field emerged as academics and practitioners responded to these questions. Davis and Olson (1985) describe the IS field as having emerged from the nexus of computer science, management and organisation theory, operations research and accounting. The IS field evolved as each new era of technology was introduced. Growth in the IS field can be mapped against the introduction of three major technologies, the mainframe computer, the personal computer (PC) and Internet technology. Heirschheim and Klein (2012) discuss these three technological eras.

Each successive wave of new information technology posed new challenges for managers and scholars. Each technological era posed distinct questions for the IS field and was followed by a stream of research tracing the impact on organisations (Ein-Dor and Segev 1994). These eras are used here as a vehicle to tell the emerging story of stages of growth modelling. Within each era, various modelling methods and frameworks were used in an attempt to answer the questions posed by that era. Stages of growth modelling surfaced as a framework during the first of these eras and continued into the second and third eras. This framework was used to help answer continuing issues regarding the governance and management of technology, technology assimilation and technological architectures.

2.2 First Technological Era – 1960 to late 1970's

The development of mainframe computing, precipitated questions about how the application of computing could be best applied to organisations and their processes, how the logic of these processes could be mapped, how the data flows could be traced throughout the many layers of organisational systems, how to map the impact of business events on both logic and data and how best to construct software programs and applications that obtain value from these complex machines. This era ran from the 1960's through to the late 1970's. During this era many of the pioneers of the IS field concentrated on systems analysis together with design and development techniques and methods (Hirschheim and Klein 2012). Researchers in this era were concerned with identifying and categorising systems and elements of systems. Drawing from the systems sciences Ackoff defined systems and categorised their elements (1967, 1971) and Churchman set out five archetypal kinds of inquiry approach while analysing organisational systems (1971). Blumenthal (1969) described the development of computer-based information systems with a cybernetic view of organisations. Langefors (1973) divided an information system into: a data component, an information component and the interpretive process. Mumford (1974) emphasised the relationship between the technical systems and the social system and the importance of both when designing a new system. Checkland (1972) introduced Soft Systems Methodology (SSM) which provides a way of conceptualizing the social processes in an organizational context.

Researchers also focused on how best to apply technology to business processes with systems analysis and development methods. Yourdon and Constantine (1979) developed structured analysis techniques and Jackson (1975) developed principles for program design. Much of this research later culminated in analysis and design methodologies such as SSADM (Structured systems analysis and design method). During this era organisations concentrated on how individual functions or departments were developing IS applications that were of importance to their particular areas. Corporate level strategies for IS were not well developed.

2.3 The Second Technological Era – 1980 to late 1990's

The second era emerged in the early 1980's as computing technology evolved toward midrange and mini computers. Organisations' reliance on mainframe computers shifted with the introduction of the personal computer (PC), which offered more accessible and cheaper computing. Competitive advantage was offered to organisations which began to replace mainframes in favour of PCs and distributed systems, which in turn encouraged more penetration of computing across organisations. IT departments began to control the emerging cost and complexity of this movement. Commercial software packages became increasingly available and business units began to gradually demand their own hardware and software to suit departmental needs. Personal computing paved the way for a more decentralised approach to computing within organizations (Hirschheim and Klein 2012).

This trend created new problems of data incompatibility and data integrity across functional departments (Hirschheim and Klein 2012). Organisations began to redesign their business processes based on the newly distributed computing architectures (Hammer and Champy 1993). As computing penetrated more and more aspects of organisations, management concerned themselves more than ever with value for money and return on investment (McFarlan 1981; Remenyi et al. 2007). Questions for this era centred around how to assimilate the IT function into the organisation, how it should be managed and how to align it with the strategic direction of the organisation (McFarlan et al. 1983; Ein-Dor and Segev 1994). Stages of growth modelling became increasingly popular during this era because they offered a method to map the gradual introduction of computing into the mainstream of business organisations.

2.4 The Third Technological Era – late 1990's to 2012

The third era continued with advances in PC hardware and software, and rapid advances in networking and telecommunications. The main technological advance

of this era was the emergence of large scale computer networking, the widespread adoption of the TCP/IP³ protocol for computer networks, the use of markup languages in particular Hyper-Text Markup Language (HTML), all of which facilitated the introduction of the Internet, web based application development and subsequently web 2.0. This era marks a shift in IS technology and many challenges for the business environment and the IS field (Hirschheim and Klein 2012). The commercialisation of the Internet introduced new methods of communication between businesses and customers. Organisations modified their business strategies to take advantage of the new technological opportunities. The spread of technology brought new problems for IS managers who had an increasing struggle to manage their increasingly widely distributed technologies, IS personnel and users. With web technology computing became even more pervasive within organisations, with a substantial increase in the number and types of applications that were available to be exploited by Chief Information Officers (CIO). The third technological era continued to introduce research opportunities in the management and governance category. Two additional categories of research question emerged as a result of the increasing scale, complexity and numbers of technology solutions available to organisations - technical architecture questions and technology assimilation questions (Holland and Light 2001; Watson et al. 2001), both of which are reviewed below.

2.5 Stages of Growth Models in the Literature

A review of the IS and e-government academic literature, reveals that during the period 1973 through 2012, approximately 51 maturity models⁴ were developed

³ Transmission Control Protocol and Internet Protocol (TCP/IP) is a set of communications protocols used for the internet and similar networks. TCP/IP is sometimes known as the Internet Protocol Suite.

⁴ This number does not necessarily include all models found. Some models were not included where they were subsequently subsumed within other models or where they were exclusively industry driven.

and published with IS and e-government journals and conferences. (Appendix 1 shows the maturity models chosen for this review).

In the IS field alone, Becker et al (2010) have shown an increasing interest in maturity modelling, with more than a thousand academic papers published on maturity models during the last fifteen years, more than half of which were published in the period between 2005 and 2009. Stages of growth modelling became an increasingly important framework for researchers who attempted to respond to the challenges that each era of technology brought to the IS field.

This review of stages of growth modelling in the IS field outlines a trend in the numbers and types of stages of growth models published. The numbers and types of models change from predominantly behavioural science models (which are characterised by empirical observations of phenomena over time) with an academic orientation, toward design science models (which are models that map a path toward a desired end). One explanation for this trend is that researchers were responding to the demands from organisations for practical relevance from IS research.

2.6 Review of Stage Models

In 1973 Richard Nolan proposed a stages of growth model which described how computing evolves within organisations. Nolan's model attracted significant attention from both information systems researchers and practitioners.

According to Hamilton and Ives (1982), nearly a decade later, the paper was still among the top fifteen most cited papers by information systems researchers.

Although some of the specifics of the model have dated over the last four decades, the basic concept of the development of information systems from initiation to maturity remains relevant.

2.6.1 Nolan 1973

The Nolan model (sometimes referred to as the Nolan-Norton model or Gibson-Nolan model) appeared not as one paper, but as four separate publications between 1973 and 1979 with each building on the preceding paper (Nolan 1973;

Gibson and Nolan 1974; Nolan 1977, 1979). The initial paper postulated a four-stage model (Nolan 1973). This version of the model was based on observations of how ICT⁵ expenditure progressed over time within three organisations. The ICT expenditure when graphed showed a pattern, which was S-shaped. The paper suggests that the expenditure pattern captured the many different environmental issues affecting ICT expenditure and displayed them as an aggregation in this S-shaped curve. This pattern suggested to Nolan that there were distinct episodes within organisations where ICT was managed differently. In this respect the paper makes observations on the types of systems introduced and the governance of those systems.

Nolan outlines the model as follows:

Initiation – Stage 1

The Initiation stage describes the introduction of computing into the organisation where basic data processing is automated.

Contagion – Stage 2

The Contagion stage describes a rapid growth, which emerges as the exploitation of ICT, yields a significant return on investment for each distinct usage of the technology.

⁵ While the acronym IT is more appropriate in this context it was considered preferable to use ICT for the sake of continuity.

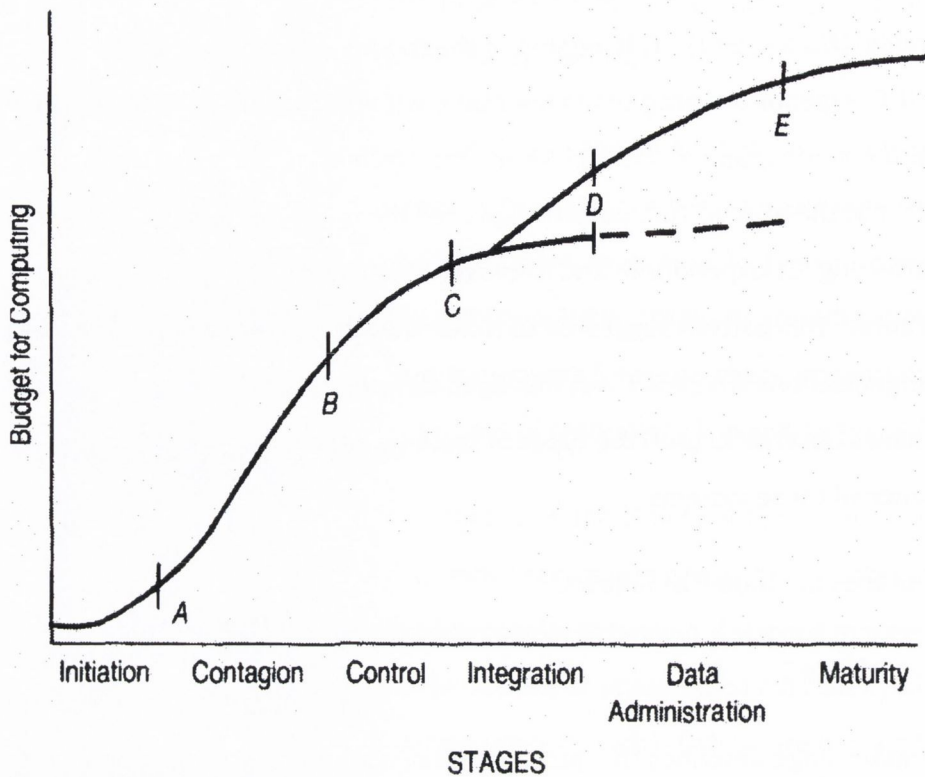


Figure 2.1: Nolan's Stages of Growth Model 1979

Control – Stage 3

As the return on investment for each project reduces, an effort emerges to control ICT expenditure.

Integration – Stage 4

Integration stage describes how management refine the controls that were introduced in the previous stage. At this point, the controls are introduced with a more focused view to reconciling the ICT expenditure with the organisational goals.

Data Administration – Stage 5

The Data Administration stage puts an emphasis on managing corporate data. Technology has a lesser role in this stage of development. The concept of data administration is introduced to the organisation, where data usages and meanings

identified with a view toward opening up the ownership of data to the many user groups within the organisation.

Maturity – Stage 6

The final stage is achieved when systems are developed to a technological maturity. At this stage the organisation holds an application portfolio that reflects all the significant information systems and flows within the organisation. This stage is characterised by greater use of data resources to develop competitive advantage for the organisation.

Nolan did not present the model as a prescriptive one, but rather as a guideline for managing the computer resource (Nolan 1973). Nolan at this time never presented an injunction to the ICT manager; he merely observed and outlined the phenomena as he saw them.

The 1974 version of the model (Gibson and Nolan 1974) was based on the same research as the previous model, but this time the model was presented as a prescriptive one. The model became an aid to the IT manager by explaining growth patterns and predicting future growth within organisations. The four stages remained largely the same as the 1973 model with the exception of the naming convention. Stages 2, 3 and 4 now became Expansion, Formalization and Maturity respectively.

The 1977 version of the model appeared in a book by Nolan (1977) where he modified the significance of the growth in budget curve that was relied upon heavily in the previous versions of the model. With a further study of 18 firms, four benchmarks were identified which were used to support the model.

In his 1979 version of the model Nolan (1979) added two additional stages and recast the other stages with different roles (see figure 2.1). More detail for each of the stages was outlined. Nolan described the previous four-stage models as continuing to be valid, but that the experience of recent years had revealed a more complex picture with rapid changes in many areas of computing. This paper

described the model as moving beyond previous versions and now becoming a tool for evaluating computing in individual firms. Nolan described it as “the stage theory” and asserted that it could be used to understand where the company has come from and more importantly, gain insight into what the future will hold (Nolan 1979 p.125).

The earlier versions of Nolan’s model were descriptive and later versions tended to be more prescriptive or even predictive (King and Kraemer 1984). This move can in part be viewed as an industry seeking direction in what had become a complex field, which had much competitive potential and as much potential for loss on investments.

2.6.2 Critiques of Nolan’s Models

For a time, Nolan’s model enjoyed remarkable success and popularity (Hamilton and Ives 1982). However the first substantial assault on the research came after the second publication (Gibson and Nolan 1974) and was made by two researchers from New York University and IBM (Lucas and Sutton 1977) who outlined some statistical limitations in the research.

King and Kraemer reviewed the model a number of years later and criticised it, finding it wanting on empirical, theoretical and practical grounds (1984). King and Kraemer asserted that the use of the computer budget as a surrogate measure, for the organisation’s many environment variables, was not valid. Further to this, they questioned the empirical findings of the model saying that the model’s predictions were not supported by their own research and that of others (King and Kraemer 1981; Goldstein and McCririk 1981). King and Kraemer continue by saying that “as a grounded theory the model fails” (1984 p. 474) and that it is incomplete in its attempt to capture the larger organisational context within which computing occurs.

It is interesting to note that despite the fact that Nolan’s model was the subject of criticism by some academic researchers, the concept of stage models was well received by practitioners and continues to be referred to in IS literature (Friedman

1994; Becker et al. 2010). It provides a conceptual language which allows the ability to assess the current position and strategise future positions (King and Kraemer 1984; Benbasat and Zmud 1999). Although Nolan's research had its limitations, the concept of stage modelling resonated sufficiently with academics in the IS field that it became a popular framework for research.

2.7 The Spread of Maturity Modelling in the Second Era

Nolan's (1973) first attempts at maturity modelling took a broad perspective on the organisation. Nolan attempted to sketch the development of information systems for all aspects of the organisation as it developed. Subsequent usages of maturity modelling focused on specific aspects of the organisation. For instance some models mapped how IS planning took place or how various aspects of IS governance and management evolved over time. Governance and Management was the first of four main subject matter categories which emerged with IS maturity modelling. The Governance and Management theme surfaced in the 1980's directly after the rising popularity of the Nolan model. Other themes focused on how various technology types were assimilated into the organisation. Two lesser, but significant themes are present in the models observed, one of which was the original Enterprise Information Systems theme that commenced with Nolan and the second was a Technical Architecture theme which emerged around 2005. Both of these themes take a big picture view of the organisation and attempt to map the entirety of either the technical or IS domains within the organisation. Fewer attempts have been made to map this broader view of the organisation.

2.7.1 Management and Governance – Behavioural Science Models

McFarlan, McKenney and Pyburns (1983) presented the first of the Management and Governance models. The model addressed the issue of planning for the introduction of new technology and technology assimilation. The model was neither subjected to much criticism nor much acclaim and although the paper was cited many times, few, if any of these citations referred to the model itself and so

were generally supporting references. The paper was published in the Harvard Business Review and does not describe a research methodology. Its focus is directed toward the practitioner. The McFarlan et al model is more prescriptive in the sense that it offers itself as a heuristic, to help ICT managers plan the introduction of new technology.

Following that, a number of models emerged with a focus around IS planning (ISP), strategic IS planning and the alignment between Business Planning (BP) and IS planning, sometimes referred to as BP-ISP. These models were predominantly behavioural science models, which were derived empirically. The first of these pure ISP models was introduced by Earl (1983) in 1983 and had a number of subsequent revisions (Earl 1986, 1988, 1989) which ultimately yielded six stages of planning; Meeting Business Demands, IS/IT Audit, Business Support, Detailed Planning, Strategic Advantage and Business-IT Strategy Linkage. Earl's thesis is that organisations begin their planning effort by first attempting to assess the current coverage of IS in the organisation. Organisations then focus increasingly on creating a stronger linkage between IS and business objectives, until finally organisations plan to use IS as a means of accomplishing business strategy. Each stage of the model is described in detail using six factors. This research was based on case study investigations and action research. Interestingly, Earl clearly states the methodological approach as being interpretive: "These findings, their implications and the frameworks derived from them are all interpretive." (1988 p. 96)

Bhabuta's (1988) four stage model attempts to map progress towards formal strategic planning of information systems. Bhabuta takes a wider perspective with his model than the Earl models. He attempts to bring together elements of strategic formulation, information systems and the management mechanisms, basic financial planning, forecast-based planning, externally oriented planning and strategic management. The model is based on work by McKinsey & Co. Consultants - Gluck et al (1980). The methodology used is unclear, however as with Earl's model, Bhabuta describes each phase of the model with seven distinct factors.

The Hirschheim et al model (1988) contends that organisations move through three stages of planning which are related to the usage of technology and information systems, Delivery Phase, Re-orientation Phase and Re-organisation Phase. The 'delivery stage' is characterised by management's concern for the introduction and application of technology. The 're-orientation stage' changes focus from delivery to exploitation of technology for competitive advantage. And finally, the 're-organisation stage' looks to manage the interfaces and relationships between the IS function and the rest of the organisation. The models so far have described elements of technical, organisational and managerial functions where ISP has been the differentiating feature. With the exception of the McFarlan models, the models thus far have all been based on empirical observations and while change mechanisms are not a significant feature they can be categorised as behavioural science models.

Galliers and Sutherland (1991) draw together a number of these management and planning type models (Earl 1986; Galliers 1987; Earl 1988; Bhabuta 1988; Hirschheim et al. 1988; Earl 1989) into a six-stage model describing a growing maturity in the management and use of IT in an organisation; Adhocracy, Starting the Foundations, Centralised Dictatorship, Democratic Dialectic and Cooperation, Entrepreneurial Opportunity and Integrated Harmonious Relationships.

The objective of the Galliers and Sutherland (1991) model is broader than its predecessors in that it tries to draw previous models together (including Nolan's original stage model) and provides a comprehensive model to support BP-ISP, technology development, strategic planning and management, while also identifying the skills and resource development required for each stage. The model is categorised as descriptive and is based on previous models and a single case study. While the model is more comprehensive than its predecessors, it lacks some depth in each of the other areas it addresses. The researchers admit to not providing precise detail of the contents of each element at each stage of the model, but claim that it does not affect the utility of the model.

Burn (1991) builds on Earl's model (1988) and incorporates both the stages of growth from Nolan (1973, 1977, 1979) as well as presenting a six-stage model for ISP. The model suggests that different types of planning are appropriate at each of the stages of growth within an organisation. Burn combines Nolan's stages and Mintzberg's (1973) organisation structures and suggests the following planning methods for each stage; Stage 1 Bottom Up, Stage 2 Multiple, Stage 3 Top Down, Stage 4 Top Down/ Bottom Up, Stage 5 Inside Out, Stage 6 Multiple. Burn's model is presented as a well thought out hypothesis, which is grounded in a literature review of that era; unfortunately the model was not tested empirically and as such is less than rigorous in its research methods.

The ISP models discussed thus far were built on previous work in the organisation and management field, where models or aspects of models have been imported and adapted for the IS planning domain. It also appears as though there was a cumulative approach taken within the IS field where models tend to have been built on one another. However the cumulative approach focuses more on an increasing scope rather than an increasing depth of understanding or causality. The methodological approach for these models certainly diverged from Nolan's (1973) early quantitative research and had taken on a more interpretive approach. There was little reflection on what maturity models should provide, although it seems clear from the research that a descriptive model was favoured with little or no attempt at building an underpinning theoretical framework.

The last in this line of ISP models came with two pieces of research from King and Teo (1996; King and Teo 1997) . These papers presented a four-stage behavioural science model tracing BP-ISP, its provenance and the stages of growth associated with its development. This was the last in a line of the governance models relating to ISP. By this time a number of monographs and books had emerged on this topic (Tozer 1996; Ward and Griffith 1996; McNurlin and Sprague JR 1998). While this review is not about ISP specifically or even Management and Governance models generally, it is worth observing that there is a theme where

specific bodies of knowledge are built with models making additions to models and culminating in substantial know-how to assist management with their task⁶. In this instance IS planning was developed into frameworks that provided maps for use by the industry and for undergraduate purposes.

2.7.2 The Emergence of Design Science Models

A significant departure from this pattern of behavioural science models was introduced by Paulk et al (1993) from the Software Engineering Institute (SEI) at Carnegie Mellon University. Its provenance is as follows. SEI was asked by the U.S. Air Force in 1986 to provide a systematic way of evaluating software contractors. A study group was set up and a questionnaire was developed with over 100 questions that had the objective of discerning successful software development companies. Over time, these questions were formed into groups and then levels, which assessed a progression from lesser to greater success. The resulting model was termed the Capability Maturity Model (CMM) and was inspired by Juran (1988) and Deming (1982) (see Baskerville and Pries-Heje 1999). The CMM⁷ is a framework, which describes a path for process improvement in the software development industry. The path has five levels, where an organisation has goals to meet at one level before it can reach the next level. Maturity levels are composed of a number of key processes for that level and challenges to meet for the next level, where if they are accomplished; the software process is known to improve. The stages are entitled: Initial, Repeatable, Defined, Controlled and

⁶ It is not suggested that these were the only conceptual frameworks used to build this ISP domain.

⁷The CMM had such success, that the SEI created a number of additional models in areas such as acquisition, outsourcing and service delivery, all of which have been incorporated into one maturity model now named the Capability Maturity Model Integration – CMMI de Bruin, Tonia. and Michael. Rosemann. 2005. "Understanding the Main Phases of Developing a Maturity Assessment Model." In 16th Australasian Conference on Information Systems. Sydney.

Optimised. It was intended to be a coherent ordered set of incremental improvements, all having experienced success in the field, packaged into a roadmap that showed how effective practices could be built on one another in a logical progression (Herbsleb et al. 1997). The model was clearly prescriptive. The term 'maturity model' was coined and introduced for the first time to describe the stages through which software development matured over time.

From this point onwards maturity models were influenced by this template. In fact many models used the same maturity level terminology – Initial, Repeatable, Defined etc. This was the first of the design science models. This type of model views the stages of development as stepping-stones toward a progressively more complex or better version of itself. This type of model defines the desired endpoint and the maturity scale and is therefore a model from design. Such models have a clear concept of the direction of change and the destination of change. Models such as this, explain the course of change in terms of its direction toward the final endpoint or maturity. Design science models are described by Carcary (2011) as being located between models and methods in that they offer descriptions of the current maturity level and guidelines on how organisations can achieve higher maturity. According to Hevner et al (2004) design science research is perishable, with a shorter shelf life than behavioural science. The value of design science models can change with rapid advances in technology and leave much of this research invalid or redundant.

These models do not focus on mechanisms for change. Rather there is an implicit understanding that management intervention is the primary change mechanism for organisational growth. This type of change mechanism is described by Van de Ven and Poole (1995) as teleological where teleology is the philosophical doctrine that purpose or intention is the final cause of change within an organisation or entity.

2.7.3 Further Management and Governance Questions in the Third Era

The governance models in the third era moved beyond ISP and into areas such as Process Improvement (Harkness et al. 1996), Outsourcing (Rajkumar and Mani 2001; Solli-Sæther and Gottschalk 2008), Business/IT Relationship Management (Martin et al. 2004), General ICT Management (Renken 2004), Software Maintenance (April et al. 2005), Knowledge Management (Dayan and Evans 2006; Gottschalk 2006) and Innovation with Westerman and Curley (2008). With the exception of the Harkness et al model, all of these remaining management and governance models are design science models reflecting many aspects of the CMMI type template.

2.7.4 Technical Architecture Questions in the Third Era

According to Ross et al (2006), in many instances enterprise solutions did not meet the specific needs for departments. Organisations opted instead to engage with integrating COTS (Commercial Off the Shelf) software applications. This option presented many questions regarding technical architecture and how to integrate data and processes across many messaging systems and data stores. Solutions around service oriented methods began to emerge in the IS field along with some focus on stages of growth models describing technical architectures.

The Technical Architecture models take a broad perspective on the organisation. The first of the Technical Architecture (TA) models was described as a four stage model by Ross and Weill (2006). Two further TA models came in 2006 with the advent of Service Oriented Architecture (SOA) (Erl 2006; Malinverno and Barnes 2006). Gotchalk (Gottschalk 2009) developed the final TA model for a 'Whole of Government' initiative.

TA models are only a recent phenomenon that arose from observation of a growing requirement for application integration and systems integration. The introduction of this type of model suggests a moving away from complete all encompassing Enterprise Resource Planning (ERP) systems, to an environment where many and varied off-the-shelf systems are purchased and require

integration to the overall enterprise architecture. The stage models in this category can be characterised as being predominantly prescriptive, with the exception of Ross and Weill's (2006) model which is descriptive. Ross and Weill's stages of technical architecture progress as follows:

1. Application silo architecture – This consists of architectures of one or more individual applications architectures rather than an architecture for the entire technical stack.
2. Standardised technology architecture – At this stage the organisation has taken on an organisation wide technical architecture which is designed to accommodate all applications. This architecture provides efficiencies through technology standardisation and, in most cases, centralisation.
3. Rationalised data architecture – The organisation-wide technical architecture expands to include standardisation of not alone the technology stack but also standardisation for data and processes.
4. Modular architecture – This architecture builds on organisation-wide standards with loosely coupled applications, data, and technology components to preserve the global standards while enabling local differences.

This model is significant not alone because it is descriptive, but for the fact that it is the only behavioural model presented in this category.

2.7.5 Technology Assimilation Questions – Models in the Third Era

Technology assimilation issues emerged in the third era, as a result of an increasing number of technologies and commercial software packages available to cater for the specific needs of departmental units. Problems of data incompatibility and data integrity across functional departments persisted (Hirschheim and Klein 2012). More complex software solutions attempted to solve these problems with enterprise solutions (Willcocks and Sykes 2000). As software increased in complexity, problems of implementation and assimilation came to the fore for organisations. Around this time many technology assimilation models emerged, describing the progress and incorporation of specific technologies into organisational structures.

Many technology topics were mapped in this way with maturity models. Enterprise Resource Planning technology and its assimilation, is the topic of two models; one by Holland and Light (2001) and the second by Lundahl Due et al (2005). Data Warehousing and Business Intelligence stages were described with models by Watson et al (2001) and Lukman (2011) respectively and Business Process Management stages were described by Roseman and de Bruin (2005).

While some Technology Assimilation models were published before the CMMI template (Magal et al. 1988; Cooper and Zmud 1990), it was after the CMMI maturity model template was introduced, that technology assimilation models become popular. From this point forward, technology assimilation models took on the design science template beginning with a model brought out by KPMG (1997). This model gained traction both in academic and industry arenas. It focused on the topic of e-Business and web technology assimilation, as did a number of other models over the next decade. These include; Earl (2000), Prananto et al (2003), Rao et al (2003) and Chen & McQueen (2008) which extended the Rao et al model.

In a similar vein, a number of e-government models were developed which also outlined frameworks to assimilate web and various technologies to government business. Although the concept of e-government is a relatively recent phenomenon, stages of growth models abound within this sphere.

The e-government stages of growth models are developed similarly to the mainstream IS technology assimilation models. To that extent they broadly appear as government agency assimilation models for Internet and web-based technology. It should be noted that for the most part, the following review of e-government stages of growth models tend to assume a narrow definition for the term e-government which is confined to web based technology. What is also interesting is the fact that many of the models are hybrids between behavioural science models and design science models. That is, many of the models' initial stages have been observed empirically and the remaining stages are aspirational and so therefore these models tend to be partially created from design.

One of the first and by far the most cited model was presented by Layne and Lee (2001) who define e-government as the use of web based technology and Internet applications to enhance the delivery of government information and services to citizens. With this definition in mind, they postulate a four-stage model of growth for e-government, progressing as follows:

- A Catalogue stage where there is the initial creation of an online presence by delivering some static or basic information;
- A Transaction stage which extends this presence and adds some simple transactions to the functionality;
- A Vertical Integration stage which transforms government services as opposed to the simple automation. It focuses on integrating government across departments or government agencies at a functional level;
- A Horizontal Integration which looks to integrate separate systems with a view to providing users with a unified and seamless service.

This model was followed with another model by Moon (2002) who defines e-government as the web-based service delivery and the establishment of central data storage for more efficient and cooperative interaction among governmental agencies. Moon describes a five stage model with stage one being information dissemination, stage two exhibits two-way communication, stage three brings service and financial transactions, stage four introduces vertical and horizontal integration and stage five involves political participation including online discussion and voting. As mentioned previously, these e-government models are a hybrid between being behavioural science models and design science models. The earlier stages are clearly taken from empirical observations unlike the later stages, which are directed toward an ideal design state for e-government.

Siau and Long (2005) synthesize a number of e-government models which had appeared in the literature up to that point and created a new e-government stage model with the following five stages; web presence, interaction, transaction, transformation and e-democracy. The stages are similar to the Moon model and do not offer much additional insight. The researchers applied a research method called meta-synthesis (Noblit and Hare 1988) which attempted to synthesize a new stages of growth model from six existing models. Given that the method was newly imported to the IS field, some method of validation would be expected. The model is regarded as an untested hypothesis with no description of the stage change mechanisms or the causal nature of change. The model is categorised as prescriptive rather than descriptive and as such is a design science model. Many of the e-government models follow this pattern where the research methods are unclear and while the initial stages may resonate with observation, the later stages are prescriptive and aspirational.

Jansen and Van Veenstra (2005) describe a five stage model of e-government which takes a technical architecture perspective. The stages are as follows; Stage one is defined as no integration, Stage two holds one-to-one messaging or transactional services, Stage three brings a centralised repository among government agencies, Stage four uses a message broker to deliver real-time services, Stage five allows more integrated and seamless services to citizens using orchestrated broker architecture. The model is categorised as a design science model, the research methods are unclear and the model is neither descriptive nor theoretical.

Andersen and Henriksen (2006) extend Layne and Lee's (2001) model by including more dimensions, particularly focusing on a customer centric approach rather than the technological capability. The model is neither descriptive nor theoretical and the rigour of their research methods is also unclear.

Klievenk and Jansen (2009a) published a five stage model which focuses less on individual agencies and more on a broader governmental approach to e-government. The model is categorised as a design science model and focuses on

ideal future stages of development for government agencies. The model could not be regarded as either descriptive or theoretical.

2.7.6 Discussion

Coursey and Norris (2008) reviewed the earlier models on empirical grounds and found that for the most part, the descriptions in the models provide a reasonably accurate view of e-government in the early stages, from initial web presence to information provision, to interactivity. Beyond this, for Coursey and Norris, the models become “predictive and normative and their empirical accuracy declines precipitously” (2008 p. 523). Although Coursey and Norris’s research was carried out on some of the earlier models, this view coincides with Klievenk and Jansen’s more recent research (2009b).

More fundamentally however, all of the e-government stage model descriptions commence with the advent of web services and the Internet, and broadly define e-government as web based delivery of government information. The focus of these models has tended towards an outward facing approach to e-government, which is not surprising given the definitions chosen. This narrow definition of e-government used by researchers in the field has limited the scope of the models in the literature. A model, which is narrow in scope, may obscure risks or returns accruing to the ICT investment which relies on it. Many of the benefits of ICT investment are subtle and difficult to measure. Many of the pitfalls are equally subtle. Remenyi et al (2007) suggest that a multi-dimensional perspective should be adopted when attempting to measure value for money in ICT investment. Narrowing the definition of e-government to a web-based delivery of information will reduce the scope of any stage model and is likely to miss the broader dimensions of ICT investment.

A broad definition of e-government allows ICT investment in public sector organisations to be viewed more comprehensively. Any such definition is likely to need a different and more comprehensive stages of growth model. Such a model could be built from first principles rather than as a modification or adaptation of

one of the existing models. A more comprehensive model may help overcome some of the shortfalls associated with existing models.

Klievink et al (2009) identify some shortfalls in current e-government stages of growth models. Current stage models have described past developments quite well, but few organisations have yet been observed to have gone through all stages.

“Stage models seem unable to provide a clear vision and roadmap to organisations attempting transformation since the stages they identify do not prepare organizations for the total and complete change in character that the mature stage entails; the mature stage is formulated on an entirely different level than the other stages. This gap between the pre-mature stages and the mature stage should be investigated further, both to enhance the literature on stage models and to provide government organizations with better directions for stage-wise progression.” (Klievink et al. 2009 p.731)

It appears that the move towards the later stage of these models seems too big a gap. The models do not therefore reflect the reality of e-government efforts. Most of the models were not built from observations or descriptions of real e-government initiatives. In that sense they are aspirational and are possibly a step too far. The higher stages of these models are not based on empirical evidence and do not describe why these changes happen. In addition the scope of these models has been narrow and confined to web-based initiatives, missing the broader dimensions of ICT and e-government investment. One approach to resolving these issues would be to take a broader definition of e-government thus widening the scope for a stages of growth model which would describe the evolution of information systems and ICT within individual government departments. Castelnovo and Simonetta (2007) define e-government as the process of innovation of Public Administration in order to achieve innovative forms of government and governance through the use of ICTs. This is a substantially broader definition than that used by Layne and Lee and that

underpins most of the e-government state models proposed to date. An e-government stages of growth model based on this wider definition would describe a broader picture of the growth and evolution of information systems within government agencies.

2.7.7 Enterprise Models in the Second and Third Technological Eras

Over the period of the second and third technological eras an additional category of model was identified, one which attempted to take the broadest organisational perspective, while mapping the growth of information systems. The other three model types focused on technology assimilation, technology architecture or the management and governance of the ICT function. These Enterprise Information Systems models are used to describe broad aspects of the organisation's operations and information systems. The purpose of such research is to give organisations a direction and focus to overall ICT expenditure. While calls for this type of research have been persistent through each of the technological eras (McFarlan 1981; McFarlan et al. 1983; Ein-Dor and Segev 1994; Zmud 2001; Urwiler and Frolick 2009) few researchers have attempted it.

“Far less common have been examinations of how an organization should manage, in an on-going manner, its portfolio of IT investments.” (Zmud 2001 p. v)

Nolan (1973) presented the first in this category of models. There are three further models in this category, the first of which was (Venkatraman 1991) published as part of a report called MIT90 (Management in the 1990s Research Programme) which was based on research carried out by a group from Massachusetts Institute of Technology (MIT). The second model was proposed by Ward and Griffith (1996). There were two variations on this model. The first was a three-stage model. The second variation came in 2002 from Ward and Peppard (2002). The third and final model was proposed by Urlick and Froller (2009) and made a simplistic analogy between enterprise information systems and Maslow's 'Hierarchy of Needs'. In almost four decades only three models were produced

which attempted to describe the overall development of IS in organisations.

These models will now be discussed.

The MIT90 research programme developed a five stage model or a hierarchy of five levels, as the model was only partially conceptualised as a stages-of-evolution model (Venkatraman 1991). The model is mentioned here for completeness and to acknowledge it as one of the few models that attempts to map ICT usage across the enterprise. Level one is 'localised exploitation', which is concerned with exploiting IT to improve efficiency at an operational level without necessarily influencing related areas of operations. Level two is 'internal integration', which is a logical extension of the first and includes both technical (platform integration) and organisational integration of applications and roles. Venkatraman describes these two levels as being evolutionary processes. In contrast, the remaining three levels are described as being revolutionary and are presented as broad recommendations for organisations using technology. The revolutionary levels are not contingent on the previous levels being present before moving to the next level. In that sense the model is acknowledged as not being a stages of growth model. The first two stages allow this model to be categorised as an enterprise information systems type model, but the final three stages are broad recommendations on the direction for technology usage.

The revolutionary levels suggest fundamental changes to the business processes. The central premise at level three, 'business process redesign', is that IT is a lever for designing or redesigning business processes and that it should not be simply overlaid on the existing processes within the organisation. At this level business processes are designed in conjunction with IT technology such that there is a greater alignment between short-term business goals and longer-term business strategy. Level four 'business network redesign' is as the name implies concerned with design and redesign of business processes with a view to electronic integration with key business partners outside the boundaries of the organisation. Level five 'business scope redefinition' concerns the possibility of expanding the business scope and mission of the organisation including diversification, divestment and consolidation. The revolutionary levels pointed to the fact that

ICT had potential as a transformative technology rather than merely an enabling tool.

Following on from MIT90, Ward and Griffith (1996) proposed a three era or stage model outlining the progression of IT solutions within organisations over time. Stage one, or the first era, is referred to as the data processing era. This stage focuses on improving operational efficiency by automating information-based processes. Stages two and three focus on the changing aspect of the use of data and how it can relate to customers, what the extra dimensions of the customer are and how business process should re-approach that customer. Stage two, the management information systems (MIS) era, looks to increase management effectiveness with the electronic provision of data to support decision and strategy formulation. The third stage relies on the previous two to build strategic information systems. Strategic information systems (SIS) improve competitiveness by changing the nature or conduct of the business, the nature and processes associated with relationships between customers or partners, the products, markets or delivery mechanisms by utilising information technology. In many ways this SIS era resembles the final three stages of the MIT90 model (Venkatraman 1991) where ICT is described as a transformative technology rather than an enabling tool.

The criticism most commonly levelled at the Ward and Griffiths model and one that is accepted by the authors (Ward and Griffith 1996) is that the model attempts to describe what is a complex development of information systems in organisations with only three stages. In addition the authors say little about how or why organisations make the transition from one stage to the next. In this sense it is a (purportedly) descriptive model without any observations on the change mechanisms. That said, the model does offer valuable thoughts and observations on ICT and how it can be applied to information systems progressively, by an organisation.

The Ward and Griffiths model subsequently had a fourth stage added by Ward and Peppard (2002) which they refer to as the era of IS capability. This stage was

described in more detail in a later contribution by Peppard and Ward (2004) where they propose a framework for this capability, one which incorporates 26 distinct competencies that together provide an organisation with the potential to influence organisational strategy in an effort to sustain competitiveness over time. This stage follows on from SIS as a stage that prescribes IT management and governance rather than an information system or application type.

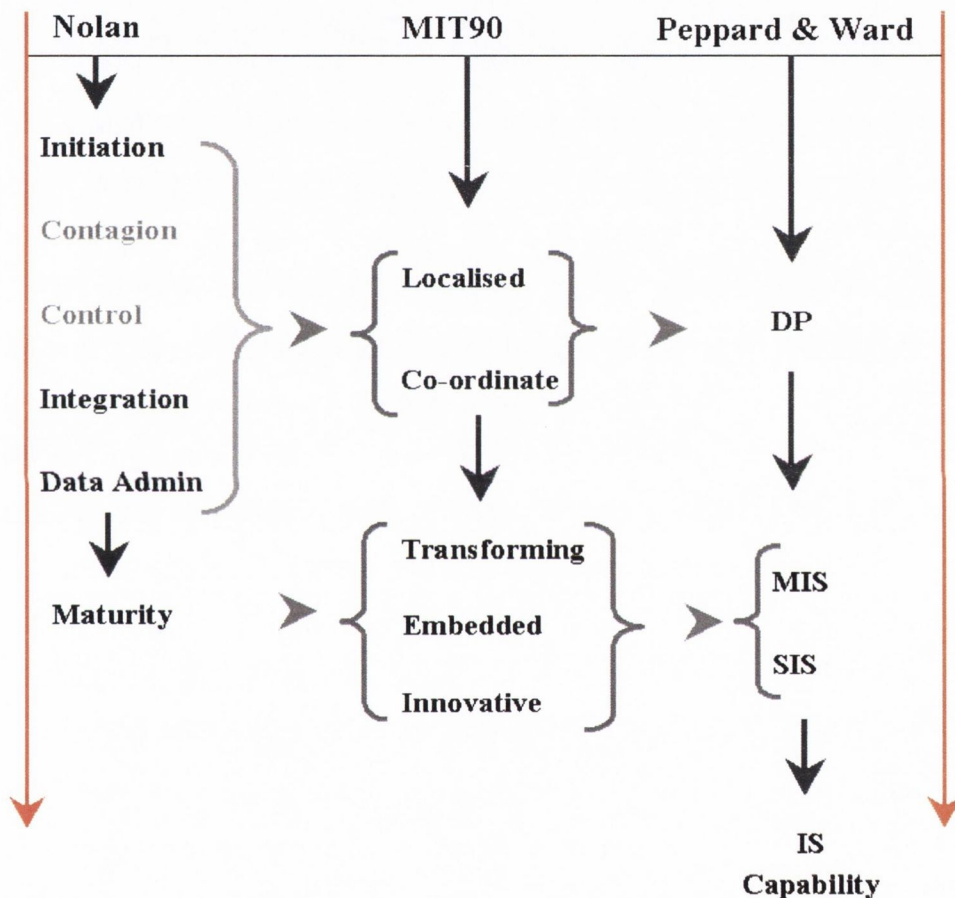


Figure 2.2: The progress of Enterprise Information Systems models

The Enterprise Information Systems models are summarised in figure 2.2. Nolan's first five stages are captured by the MIT90 model with their first two stages and these stages are summarised again by Peppard and Ward with their first Data Processing stage. Conversely Nolan's maturity stage is described in more detail by the MIT90 model. This detail is further expanded on by the Peppard and Ward

model with their two stage MIS and SIS. The final Peppard and Ward stage suggests that to be successful, organisations need to develop through the previous three stages and also develop a full set of IS competencies in order to derive continuous benefits for the organisation. This final stage diverges from the others and previous models in this category when it builds to become a complete IS/IT governance framework in itself. This final stage is similar in many respects to the IT Capability Maturity Framework (IT-CMF) governance model which was subsequently proposed by Curley (2007).

While the Nolan and the MIT90 models were valuable in their own era, their influence has not persisted over time. The Peppard and Ward model, as mentioned previously has forfeited much of the complexity associated with organisational growth by describing it with three stages. The final stage which incorporates the concept of the IS capability and competencies has been developed by further research and practice (Curley 2004, 2007; Carcary 2011). This concept of an IS capability and competencies moves the model toward the management and governance category. Therefore organisational growth remains described in the literature with Peppard and Ward's initial three-stage model, which does not adequately describe the complexities associated with the evolution of information systems in business or government organisations.

2.8 The Spread of Maturity Models – Summary

Appendix 2 gives an overview of maturity models in the literature where they are categorised by their subject matter. Appendix 2 is summarised in Figure 2.3. Figure 2.4 shows the number of models for each of the categories. Figure 2.3 shows how maturity models are spread by subject matter type. The diagram shows four quadrants with a subject matter category represented in each of the quadrants. In addition, each of the quadrants shows a timeline from 1970 to date, with the earliest date in all cases nearest to the origin.

From these diagrams it is clear where maturity models have had most impact on the IS field and where least impact has been. Most of the impact has been around the Management & Governance category. There has been a consistent application of maturity models to this subject matter since the 1980's with a slight increase in the last decade. The Technology Assimilation category has shown the next most impact with a significant increase in usage during the last decade. The Technical Architecture category is significant for not having any models until late in the last decade and then producing five models. One explanation for this could be that the gradual increase in the numbers of applications incorporated by organisations has driven demand for application integration, systems integration and an enterprise architecture on a technical level. While the Enterprise Information Systems Category is from where the initial model was spawned, this category has yielded fewer models than any other area and certainly the fewest in the last decade up to 2013. A cursory explanation of this is the fact that larger scope models such as is demanded in this category, can present more problems than other categories. Governance and Technology Assimilation present discrete self-contained subject matters that appear to be more easily tackled.

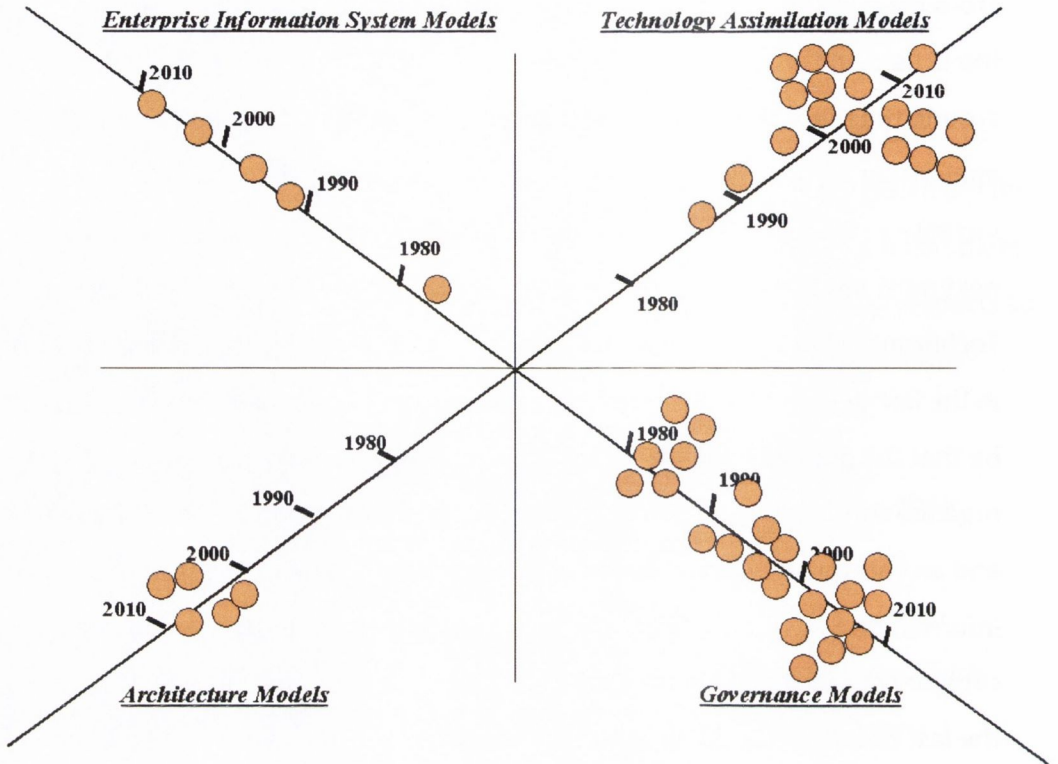


Figure 2.3: Models by Subject Matter Category

Figure 2.3 shows the number of Governance & Management models steadily increasing since the 80's with a significant surge since the year 2000. Governance & Management models increased in line with the many new management techniques that were imported from organisation theory and management fields.

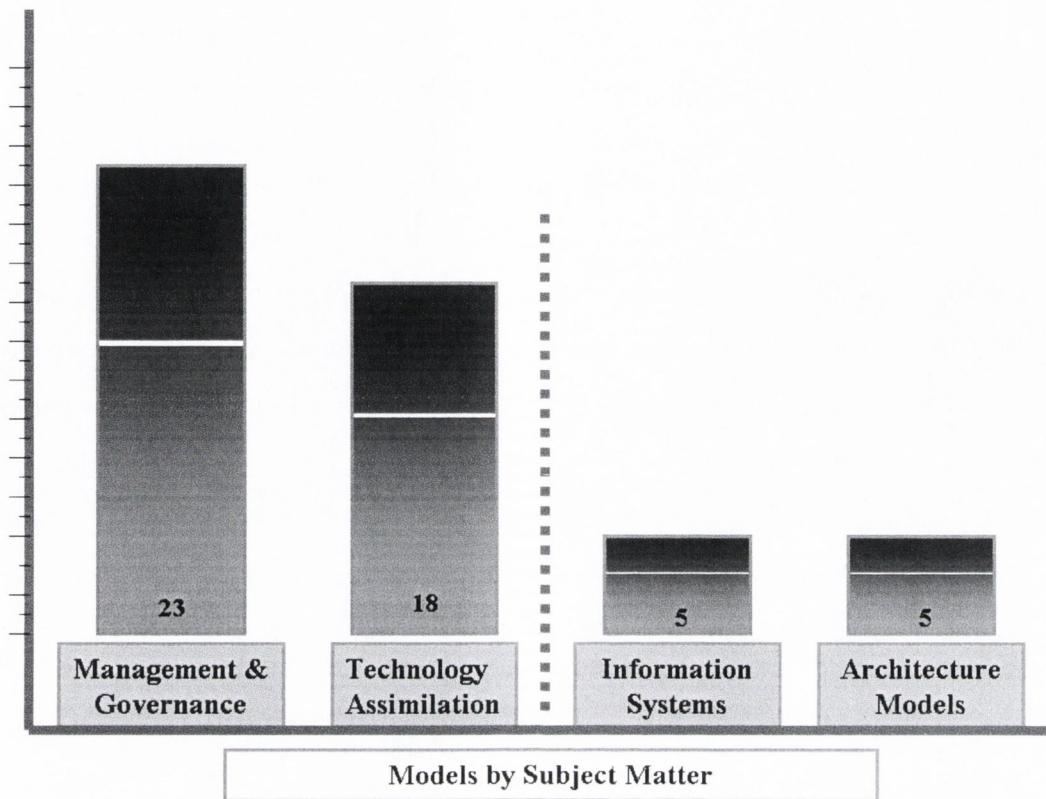


Figure 2.4: Number of Models in each Subject Matter Category

In addition ICT has shown increasing levels of cost and influence on organisations with ICT managers making greater efforts to align ISP and BP (Teo and King 1996; Remenyi et al. 2007). Efforts to control, manage, and align the ICT function within organisations have influenced the number of models in this domain.

Figure 2.3 also shows a significant increase from the year 2000 onward in the number of Technology Assimilation models proposed. Technology Assimilation models increased in line with output from the technology industry and the increasing supply of new technology and products from software vendors (Ein-Dor and Segev 1994; Remenyi et al. 2007). Two explanations are possible for this increase; the academic field responded to demands from industry for help with what McFarlan et al call the 'technology archipelago'(1983) or researchers found fertile ground in the rapidly changing application of technology to organisations. A third explanation is that the CMMI template and method opened up the opportunity to bring easily digestible prescriptive research to CIOs and IT managers seeking guidance. Most likely it is a combination of all three reasons

and given the fact that the software industry shows no sign of slowing down, it is reasonable to expect progress to continue in this direction and at this pace.

The Architecture category includes a small number of models, all of which have been developed in the decade up to 2013. The models have generally attempted to integrate what have become an increasingly disparate set of ICT applications within organisations. In the past, efforts to coalesce disparate applications have resulted in large ERP solutions. ERP solutions however, have not been the answer to all the questions. In particular where organisations find value in acquiring COTS applications, there will continue to be a demand for technical architectures that can integrate these applications and their data into the organisation's infrastructure.

The Enterprise Information Systems category has shown a small number of models over the last four decades. Modelling the maturity stages for all aspects of an organisation is clearly a difficult task. Scholars who have attempted to model within this category will most likely have battled with the rapid changes in organisations that have followed successive waves of new information technology. Efforts by researchers in this category have delivered as few as three models. While these models have contributed insight to growth of IS within their respective eras of computing, none of them have persisted or evolved beyond a simple three stages (Ward and Griffith 1996). There is clearly a gap in the academic literature as regards Enterprise Information Systems models.

As for e-government models, although the name or title (e-government) implies that they should be categorised along with the Enterprise Information Systems category, they are not categorised as such. They sit clearly within the Technology Assimilation category and offer little by way of help to the CIO with information systems from the broad enterprise level.

Each model type attempts to map the evolution of information systems over time. The enterprise information systems models have broad application to organisations and the e-government models apply specifically to government

agencies. Examples of both types have fallen short as either fully descriptive or theoretical models (i.e. models describing causality). None have described how or why organisations make the transition from one stage to the next for all stages. However while both model types successfully describe some of the stages, all of the higher stages of each model incline toward some prediction of maturity, which is typically not taken from observation. The main difference between both model types is that the e-government models start with the Internet and web services and the enterprise information systems models begin with the introduction of computing to the organisation.

In general, while some of the models are acknowledged by Coursey and Norris (2008) as being accurate in their description, they are not descriptive models in the sense that Whetten (1989) suggests. The models are more clearly prescriptive, outlining the stages for the use of management techniques or technology assimilation. What is required is a stage model that shows how organisations evolve and also explains how they move from stage to stage and even within stages so that other organisations have a model that they can use as a template or source of ideas.

2.9 Academic Contribution of Behavioural Models and Design Science Models

Classifying models according to whether they are behavioural or design science research, does not offer insight to the quality of research or the academic contribution that the models may have made. Some additional insight may be obtained from further observations on how the models have contributed academically and where there are gaps in the academic contributions thus far.

According to Hevner et al (2004) the IS field is relatively new and as yet lacks the cumulative theory development found in other engineering and social-science disciplines. Hevner et al continue by saying that without such cumulative results it becomes difficult, if not impossible, to develop and assess strong theoretical models. Lewin contends, “nothing is so practical as a good theory” (Lewin 1945).

Gregor (2006) agrees that theories are practical because they facilitate the accumulation of knowledge in a systematic manner and in turn this accumulated knowledge enlightens professional practice. Gregor continues saying that the nature of theory in the IS field is different from other fields in that IS links the natural world, the social world, and the artificial world of human constructions. Therefore theory in this field will draw on natural science, social science and design science.

Sutton and Staw (1995) take a fundamental approach toward a view of theory by establishing first 'what theory is not', thus corralling the definition into a certain region. They contend that theory:

- Is not a stream of references to prior work where theory was developed;
- Is not data or observed patterns in data where causal logic is not established;
- Is not a list of variables or constructs. A theory must explain why constructs or variables come about and why they are connected;
- Is not a diagram or diagrams; lists or tables rarely if ever constitute theory by themselves;
- It is not a hypothesis or prediction or conjecture.

Whetten sets out the building blocks for theory development as: What, How, Why, Who, Where and When (1989). The Who, Where and When are temporal and contextual characteristics and as such set the boundaries for generalisability and range for the theory. More importantly however, Whetten characterises theory as having the answer to three fundamental questions about a particular phenomenon; What, How, and Why. 'What' outlines the variables, constructs and relevant factors associated with the phenomenon. 'How' introduces the relationships between the variables and other factors involved. 'Why' presents and justifies the causal nature of the occurrence - the theoretical glue that welds the model together into a coherent theory. 'What' and 'How' describe events

associated with the incident, event or trend. Only 'Why' explains causality. Good or strong theory, according to Whetten (1989) and Sutton & Staw (1995) must include a plausible, cogent explanation for why we should expect certain relationships in our data. For these researchers theory is a product where all three components must be present before the term can be invoked. Karl Weick (1995) on the other hand sees theory less of a product and more of a process with various stages; all of which may have the term theory applied to them. Weick would prefer not to reserve the theory for Good Theory, Grand Theory, or unassailable theory. Whetten also sees the generation of theory as a process or path where theory development begins with the 'What' and the 'How'; which is also known as descriptive research (1989).

Prescriptive research on the other hand is more focused toward practitioner relevance and seeks to answer 'How to' questions (Lee 1999; van Aken 2004). Many practitioners regard the vast bulk of research topics as not having the sort of relevance that contributes directly to their role as managers. What they want are prescriptive statements, best practices and actionable advice (Starkey and Madan 2001). According to Weick, practitioners scorn academics for not giving due regard to the 'real world' while academics claim that their reality has a longer-term and more strategic relevance (as opposed to practitioner focus which is more on tactical exigencies). Prescriptive research or models tend to be heuristic with little focus on causality. Van Aken (2005) states that academic knowledge can be descriptive or prescriptive in nature, where development of prescriptive knowledge is field-problem driven and solution-oriented and descriptive knowledge is generally theory-driven with a focus on causality.

Hansen et al (2004) describe the stages of theory development as moving from prescriptive type contributions, to descriptive contributions and finally to reflection. Reflective contributions in this context are concerned with setting descriptive contributions into a theoretical context or developing theory itself.

Hansen et al describe reflection as a broad term which may also be concerned with reviewing or categorising prescriptions and/or descriptions into some existing theory. Becker et al (2010) develop Hansen et al's view by saying that the evolution of an academic field exhibits a circular logic (see figure 2.5) where prescriptive contributions are followed by descriptive contributions and finally to reflective and or theoretical contributions. Prescriptive contributions attempt to appease demands for 'actionable advice and best practice' that Starkey and Madan (2001) identified. The resulting experiences are described so as to gain a better understanding of the domain. Finally, these insights are reflected on in order to generalise them to theory, which could then again provide the basis for better prescriptions (Hansen et al. 2004).

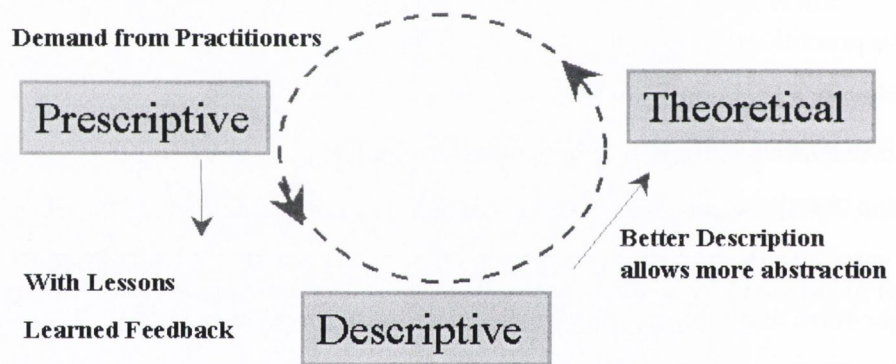


Figure 2.5: Circular logic of the Evolution of an Academic field

In this dissertation Hansen et al's 'Reflection' category is distinguished into two further categories; Theoretical in the Whetten (1989) sense of showing causality or the 'Why' of a phenomenon and Reflection as the simple review of prescriptive or descriptive contributions. The Academic Contribution category used in this literature review is drawn from Becker et al (2010), Hansen et al (2004) and Mintzberg (1990) and has four aspects:

- **Prescriptive** contributions specify how organisational improvements could or should take place. Where a model is categorised as prescriptive alone it

implies that the research methods were not disclosed and it is assumed that the model is not based on empirical evidence.

- **Descriptive** contributions are concerned less with prescribing ideal methods for change, they are more concerned with describing how change happens or has happened. A descriptive piece of work according to Whetten (1989) is a rigorous piece of work that provides what he calls the 'What' and the 'How'. Whetten describes the 'What' as an outline of the variables, constructs and relevant factors associated with the phenomenon. 'How' introduces the relationships between the variables and other factors involved.
- **Reflective** contributions include discussions and criticisms of the core assumptions of maturity models or focus on building theoretical frameworks.
- **Theoretical** contributions have attempted to underpin the causal (Whetten 1989; Sutton and Staw 1995) mechanisms for change with a theoretical framework.

2.9.1 Maturity Models by Academic Contribution Type

Appendix 3 gives an overview of maturity models in the literature where they are categorised by their contribution type. Appendix 3 is summarised in Figure 2.6. Figure 2.6 shows how maturity models are spread by academic contribution type. The diagram shows four quadrants with a contribution type category represented in each of the quadrants. In addition, each of the quadrants shows a timeline from 1970 to date with the earliest date in all cases nearest to the origin. It can be seen from this diagram that most models during the second technological era up to mid 1990's were descriptive and the third era from mid 1990's showed a substantial increase in the number of prescriptive models.

The reflective category is slightly out of context here, in that this does not represent a model category, but rather, it sets out where papers were published containing models, that these papers included discussions and criticisms of the core assumptions of maturity models or that they had some focus on building theoretical frameworks. It should also be noted that some of the models are

categorised as both prescriptive and descriptive, indeed it is conceivable that a single model could fall into all three categories. In fact, few scholars took the opportunity to reflect on maturity models even though they were presenting a model in their research. This is not to say that maturity modelling was not reflected on by academics. Reflection on maturity modelling has mostly been presented separately alongside criticisms of models (King and Kraemer 1984; Rosemann and de Bruin 2005; Becker et al. 2010; Mettler 2011).

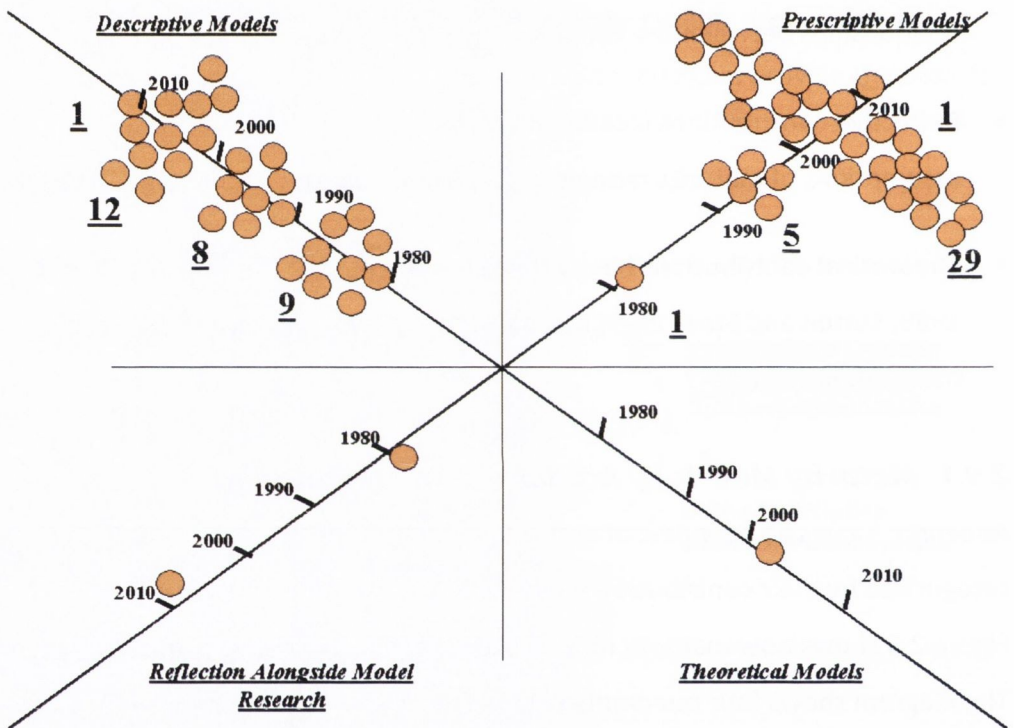


Figure 2.6: Models by Academic Contribution Type

What is remarkable from this figure is the fact that there has only been one theoretical model produced in the last four decades. This model was developed by Ross (2003) and describes a technical architecture stages of growth model.

Ross presents empirical evidence based on 40 case studies that suggest firms can generate significant business value at each stage provided each architectural stage is adopted in the correct sequence. She describes how organisations learn at each stage, what benefits accrue and how each stage positions the organisation for the next architectural stage. Ross describes how, when organizations attempt

to skip stages, either the benefits are severely delayed or they must return to the previous stage or stages to acquire the missing architectural component or configuration. Ross describes the characteristics of each stage and their benefits and risks. One criticism of Ross's model is that although it was classified for this review as being a theoretical model, change mechanisms are not explicitly described; some drivers and enablers for change are identified and placed under the heading 'Benefits and Risks'. Organisations that have adopted a particular architectural stage may have a risk of accruing additional costs for remaining there, or a potential benefit in terms of cost savings for moving to the next stage.

The first stage (Silo Architecture Stage) is identified as a stage where there is a risk associated with increasing expenses as a result of efforts to maintain the linkages between each of the technical architectures; the second stage is adopted where management believes the IT costs have increased to the point where a move to standardising and consolidating technology platforms can lead to significant cost savings; cost savings may accrue from the third stage as a result of the organisation's learning at the second stage where standardisation infrastructure has disposed the organisation well in order to apply a similar discipline to their core data and processes; although no firms were identified at the fourth stage, managers provided insights into the promise they see in the modularity architecture stage - insights that promise strategic agility through customised or reusable modules.

Ross's model was the first and at the time of writing the only theoretical stages of growth model in the IS field. The above review shows that the first technological era produced many models that centred on the 'Management & Governance' subject matter. These were descriptive models that supported the demands of an academic field seeking quality and rigour in its research methods. The second era produced many design-science models that were prescriptive, with a focus on 'Technology Assimilation' and 'Management and Governance'. These models increased in number as a result of calls from practitioners who were faced with an increasingly difficult choice as regards technology solutions and ICT management. Although the concept of stages of growth or maturity modelling was and remains

a popular tool for academics and practitioners in the IS field, it is interesting that it took forty years before the first theoretical model was proposed.

2.10 - Gaps in the Literature

From the above review of the literature two gaps emerge. The first is associated with the number of Enterprise Information Systems models and the fact that the models in this category are no longer considered accurate (King and Kraemer 1984) or comprehensive (Ward and Peppard 2002) descriptions of how the stages of growth emerge for information systems in organisations. Enterprise Information Systems type models provide insight into how information systems develop across the full range of the organisation's operations. While calls for this type of research have persisted over the last three decades (McFarlan 1981; McFarlan et al. 1983; Ein-Dor and Segev 1994; Zmud 2001; Urwiler and Frolick 2009) few researchers have attempted it.

The second gap is the paucity of theoretical models observed in both the information systems and e-government fields. In the period covered by the review there was only one theoretical model published in both of these fields. The only theoretical model was produced by Ross (2003) which was categorised as a Technical Architecture type model. No theoretical models were identified in the Enterprise Information Systems category. It is clear that there is a gap in the research as regards theoretical maturity models, where there is a focus on causality and stage change mechanisms. The IS field has little by way of maturity models that incorporate change mechanisms whether at the level of the model itself or indeed at the level of the individual stage changes within the models. In other fields change mechanisms have been postulated for stage models. For example: in the organisation field Greiner (1972) views the growth of organisations as a series of evolutions and revolutions that are precipitated by internal crises related to leadership, control and coordination; Moore and Tushman (1982) regard stages of organisational growth as a response to changes in the product life cycle; in the psychology field, Kegan (2002) describes the mechanism for adult development as a social curriculum that drives change;

Piaget (1937) regards assimilation and accommodation as two mechanisms that describe how change occurs during cognitive development. Future maturity models or stages of growth models in the IS field should look to identify reasons for change at both the model level and the stage change level. Research that offers stage change mechanisms will have significantly more value than the current models that leave change mechanisms as an open question for the reader.

2.11 Conclusion

As noted in section 2.9., the IS field has been acknowledged as lacking a cumulative research tradition (Hevner et al. 2004) which is in part due to the changing technological environment. This changing environment adds complexity and uncertainty to research efforts, which results in the field chasing after practice rather than leading it (Benbasat and Zmud 1999). These conditions in a field inhibit sound literature reviews and descriptive research, which are important contributors toward the goal of producing theoretical research and models (Webster and Watson 2002; Kim et al. 2011; Hirschheim and Klein 2012).

This literature review has taken a broad look at maturity models and how they've been used as frameworks for research in the IS field. 51 models were reviewed, which were published in IS and e-government journals over the last four decades. In the course of the review these models were categorised by subject matter and academic contribution. The history of IS maturity models was traced and a narrative was constructed to explain their provenance, emergence and current position. Some opportunities were identified for the usage of maturity models. These gaps arose in both the subject matter of the field and in the theoretical substance. The subject matter showed a distinct lack of maturity models in the Enterprise Information Systems category and that there was a lack of theoretical models across all categories. This research seeks to address this gap by developing an Enterprise Information Systems maturity model that is both descriptive and theoretical in the sense that it explains causality by describing

change mechanisms both for the overall model and for each of the stage changes.
No such model currently exists.

Chapter 3 – Research Methodology

3.1 Philosophies of Research

Knowledge and how it is formed is the primary concern for the field of philosophy known as epistemology. Epistemology is concerned with what we can know and how we know it - the nature, sources and limits of knowledge. The origins and grounds of knowledge were the subject matter of one of the great philosophical disputes which emerged between the rationalists and the empiricists (Law 2007). The rationalist philosophers (e.g. Descartes, Leibniz and Spinoza) contended that sense perception and experiences may bring knowledge to consciousness, but that experiences do not provide us with the knowledge itself, rather that knowledge is immanent and has in some way been with us all along. In that way knowledge is not acquired with sensory perception, but intellectual reasoning and deductive logic. The Empiricists (e.g. Bacon, Locke, Berkley and Hume) on the other hand asserted that knowledge comes only from sensory perception or experience. Empiricism requires that hypotheses be tested with observation from the natural world via sense perception rather than relying on *a priori* knowledge or intuition. Defending empiricism, Locke argued that all knowledge is ultimately derived from experience:

“Let us suppose the mind to be, as we say, white paper, void of all characters, without any ideas; how comes it to be furnished? Whence comes it by that vast store...? To this I answer in one word, from experience: in that all is founded, and from that it ultimately derives itself.”
(Locke 1690 Book II chapter I, section 2).

Bacon (1620) rejected rationalism famously saying that we should be neither like spiders, which spin out their insides, nor like ants, which merely collect, but like bees, which both collect and arrange.

The modern physical sciences and the scientific method are grounded in Bacon’s work and empiricism. Bacon was a pioneer in his attempts to establish the

scientific method and as the founder of modern inductive logic, which is one of the key attributes of the scientific method (Russell 2004).

A further development of thinking about epistemology emerged from the German idealist movement (which had affinities with the romantic movement) and which was founded by Kant (2007)⁸. Kant added to the rationalist/empiricist debate by asserting that while experience is fundamentally necessary for human knowledge, reason is also necessary for assimilating that experience into coherent thought. While Kant accepted the tenets of empiricism, his views brought about a renewed emphasis on the mind as opposed to matter (Russell 2004). Kant influenced the introduction of phenomenology (see below) and once again affirmed empiricism (Russell 2004; Moran 2006). In the early twentieth century Russell and Whitehead and later Wittgenstein sparked a renewed interest in empiricism and analytic philosophy (formal logic and the analysis of language). Around the same era a group of philosophers in Vienna⁹, who were influenced by Ernst Mach and Gotlob Frege and their views on empiricism and analytic logic, re-ignited the empiricist view and formed the movement and approach to philosophy known as logical positivism (Ayer 2002).

Another influential school of thought that emerged in early 20th century was phenomenology. The founder of this movement was Edmund Husserl. Phenomenologists, unlike empiricists, do not consider the world to consist of an objective reality, but instead consider subjective consciousness to be of primary importance. Phenomenology is defined by Cohen and Manion (Cohen and Manion 1987 cited in Remenyi et al 2005 p. 34) as:

⁸ The reference here is to a specific (and acclaimed) translation of Kant's Critique of Pure Reason by Norman Kemp Smith.

⁹ This Vienna Circle was a school or group that emerged from the University of Vienna and were led by Moritz Schlick.

“a theoretical point of view that advocates the study of direct experience taken at face value; and one that sees behaviour as determined by the phenomena of experience rather than by external, objective and physically described reality.”

Empiricism and phenomenology emerged as dominant epistemologies which were differentiated over time, into research paradigms and broadly speaking manifest themselves in modern IS research as positivism and interpretivism. These are discussed in the following section.

3.2 Research Epistemologies in Information Systems

Research epistemologies have evolved into three what are commonly referred to as research paradigms or sets of underlying beliefs that are found in IS research. Two of these, positivism, interpretivism, emerged from the phenomenologist and empiricist traditions respectively. The third is critical theory which emerged somewhat later (Chua 1986b; Orlikowski and Robey 1991; Orlikowski and Baroudi 1991; Klein and Myers 1999). For the sake of completeness, it is noted that there are others in addition to these, but they are not of any significance in IS research.

Research paradigms can be understood as:

“shared belief systems that influence the kinds of knowledge researchers seek and how they interpret the evidence they collect” (Morgan 2007 p. 50).

For many years positivism and interpretivism have dominated IS research though there is a small, but significant critical thread. These three paradigms are now discussed.

3.2.1 Positivism

Positivism was for many years (and to some extent still is) the dominant research paradigm in the information systems field (Orlikowski and Baroudi 1991; Walsham 1995). Positivism is most closely aligned with empiricism, the scientific method and is commonly associated with quantitative research (see below). Alveeson and Deetz describe positivism in the following way (though it should be noted that their view is polemical because they juxtapose positivism with critical theory):

“Positivism is a particularly slippery term, so it is useful to explicate what we mean by it, namely an approach which assumes that (a) there is an objective external reality awaiting discovery and dissection by science; (b) scientific method gives privileged access to reality; (c) language provides a transparent medium for categorization, measurement and representation; (d) the observer scientists occupies a position outside and above reality from which he (rarely she) develops and validates robust theories about reality.”

(Alvesson and Deetz 2000 p.61)

Positivists assume that there is an objective reality about which statements can be made that that is has properties which can be measured in a way that are independent of the observer (researcher) and his or her instruments. Positivist studies generally attempt to test theory or hypotheses in an attempt to increase the predictive understanding of phenomena. In line with this, Orlikowski and Baroudi (1991) and Klein and Myers (1999) classified IS research as positivist if there was evidence of formal propositions, quantifiable measures of variables, hypothesis testing or experimentation and the drawing of inferences about a phenomenon from a (random) sample drawn from a defined population.

3.2.2 Interpretivism

Interpretive researchers assume that access to reality is only available through social constructions such as language, consciousness and shared meanings. The philosophical base of interpretive research is phenomenology (Klein and Myers 1999). Phenomenology is the study of phenomena that appear in consciousness before we assign meaning to them. Consciousness at both the subjective and inter-subjective levels (or social world) has no meaning until human beings reflect on a segment or passage within time and assign a meaning to it. According to Chua (1986b) humans continuously assign meanings and classifications to actions – we interpret our own actions and those of others we interact with. Through this continuous assignment and classification we form norms of behaviour and we protect those norms by assigning values to them and enforcing them with

customs and rules. Customs and rules form cultures, social constructs, associations and complex institutions such as money and politics (Searle 2010). These norms, cultures and institutions form a comprehensive social reality that confronts the individual in much the same way as the natural world. Interpretive studies attempt to understand phenomena through the meanings that people assign to them. Interpretive methods of research in IS are:

"aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context" (Walsham 1993 p.4).

Interpretive research does not predefine dependent and independent variables, but looks to the full complexity of human sense making as phenomena evolve or emerge over time (Kaplan and Maxwell 1994).

Interpretivist research is often associated with qualitative research methods, though, as will be shown, just as positivist research can use qualitative research methods, interpretivist research can and does use quantitative research methods.

3.2.3 Critical Research

Critical researchers assume that social reality is constructed by its participants and although they can consciously act to change that reality, their ability to do so is constrained by social, cultural and political domination by individuals or groups within society. Walsham (1993) distinguishes critical theory from both positivism and interpretivism. These both tend to attempt description and understanding whereas the critical approach has a focus on emancipation at the individual level. Critical research is a form of social critique where light is thrown on the shadows that are cast by the restrictive and alienating conditions of the status quo. Critical research focuses on the oppositions, conflicts and contradictions in contemporary society (Alvesson and Deetz 2000). Critical research often centers on topics where the injustices of our current world are most visible and where it is believed that critical research can make a difference (Stahl and Brooke 2008).

3.2.4 Mixed Methods

Finally it is worth noting that research in the social sciences can be divided into mono methodological and mixed methodological. The latter is sometimes described as Pragmatism (Saunders et al. 2009) - where the researcher combines elements of both positivism and interpretivism and methods typically associated with each, for example a survey followed by focus groups or an experiment followed up with interviews.

3.3 Research Methods and Methodology in IS

The approach to research in IS (and more broadly in the social sciences) has been compared to peeling an onion (Saunders et al 2009). The researcher starts by taking a philosophical stance and from within that chooses a research paradigm. He or she then chooses a strategy or methodology, an approach, a time horizon and then specific technique(s) for data gathering and analysis. Certain strategies and techniques tend to be associated (and sometimes incorrectly equated) with different paradigms – quantitative with positivism and qualitative with interpretivism. In this section a brief review of methodologies and techniques is presented. The approach used in this research is discussed in section 3.5.

A research strategy is about how the research question will be addressed, whether it is empirical or non-empirical and what the overall tactics are. It outlines the methodology, sets out data collection methods and describes the data analysis techniques. A common problem in writing about IS research is confusion of the words 'methodology' and 'method'. Galliers (1992), for example, lists 14 research methodologies: action research; case studies; ethnography; field experiments; focus groups; forecasting; futures research; game or role playing; in-depth surveys; laboratory experiments; large-scale surveys; participant-observer; scenario discussions and simulation. This list mixes apples and oranges. A case study is a methodology; it is an approach to the problem. Within the case or cases the research still has to determine how to collect her data. A survey is a data gathering technique. One might use a survey in a case study, but one cannot

use a case study in a survey. For the purpose of this discussion, broad methodological approaches will first be discussed and then specific methods.

3.3.1 Case Studies

Cole and Avison (2007) outline the dominant interpretive research methodologies in the IS field as: action research, case study and ethnography. Of these three, the case study is the most common form of research in IS. The case study has been recognised as a sophisticated methodology (Remenyi et al. 2005) which is described by Yin as:

“an empirical enquiry that investigates contemporary phenomena within real life context....[and] is particularly valuable in answering who, why and how questions in management research.” (Yin 2009 p. 5)

Case studies allow the researcher to carry out an in-depth exploration of the characteristics of specific phenomena in real life. The case study allows the researcher to concentrate on specific phenomena thus allowing the opportunity to make observations that may not be discernable using methods such as large-scale surveys. Case studies can be used both to generate theory and/or support or reject theoretical propositions or conjectures. Case studies can provide a high quality of insight and understanding required to address the research question. Within any of the paradigms, case studies allow a narrative to be created which acts as a precursor to a theory or theoretical conjecture.

“The case study is useful for both generating and testing of hypothesis but is not limited to these research activities. Case studies are valuable at all stages of the theory building process....” (Flyvbjerg 2011 p. 306)

The case study can be and is used within of the philosophical research paradigms though it is mostly associated with interpretivism. Case studies can be single or multiple. The latter is often subdivided into a small number case study approach (say two to five cases) and large number case studies (say 15 or more). According to Yin (1989) the case study follows more of an experimental logic rather than the logic of a survey and for that reason it is not necessary to replicate a case study

many times. A single case study, like a single experiment, can establish the existence of a phenomenon although this may not be enough to provide robust generalisations; for that multiple cases are needed. Flyvberg (2011) on the other hand contends that a well-chosen single case study may be generalisable as a supplement or alternative to other methods. In addition Flyvberg goes on to claim that the concept of generalisation in itself is overvalued as a source of scientific development and that the force of example and transferability are underestimated.

An obvious weakness of the case study when, say, compared to a properly executed randomised survey is bias. Bias is a feature of all research. Bias in qualitative research occurs when informants and researchers wittingly or unwittingly introduce their own perspective or flavour on a particular phenomenon. The propensity toward bias is not simply a phenomenon related to the case study in particular, but is a fundamental human characteristic. Francis Bacon expressed it as follows:

“The human understanding from its peculiar nature, easily supposes a greater degree of order and equality in things than it really finds. When any proposition has been laid down, the human understanding forces everything else to add fresh support and confirmation. It is the peculiar perpetual error of human understanding to be more moved and excited by affirmatives than negatives.” (Bacon 1620 p. 46)

Flyvberg (2011) contends that this bias toward verification is not a feature of all research methods and that the propensity for this bias is mitigated by the case study. Flyvber contends that where in-depth single case studies are concerned “The Field” asserts itself as a disciplinary force that is both demanding and coercive. He describes the reverse inclination where multiple case studies are concerned. He explains that the in-depth analysis required in single case studies is such that there is more of a tendency toward falsification of the conjecture rather than verification.

Single-case design or multiple-case design is an important consideration for Yin (2009). The single-case design has distinct value in a number of instances; where a single critical case can facilitate testing a well-formulated theory, where the case represents an extreme condition to exemplify the conjecture, where the case is a typical or representative case of others in the domain, where the case reveals some extraordinary phenomenon which is being researched and finally where a longitudinal study is being performed.

According to Bannister (2002) most longitudinal research takes place over a relatively short period, say three to five years and where the duration or scope of the research is longer than this, it will involve intermittent sampling with the researcher present at each of the sample intervals. If the researcher is not available throughout these intervals or the full review period of the case or organisation, then it should not be considered as a longitudinal study and will more likely fall into the category of historiography or a historical piece of research. Relevant aspects of historiography will be discussed in the next section.

While the evidence from multiple case studies is often considered more compelling and robust, the unique quality of a well-chosen single case study may yield more insight for theory development and/or verification – in the same way a well-chosen experiment may prove more valuable than a number of poorer versions. There is often a mistaken analogy between multiple cases and multiple respondents in a survey (Yin 2009). There is a difference between replication logic and sampling logic where a single experiment may be used to establish deeper insight to the phenomenon.

For Yin (2009) a well thought out design is the first and most important step to be taken by a case study researcher. Concepts for judging the quality of a case study include: construct validity; internal validity; external validity and reliability. These are all key considerations for a case study design. Construct validity refers to the requirement to be able to identify appropriate measures or features of those concepts being studied. In this instance – how can each of the stages of development be clearly differentiated from other stages? Internal validity looks

to how the causal relationships are identified and distinguished from spurious ones. External validity refers to how and in what context the findings can be generalised. Reliability (note this is a positivist criteria) refers to data collection procedures and the repeatability of those procedures.

3.3.2 Action Research

Action research is a form of extended field experiment (Lewin 1946; Avison et al. 1999). In action research, the researcher is in a position to influence the course of events. In other words he or she can put a theory and/or a plan into practice and observe the result. The preconditions for action research require the researcher to be in a position of authority and to be able to exercise some degree of power. Action research is not that common in the IS field. It is also, for obvious reasons, only applicable to certain types of research problem.

Action research is an appropriate methodology where an organisational strategy is being tested almost experimentally and where data produced is assimilated by the researcher and fed forward to adjust or redirect the strategic direction.

Like case studies, action research can and does use a variety of different data gathering and analysis techniques.

3.3.3 Ethnography

Ethnography is a methodology that is phenomenological in nature and one which, according to Rosenthal and Rosnow (1991) observes a society's culture from within. It normally requires that the researcher become closely involved with the group that is being studied to the extent of becoming almost invisible to those being observed. Ethnography requires that the researcher engage actively with a group and its culture over a period of months or years. Silverman (1985) describes it as a methodology that involves close observations of methods and actions in natural contexts.

Like action research, for ethnography to be a practical research method, certain special conditions apply including the ability of the researcher to be present for

large amounts of time and be able to 'disappear' into the background. For this reason, amongst others, Remenyi et al (2003) claim that ethnography is seldom used in business research.

3.3.4 Historiography

As a methodology, historiography is a niche area in IS research, but there has been some interesting work done using this approach and as it is relevant to this research, it is included in this discussion.

A study of history offers a valuable perspective on the current circumstances - *"seeing the past can help one envision the future"* (Neustadt and May 1986 p. xv cited in Mason 1997). Historiography helps in developing an understanding of the origin of contemporary solutions and existing problems, how they arose and how they unfolded over time (Mason et al. 1997). In the context of IS research, history can offer an understanding of the organisational, individual, social and economic circumstances that form a holistic view and offer potential for rich understanding.

"Historical analyses teach us to interpret existing organisational structures not as determined by laws, but as the result of decisions made in past choice opportunities, some of which were made intentionally and others more implicitly." (Kieser 1994 p. 611)

Historiography is an empirical research methodology which uses an interpretative approach to distil historical events into a narrative or model in order to obtain a richer understanding of a situation or circumstance (O'Brien et al. 2004). Stages of growth models that offer a rich description of evolution over time, like those offered by a number of IS researchers like Nolan (1979) and Scott-Morton (1991), can be regarded as 'historical' (Bannister 2002).

Historiographical research has many similarities with the case study and uses many of the same sources of evidence proposed by Yin (2009): documentation; archival records; interviews; direct observation and physical artefacts. Historiographies like case studies, place an emphasis on the narrative and a focus on how and why questions. Yin (2009) characterises the case study as focusing on

contemporary events. However to fully understand phenomena in the case study, some context in the form of history is generally required (O'Brien et al. 2004). Where the phenomenon being studied has periods that occurred in relatively recent history, then eyewitness accounts may be available and in this respect it has many crossovers with a case study.

3.3.5 Grounded Theory Method.

Grounded theory method is a unique systematic approach where the researcher does not formulate the hypotheses in advance of the field work, rather the first step is data collection (Glaser and Strauss 1967; Douglas 2003). From the data collected, the key points are extracted, coded and categorised from which concepts are formed. These codes, categories and concepts form the basis for the creation of a theory or a hypothesis. Glaser defines grounded theory as “a general methodology of analysis linked with data collection that uses a systematically applied set of methods to generate an inductive theory about a substantive area” (Glaser 1992 p. 16). Grounded theory normally relies on the use of in-depth interviews, with experts in the field, as the primary source of evidence and urges the researcher to avoid preconceived views taken from the literature.

3.3.6 Theoretical Research

Still at the level of methodology, there is theoretical research. Theoretical research uses logic, reasoning, argumentation and thought experiments to explore potential consequences thus forming hypotheses, conjectures or theories, which may later be verified with experimentation. This is a rationalist approach to research and one that Bacon described as spiders spinning out their insides. According to Remenyi et al (2005) however, this type of research rarely happens in a vacuum and generally relies on evidence or findings from previous empirical research or experimentation. In practice there is a dialectical relationship between theory and empirical evidence. They note that:

“There are always theoretical assumptions associated with the collection of evidence and there is always evidence that underpins theory.” (Remenyi et al. 2005 p. 32).

Theoretical research, like ethnography, is relatively rare in IS research.

3.4 Research Methods: Data Gathering and Analysis

3.4.1 Quantitative and Qualitative Approaches

There are many ways of gathering research data. These techniques are commonly divided into quantitative and qualitative. Qualitative research is an umbrella term that incorporates many methods, approaches, methodologies and epistemologies. According to Denzin and Lincoln (2008) qualitative research implies an emphasis on the qualities of entities and on processes and meanings that are not experimentally examined or measured in terms of quantity, amount, intensity or frequency. As noted above, qualitative research is not synonymous with interpretivism or social constructivism nor is it directly associated with a specific epistemology. Qualitative research can take a positivist, interpretive or critical stance (Klein and Myers 1999). Common qualitative data gathering techniques include:

- Participant observation;
- Interviews (semi-structured or unstructured)
- Focus groups;
- Documentation and artefacts;

The quantitative approach uses methods and techniques to measure numeric quantities and represent values through numerical data with a view toward mathematical or statistical modelling. This is independent of whether what is being measured is inherently numerical (such as the number of products sold this month) or needs some sort of proxy measure (e.g. willingness to adopt new

technology). Quantitative approaches are often mistakenly assumed to be based on an objective perspective while qualitative approaches are regarded as a subjective. However quantitative research can also be subjective, although it appears to be less so than qualitative research (Snape and Spencer 2003) Quantitative methods also includes many methods, but it is most closely aligned with (although not exclusive to) the philosophical perspective of positivism (Klein and Myers 1999). Common quantitative data gathering techniques include:

- Surveys;
- Experiments;

In practice, much research uses more than a single method including mixing both qualitative and quantitative methods.

3.4.2 Research Methods in Interpretative Research

According to Yin (2009) the six sources of empirical evidence most commonly used for case studies are: documentation, archival records, interviews, direct observations, participant-observation and physical artefacts. Given the similar nature of case studies and historiography it is reasonable to assume these six sources remain the same for both.

In addition to case study evidence, McDowell (2002) outlines some potential sources of evidence for a historiography. They include, for example, academic papers, corporate documents such as annual accounts, personal letters, consultant's reports, government archives, autobiographies, masters and doctoral dissertations, photographs, ordinance survey maps, television and radio programs.

3.4.3 Documentation

There are many types of documents that may be examined which include: position documents, process change documents, strategic plans, business plans and memoranda, commissioned reports, formal studies (business focused and

academics focus), annual reports, finance reports; announcements; minutes of meetings and newspaper clippings.

The advantage of this type of evidence is the fact that it is concrete and may be returned to again for further insight and interpretation.

3.4.4 Archival records

Archival records offer the same as mentioned above with documents. Included here are: organisational records; personnel records; organisation charts; maps and geographical locations and survey data.

Remenyi et al (2005) note that any document, reports or studies were written for a reason other than research and may not reflect all aspects of the situation – the author may have been motivated with a pressing demand or desire. Therefore these documents are likely to carry just as much if not more interpretative bias and care should be taken to factor this into further interpretations.

3.4.5 Direct observation

Direct observations are valuable in as much as they do not rely on hearsay or indeed opinion of some sort. It can be very valuable to make direct observations on physical attributes associated with locations and the culture of the organisations in question. There are a variety of roles the researcher may adopt while making observations in the field. These roles depend on the degree of involvement the researcher has in the research site. With direct observation the researcher is watching rather than taking part. This suggests a more detached perspective which facilitates the researcher while attempting to understand the broader context of a phenomenon or setting. Therefore direct observation is not necessarily an alternative to other types of field methods, such as participant observation or qualitative interviews. Rather, it can be understood as an approach to help understand a situation or behaviour, prior to, or while, interacting with members of the organisation or group.

3.4.6 Participant-observation

Participant observation involves the researcher taking part in the phenomena or organisation like other participants, but the researcher simultaneously focuses on making observations about the group or phenomenon (Remenyi 2001).

Participant observation implies that there is some level of engagement with the organisation as opposed to the completely unengaged approach of ethnography and the close involvement associated with action research. While this offers some freedom to the researcher it is important to be aware that this level of embedding offers an additional interpretive bias that needs to be taken into consideration.

3.4.7 Physical Artefacts

Physical artefacts can have significant historic interest for research. Physical artefacts include archival records and documentation, ICT artefacts and organisational structures and business units. In addition many organisations may house museums and artefact collections, which can be a valuable source of primary or corroborating evidence.

The term 'physical artefact' is often interpreted more broadly than the words suggest. Such artefacts can include diagrams and charts for example as well as pieces of equipment or even buildings.

3.4.8 In-depth, Focused and Informal Interviews

Interviews allow researchers to probe and reach areas of reality, such as people's subjective experiences and attitudes, which would otherwise remain difficult or impossible to access. The interview is also a convenient way of overcoming distances both in space and in time. Past events can be studied by interviewing people who took part and historical events may be reviewed with an informed interpretation even though that person may not have been present at that time (Perakyla and Ruusuvoori 2011).

Yin (2009) describes three types of interview; the in-depth interview (sometimes known as semi-structured interviews), the focused interview and the informal interview. With in-depth interviews informants are asked the facts of the matter

as well as their opinions about the events and any additional insights that may occur. This type of interview may help establish a narrative or first order theory.

Interviewing is a skilled process that has a number of phases associated with it. Firstly, the choice of questions needs to be carefully considered and field tested before the protocol is established. Secondly, the process must be flexible enough to accommodate different lines of enquiry while maintaining fidelity to the research questions. Yin (2009) outlines five attributes a good case study investigator should hold and many of them fall within the remit of interviewing skills. The five attributes are as follows:

- A case study investigator should be able to ask appropriate questions and interpret the answers. For instance Becker (1998 p58) points out that where a 'why' is asked, sometimes the approach of a 'how' question may establish the same answer but be less imposing or daunting for the informant. Where good questions are concerned, it is important to establish an interview protocol which holds a loose sketch of the interview questions where the questions are thought out to the extent that they at once engage the interest with the informant and open a space for the informant to be able to respond, clarifying the issue for both parties in the dialogue.
- An investigator should be a good listener such that they do not get involved in his or her own viewpoint, preconceptions or ideological position, to the extent that possible insight is overlooked or a thread neglected.
- The investigator needs to be flexible with questioning so that new opportunities are not missed while also making sure to hold a focus on the objectives of the research questions.
- The investigator should have a firm grasp of the issues surrounding the case itself and any other valuable inputs from other fields, either academic or industry. Failure to be at ease and conversant with all the issues will limit, divert or stunt the conversation.

- The investigator should understand theoretical or industrial preconceptions, but care must be taken not to hold too tightly to these, otherwise opportunities to gain new insights and understanding may be missed.

The second type of interview is the focused interview. Yin (2009) describes focused interviews as being typically shorter in duration with a more specific focus and where the questions are derivative or are a subset of the main interview protocol. The focused interview may remain unstructured and assume a conversational tone but the purpose will be to obtain data or evidence on a specific aspect of the phenomenon. Focused interviews do not typically use the complete interview protocol, but instead centre on aspects of the research question.

The third type of interview is the informal interview. Informal interviews can be held after the main interview with clarifications from the informant or further questions from the researcher. Informal interviews may also occur prior to the main interview where a random question or insight emerges either from the researcher or informant.

According to Remenyi et al (2005) the same problems with documentary bias can occur just as easily with verbal reports and interviews - bias or misunderstanding can creep in as a result of inaccurate articulation or poor listening. In addition it is important to note that the influences of power, emotion and interpersonal relations can distort transmission or reception of data during an interview. For those reasons it is important to firstly take these contextual issues into consideration, when it comes to interpreting the evidence and where possible the evidence should be corroborated or triangulated with other informants or other sources of evidence (Fontana 2001).

3.5 Strategy Adopted in This Research

The approach used in this research is interpretivist and based on a two phase case study methodology and hermeneutic analysis. The first phase is a single case study; the second phase is comprised of four validating cases. The approach uses

techniques drawn from historiographical research (archival and documentary evidence as well as some interviews). A brief justification of these choices follows.

3.5.1 Research Paradigm

When the research question was first formulated, it was intended that a quantitative research approach would be possible. It rapidly became clear that this was not the case. There were not suitable numeric metrics that be used to determine which stage the organisation was at a given point in time. A qualitative approach was therefore adopted. Even using qualitative data, it might still have been possible to adopt a positivist approach. According to Klein and Myers (1999) qualitative research can be approached from a positivist perspective. This however implies that there is objective external reality where a stages of growth model exists and is awaiting discovery. At this point the existence of that objective external reality is not clear and this research does not intend to pursue it. Even the concept of stages of growth involves a number of assumptions that are synthetic and could be regarded as more of a social construct rather than an objective reality. For this reason positivism was considered to be an inappropriate paradigm for this research.

The critical research paradigm is not suitable as an approach for this research question as there would not appear to be any emancipatory issues involved with this research or its outcome.

The interpretive epistemology therefore offers the most suitable approach toward developing a model that observes evolutionary phenomena within organisations.

3.5.2 - Research Methodology

A number of methodologies were discussed in section 3.6. Two of these were dismissed as unsuitable for this research. Action research is inappropriate for research which is examining historical developments. It does not help with

reflection on evolutionary processes that have occurred in the past, nor does it help understand an organisation's current position.

Ethnography is not appropriate either because, although the researcher has worked within the organisation for many years, the approach requires active field notes be taken over the period being researched. Even if research notes had been taken over an extended period this would not be sufficient to piece together a stages of growth model that extends over a period that long predates the researcher's employment in the organisation.

By contrast, given that this research is about organisational development over an extended period, a case study approach combined with historiographical techniques is particularly well suited to the research question as it allows an in-depth view to be taken of an organisation over a long time period.

The remaining question was whether to use a single or multiple case study approach. In this instance a single case study was chosen for the reasons already outlined in this chapter namely that single case studies are particularly well suited to the development of theory. This was helped by the presence of an organisation which a rich and extensive canvas of ICT use, which provided almost a century of organisational change and which had more than half a century of involvement with information technology.

While this research takes the form of a single case study, it also incorporates many aspects of a historiography including research into historical archives and documents.

One option in this research would have been to confine the research to just the one case and to present the developed theory, inviting subsequent researchers to validate this theory externally. However it was decided to strengthen and extend the research by using four secondary case studies to test and validate the theory which emerged from the single case. In summary, this research it was considered more appropriate to build the stages of growth model from a single rich case study. Rather than making an effort to replicate these finding in another

department it was considered more appropriate that a number of key informants be chosen from other departments where the foci of those interviews was based around an effort to test the findings of the single case stages of growth model.

3.5.3 - Data Collection Methods

The primary sources of evidence/data collection used in this research are in-depth interviews, focused interviews as well as archival records and documentation, ICT artefacts and organisational structures and business units. The rationale for interviews has been discussed above.

Documents have been used as part of the evidence collected and assessed for this case study. The type of documents that may be examined include: position documents, process change documents, strategic plans, business plans and memoranda, commissioned reports, formal studies (business focused and academics focus), annual reports, finance reports; announcements; minutes of meetings and newspaper clippings.

In this instance a significant source of evidence will follow from the case study and will rely on in-depth interviews, but where eye-witnesses are no longer available other sources of primary and secondary evidence will be used, including articles in journals, newspapers, books and other information supplied by authors or commentators.

Participant observation is therefore also part of the range of data/evidence collection methods. Because the researcher has been a member of the organisation that is at the focus of this research it allowed many direct observations which were not alone on the physical and cultural surrounds but also on the informants themselves and the reliability of their evidence. As a participant observer within the primary case study, this offered additional insight and a substantial amount of access to informants, documents and archives. Not alone did it offer access, it also allowed an understanding of the nuances associated with culture, business processes, organisational structure and technical architecture.

Historiography and historiographic methods are also a significant part of this research. As the source of the primary case study is an organisation that is approximately 90 years old at the time of research, it is impossible to have direct observations taken from any of the interviewees. The early 1960's was the earliest that interviewees could recall in their career history. Historiographic methods were relied on to research the previous forty years. Physical artefacts can have significant historic interest for research. Physical artefacts include: archival records and documentation, ICT artefacts and organisational structures and business units. All annual reports since 1923 were consulted. All further interim papers and external reports that were available in the organisation's library were also consulted. In addition the organisation holds a museum and many artefact collections, which were a valuable source of evidence, evidence that was used as corroborating evidence.

3.6 Data Analysis - Hermeneutic Mode of Analysis

3.6.1 - Hermeneutics

Hermeneutics was chosen as a mode of analysis for this research as it is the fundamental philosophy and mode of analysis for interpretive research. Bernstein (1983) contends that hermeneutics is the essential method by which we interpret and understand phenomena. The term hermeneutics comes from the Greek verb *hermeneuin* which means to 'interpret' (Gadamer 1960). For Gadamar, hermeneutics is the art of interpretation and or understanding (Moran 2006). While Klein and Myers (1999) maintain that hermeneutics is the primary method or mode of analysis for interpretive research; they do however, acknowledge other forms of interpretive research such as postmodernism and deconstructionism.

Interpretive research has a number of different forms, fundamental to which is hermeneutics (Klein and Myers 1999). Hermeneutics is a mode of analysis that describes understanding as an iterative process. Initially one attempts to understand the whole phenomenon by observing and gaining some insight into

part of the phenomenon and with that understanding we return to the whole phenomenon to place that understanding in context and so gain further insight to the whole. Once we've gained that further understanding we return to another constituent part in an attempt to gain even further insight, thus iterating around what has come to be understood as the hermeneutic circle. The idea of the hermeneutic circle is that we come to understand a complex whole from preconceptions about the meanings of its parts and their interrelationships (Klein and Myers 1999). The hermeneutic circle is understood as the means of operation in the process of understanding. The application of the principle of the hermeneutic circle is described by Klein and Myers as:

“...the parts can be the interpretive researchers’ and the participants’ preliminary understandings in the study. The whole consists of the shared meanings that emerge from the shared interactions between them”.

(Klein and Myers 1999 p. 71)

Alvesson and Sköldbberg (2000) outline two strands of hermeneutics, the traditional or what they term objectivist and a more recent view which they term alethic which was introduced by Martin Heidegger and later taken up by Hans Georg Gadamer. Butler and Murphy (2007) and Cole and Avison (2007) use the term constructivist hermeneutics instead of Alvesson and Skoldberg’s alethic.

3.6.2 *Objectivist Hermeneutics*

Objectivist hermeneutics is concerned with the original intention or understanding of the text or spoken word and is based on the Cartesian subject object view, where the subject attempts to understand the object. The objectivist tradition is held by Emilio Betti (1980) who views the purpose of understanding in the sense that the researcher or interpreter must come to understand the original meaning of the text or the underlying meaning of the phenomena – this perspective is in some ways reminiscent of logical positivism.

Alethic (Alvesson and Skoldberg 2008) or constructivist hermeneutics (Cole and Avison 2007) views understanding as a construction of meaning or truth that has significance in a specific context. Although hermeneutics has a long tradition, Gadamer's *Truth and Method* (1960) has come to shape contemporary hermeneutics to the extent that over the past 40 years, the discussion of philosophical hermeneutics has, by and large, been a discussion of Gadamer's work (Bernstein 1983). Gadamer describes his constructivist hermeneutics as follows:

“The authentic intention of understanding, however, is this: in reading a text, in wishing to understand it, what we always expect is that it will inform us of something. A consciousness formed by the authentic hermeneutical attitude will be receptive to the origins and entirely foreign features of that which comes to it from outside its own horizons. Yet this receptivity is not acquired with an objectivist “neutrality”: it is neither possible, necessary, nor desirable that we put ourselves within brackets...In keeping to this attitude we grant the text the opportunity to appear as an authentically different being and to manifest its own truth, over and against our own preconceived notions.”

(Gadamer 1988 cited in Bernstein p. 138)

Rather than trying to corral prejudices within brackets, they are accepted as the personal backdrop from which understanding and interpretation operate on the way to an understanding that is different from the initial concepts of either the subject or the researcher.

3.6.3 Data Analysis using Hermeneutics

Cole and Avison (2007) describe the key stages and the steps required for a researcher to perform one complete revolution of the hermeneutic circle – from understanding through explanation to interpretation. These steps and stages are outlined in figure 3.1 below:

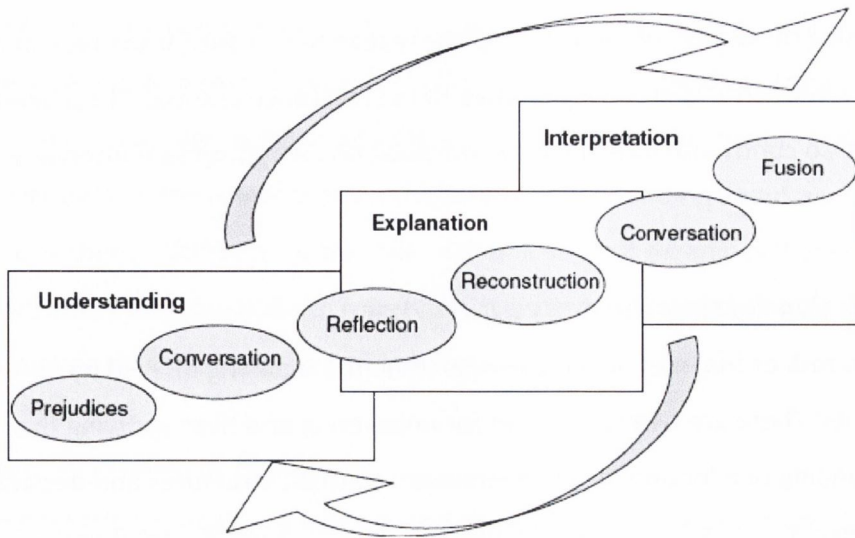


Figure 3.1: Cole and Avison Hermeneutics Six Steps

Cole and Avison (2007) describe their six steps as follows:

Stage 1: Explication of Prejudices

For researchers using constructivist hermeneutics, this stage involves clarifying any presuppositions or prejudices which are held either by the researcher or by the content or formulation of the research question. The aim of this process is to allow the researcher to uncover the boundaries of the research along with any dominant motivations held by the researcher. This stage acts as a precursor to understanding and formulating direct lines of enquiry for the research.

Stage 2: Formulating lines of enquiry

Formulating the lines of enquiry enables the researcher to clarify the focus of interest and so put focus and structure on the research. The first line of enquiry serves as a reference criterion for the study and helps the researcher to identify appropriate data sources and analytical strategies. According to Cole and Avison:

“This imposes structure on the research design helping to assure consistency of focus across subjects, time periods and different analytical stages.” (Cole and Avison 2007 p.823)

Establishing these lines of enquiry help the researcher to anchor the research and identify when 'drift' is occurring relative to the reference criteria. These lines of enquiry also contribute directly to the formulation an appropriate interview protocol.

Stage 3: Conducting the Active Interview

The main task of the interview is to understand the meaning offered by informants. There are two techniques for uncovering and then verifying the understanding of a 'notion' in a conversation: contrast structures and declarative statements. Contrast structures are used to identify 'normal' and abnormal conditions. Declarative statements are used as reality creating activities through which instances of cultural and technical significance are placed in context. Because the interview is a dynamic and fluid situation the researcher must ensure that the data being collected is sufficient to allow analysis at the next stage. Therefore the researcher must maintain the lines of enquiry to help the data gathering to remain focused around the research themes and questions.

Stage 4: Analysing a priori Codes

When it comes to data analysis, the themes used for organising data collection are re-used as codes for data analysis. The aim at this stage is to produce a thick description of the phenomena rather than an explanation of how the parts are connected. This stage requires the analysis of two types of data: feelings reported surrounding the interview event in the form of an interview journal, and the transcribed interview itself. Cole and Avison describe this focus on the different data sources as a method of creating a separate awareness of each interview as a distinct opportunity for data analysis.

Stage 5: Breakdown in Prejudices

This stage invites the researcher to re-assess and analyse their understanding of the phenomena in light of the nuances introduced by each interview. The purpose of this stage is to move beyond a thick description of the phenomena and more toward an explanation of the phenomenon and its component parts. Cole

and Avison describe this stage as being about a shared meaning, which requires exposure to alternative lifeworlds on the part of the researcher. They explain how expanding one's appreciation of different attitudes and behaviours may provoke a 'breakdown' in the researcher's unconscious understanding about a particular issue or theme. Different to the miscommunication of meanings that characterise active interviews, breakdown refers to the discrepant experiences, or theoretical anomalies, that may appear during data analysis.

Stage 6: Fusion of Horizons

The final stage is achieved when a consensus of shared meanings are distilled into a more informed, inclusive and better explanation of the phenomena in question. Cole and Avison use the term *Verstehen*¹⁰ to describe this overarching insight into the issues or phenomena.

"The aim is to create, through shared meanings, new concepts that transcend originally held meanings. It is these transcendental meanings, agreed by both the researcher and subject that represent Fusion."

They continue by saying that it is important for the researcher to be able to distinguish between partial fusions as reflexive mid-way points towards the final interpretation. The final part of the hermeneutic cycle is noted as the last interpretive process of communicating the results of the research. Communicating the results requires the researcher to refine and highlight different elements of the research into a coherent narrative.

"the framework explicitly acknowledges that interpretation of the data does not stop with the data analysis but is also a part of the presentation and discussion of that data." (Cole and Avison 2007 p. 826)

¹⁰ The term *Verstehen* is used by Gadamar (1960) to describe an 'openness to the world'

3.7 Evaluation of Interpretive Research

The quality of positivist research is generally evaluated using four criteria: validity, generalisability, reliability and objectivity which have (Guba 1981; Lincoln Guba 1985, Shenton 2012) four more appropriate correlates in the interpretive paradigm namely: credibility, transferability, dependability and confirmability.

3.7.1 Credibility

Lincoln and Guba (1985) consider the credibility criteria to be one of the most important for the interpretive paradigm. Credibility refers generally to the ability to demonstrate that the research was designed in a way that the phenomenon was accurately described; that the research strategy is sufficient to support the description and that the parameters of the study are explicit. The credibility of a piece of interpretive research can be assessed using a number of criteria including: the use of appropriate research methods, familiarity with the culture of the specific organisation which is the subject of the research (Lincoln and Guba refer to this as prolonged engagement so the investigator can gain adequate understanding), choosing appropriate informants, triangulation, iterative questioning (Lincoln and Guba refer to this as a tactic to ensure honesty in informants when contributing data), frequent debriefing sessions, peer scrutiny of research project, background qualification and experience of researcher, member checks and thick description.

In this research an approach to the research and data collection has been adopted that is appropriate for the research question and one that has been widely accepted in the research field (Orlikowski and Robey 1991), where the interview schedule, data collection and data analysis all contribute toward a rich description of the phenomenon in question. Lincoln and Guba (1985) further point out that the researcher must take the opportunity to become familiar with the organisation that is the subject of the research. As mentioned above the researcher had extensive experience with the organisation that was the subject of this research which also allowed the opportunity to choose the appropriate informants for the specific research question. Triangulation was used extensively

with this research and involved the use of focused interviews to corroborated views or details obtained in previous interviews. In addition every opportunity was taken to examine any documents referred to by informants during the actual interviews. Also a wide range of informants were used to triangulate views held or offered. Individual viewpoints and experiences were verified against documents, artifacts such as ICT systems or applications or business processes which ultimately offer a rich view of the phenomena. In addition there was some triangulation between informant views and both internal and external documents and or reports to corroborate detail or specific views.

Frequent opportunities were taken to review and scrutinize the research with peers, supervisors and academics so as to obtain any feedback that could contribute toward a richer understanding of the research findings. According to Shenton (2004) the vision of the investigator may be widened with this type of collaboration. Collaborative sessions were used to discuss flaws and alternative approaches to the research. In addition these collaborative sessions as pointed out by Shenton allowed the opportunity to test developing ideas, interpretations and to flesh out biases and preferences. Shenton points out that, when making sense of field data, it is not practical or even possible to simply accumulate information without regard to some interpretation or relationship to the whole phenomenon.

3.7.2 Transferability

Transferability refers to the degree to which the results of qualitative research can be generalised or transferred to other contexts or settings. Lincoln and Guba (1985) suggest that rather than demonstrating the transferability of research findings, a researcher's responsibility to the reader is to ensure sufficient context and detail about the fieldwork is presented. They maintain that the reader is the one who assesses transferability and the role of the researcher remains as transmitter of the context to allow inferences on transferability to be made. The researcher should help the reader to the extent that they provide a level of detail that should assist with any inferences. Guba (1981) recommends providing a full

description of the contextual factors associated with the enquiry. Shenton (2004) suggests that detail and boundaries of the fieldwork should include: number and type of organisations taking part; restrictions on the types of informants making contributions; number of participants; data collection methods used; duration of data collection sessions; time period over which the data was collected. Significant characteristics of the organisations should also be included along with any geographical details that may be considered important.

The stages of growth model applies to government departments and is specific to that type of organisation. Various departments were chosen to validate the evidence presented from the Revenue case study. Two broad categories of department were reviewed i.e. operational style departments and policy type departments that hold government agencies as their operational arms. In addition the model was reviewed by a senior manager from a centralised government department that has broad responsibility for ICT development across the whole civil service.

3.7.3 Dependability

The quantitative view of reliability is based on the concept that if an experiment is true then it should be repeatable. Positivists attempt to demonstrate reliability by showing that if the work is repeated in the same context and using the same participants and methods then similar results would be found (Shenton 2004). Although it has been acknowledged that the same degree of dependability may not be reasonable to expect with qualitative research (Fidel 1993) there are criteria that are understood to offer some dependability where qualitative research is concerned. To address the issue of dependability in qualitative research, details of the research strategy and method should be outlined such as how to enable a future researcher to repeat the work with the expectation that the same results will emerge. In that way the research design may be viewed as a “prototype model”. The idea of dependability requires the researcher to account for how a changing context may impact on the model, conjecture or theory being presented.

Methods to help deliver this assurance of dependability include presenting details of the research strategy and design describing the strategic plan for implementing the research and operational detail associated with data gathering. Some reflective appraisal of the research strategy and methods should also be included to evaluate the effectiveness of research in terms that would allow other researchers to apply a similar strategy and methods (Shenton 2004).

3.7.4 Confirmability

Where positivists look for objectivity with research, qualitative researchers acknowledge the difficulties with objectivity and so instead they use the concept of confirmability with their research. Confirmability refers to the degree to which the results could be confirmed or corroborated by others.

The purpose of this research concept or criteria is to ensure as far as possible the findings are derived from the experience and testimony of the informants rather than the researcher's prejudices (Shenton 2004). The use of triangulation once again has a significant role to play with confirmability. In addition Miles and Huberman (1994) take the view that the extent to which a researcher acknowledges their prejudices and admits their predispositions is an important step toward satisfying this criteria. Any beliefs preferences or prejudices that lie behind significant decisions made or methods adopted should be acknowledged and the reasons for favouring one approach over another should be justified or explained.

This chapter described the philosophical and methodological underpinnings of the research. It also describes the possible research paradigms and justifies the research strategy within the context of the research question. The research strategy is described as empirical research that focuses on theory building, where the methodology is interpretive using a single case study with hermeneutics as the mode of analysis.

3.8 Summary and Conclusion

Bernstein (1983) asserts that there is no rational method for choosing a paradigm and denies that there is a permanent neutral framework in which paradigms may be evaluated. The notion of what is scientific is a changing view which is grounded in social and historical practice (Rorty 1979; Bernstein 1983). This is not a relativist perspective on research paradigms, rather it is the view held by Chua (1986a) that we can understand incommensurable paradigms and in so doing understand our own prejudices.

Among all of these research paradigms a problem of choice presents itself to every researcher. Lee (1989 p. 157) contends that:

“Scientists have not yet settled among themselves on a single model of what science is.”

While there are none of what Born (1950 cited in Remenyi et al 2005) calls ‘*epistemological sign posts*’ these research paradigms provide a concerted means to solve the epistemological problem of converting beliefs to knowledge. These paradigms provide approaches, templates, methods and quality checks, to help standardise an agreed path for a type of research question. Quality checks include agreed criteria for academics to assess validity, reliability and generalisability.

On one hand these competing paradigms offer opportunities to approach a research question from a number of perspectives. On the other hand they seem to force the researcher to choose a paradigm and thus corral the researcher’s approach into certain methods. Raimond contends that:

“Scientific methodology needs to be seen for what it truly is, a way of preventing me from deceiving myself in regard to my creatively formed subjective hunches which have developed out of the relationship between me and my material”

(Raimond 1993 p. 93)

The strategy adopted in this research is an interpretive one and the primary research methodology is a single case study. This is backed up by four smaller validating case studies. Techniques used for data gathering include in-depth interviews, documentation and archival research and participant observation. The approach is also broadly historiographical in that it examines the development of the Revenue from the foundation of the organisation though the main focus is on the period following the introduction of computers into the Revenue in 1964. In this section this research approach and the rationale for it are set out.

As noted above, a research strategy sets out how the research question will be addressed, whether it is empirical or non-empirical and the research paradigm, which will be used. It sets out the methodology, the nature of the data to be collected, the data collection methods and the data analysis techniques to be used.

This research combines a number of techniques. It will rely in part on a theoretical approach in the form of some reflection, analysis and use of the concepts associated with stages of growth modelling. For the most part, however, this research, like most research in the IS field, will use empirical evidence to support or reject conjectures and answer the research questions. The following paragraphs set out the rationale for choosing this approach.

In considering possible research strategies, an obvious initial question is can the stages of growth be demonstrated using mathematical or statistical measures or models (as Nolan did in the 1970s – see below)? The answer to this is that it is far from evident that a set of measurable parameters exist whose values could be used to measure an organisation's stages of growth. This is not to say that such metrics do not exist or that it is impossible to build such a model using quantitative methods. Suffice to say that the research questions are not readily amenable to quantitative evaluation.

In addition, when the stages of growth literature was reviewed there was only one piece of research that adopted a quantitative approach (Nolan 1973) and those quantitative measures were soon undermined by Lucas and Sutton (1977). All subsequent research by Nolan in this area used a qualitative approach. Further, of the many models observed in other fields, none used a quantitative research approach.

Because this is more of a “how” question rather than a “how much” question, it would suggest that a qualitative approach to the question rather than quantitative one may offer a greater opportunity for increasing understanding.

Chapter 4 – Data Collection, Data Analysis and Stages of Growth

4.1 Introduction

This chapter sets out the steps and procedures that were carried out during the course of this research. It explains why the specific case study was chosen and how the informants and the sequence in which they were interviewed was determined. The interview schedule is described along with how data analysis was conducted.

The field research was carried out in two phases:

Phase 1 building the stages of growth model;

Phase 2 validating the findings from Phase 1 using evidence from informants in other government departments.

Figure 4.1 below outlines the phases of the research strategy. The main episodes of the research are listed along the right side of the figure. Included in this list are some of the important preliminaries which are shown at the top of the diagram along with the significant steps within each of the phases. This list also broadly reflects the sequence of this chapter.

In phase 1 of the research, a total of 30 in-depth and focused interviews were undertaken. Hermeneutics was used as the mode of analysis for this phase which incorporated data from the interviews and two other dominant sources of data namely documentation and ICT artefacts. Phase 2 is a model validation phase and incorporated a further 33 interviews with experts in four government departments.

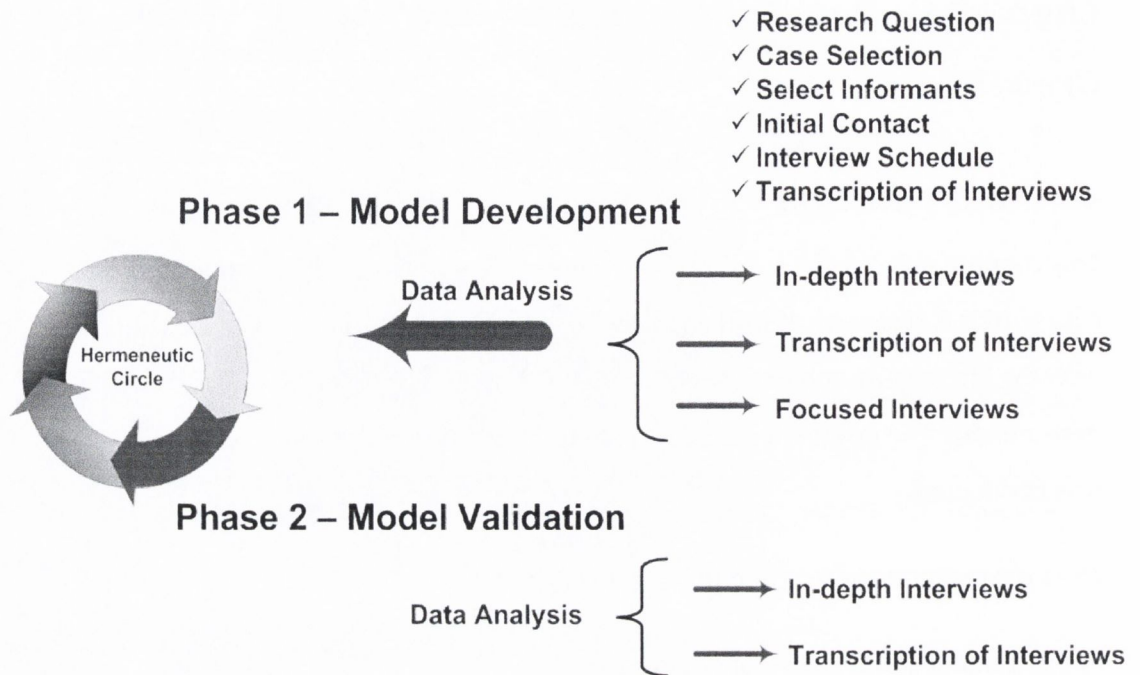


Figure 4.1 : Research Strategy

4.2 Research Question

The research question starts from the premise, grounded in the literature, that as for commercial organisations, the development of information systems in government departments, can be divided into distinct stages of growth or maturity. The three research questions follow from this:

- What is the sequence of stages through which information systems in government departments develop?
- What advantages/benefits does each stage deliver over the previous stages?
- Why do information systems in government departments develop through these specific stages and what factors enhance or inhibit progression through these stages?

4.3 Case Selection Phase 1

Revenue, the Irish national tax authority was chosen as a single case study for this research. The case was chosen for a number of reasons. First, Revenue is the oldest government department in Ireland and, as such provides a particularly rich and extended history of IS use. Secondly access to the organisation is available and extensive (see below). Thirdly, Revenue is the Irish Government department with the largest number of employees. Fourthly, it has a wide range of operational functions and a large number of information systems. Fifthly, while many Irish government departments have been broken up and re-constituted from time to time, few departments can claim an unbroken thirty year history (Bannister 2005) and none apart from Revenue can claim almost a century of development without mergers, divestments or acquisitions of additional government programmes or portfolios.

Revenue was the earliest adopter of ICT in the civil service and now has over half a century of experience with ICT. In 1967, the then Minister for Finance noted that Revenue was one of the first organisations in the country to adopt computing on a large scale.

“...the first full-scale electronic computer to be installed in this country was installed by the Revenue Commissioners.”

(C.J. Haughey Minister for Finance 1967 Dáil Eireann Debates Report 2 May 1967 cols 492-3)

In addition the researcher had, as a long serving and senior member of Revenue’s staff, substantial access to many aspects of the chosen organisation having been part of the organisation for over 30 years and having worked in many parts of the organisation including the ICT Division for the last two decades - the first ten years as a systems analyst and developer and the remainder as a senior manager in that division.

Revenue is managed and directed by a board of two Commissioners and a Chairman (see figure 4.2). There are 15 Divisions within Revenue which have the following functions:

- Four Regional Divisions:

Each region is responsible for customer service, compliance and audit functions to customers resident in and businesses managed and controlled in each region with the exception of large corporate and high net worth individuals.

- Large Cases Division:

The Large Cases Division provides customer service, compliance and audit functions relating to the largest businesses and wealthiest individuals.

- Investigations and Prosecutions Division:

This division manages and coordinates all of Revenue's investigation and prosecution activity, particularly for serious cases of fraud and evasion.

- Three Revenue Legislation Service Divisions:

These divisions draft and develop legislation and policy for all of the taxheads (a taxhead being a type of tax, e.g. VAT, gift tax, income tax, etc.).

- Planning Division:

Planning Division develops and evaluates operational policy and provides forecasting and analysis for the board and other Divisions.

- Corporate Services Division:

The Corporate Services Division is responsible for resource management strategies and manpower planning and the Accountant General's Office.

- Corporate Administration and Customs Division:

This Division evaluates corporate performance and develops strategies for corporate reform.

- Revenue Solicitor's Office:

The Revenue Solicitor’s Office provides comprehensive legal support, including the conduct of litigation and appeals and the prosecution.

- Information, Communications Technology and Logistics Division:

This division provides information technology support and services for the organisation.

- Collector General's Division:

The Collector General’s Division collects and lodges monies taken from taxpayers under each of the major taxheads. It also operates pursuit mechanisms for non-compliant taxpayers.

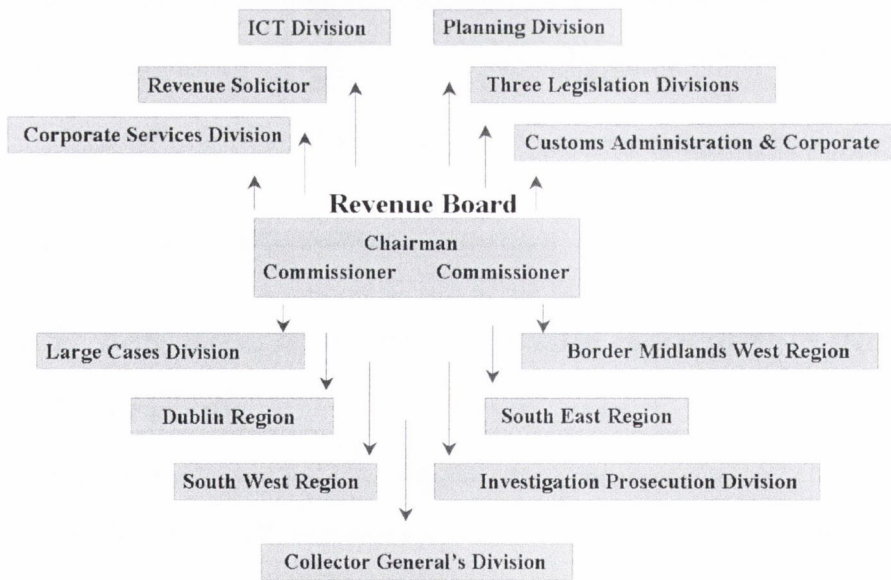


Figure 4.2: Revenue Organisation Structure

4.4 Case Selection Phase 2

Phase 2 of the research involved choosing a number of government departments which could be used as validating cases for the findings from the single case study

and the stages of growth model. There are 16 Irish departments of state (see figure 4.3). (Aside: Revenue is not, constitutionally, a department of state). Of these 16, there are only two departments which are of comparable size to Revenue in terms of number of employees, namely the Department of Social Protection and the Department of Agriculture, Food and the Marine. In addition, both of these are, like Revenue, operational departments by which is meant that they have extensive day-to-day dealings with the public. Both departments make extensive use of ICT and have a long history of such use (albeit not quite as long as Revenue). These departments were obvious choices for validation. For comparative purposes however, it was decided that a smaller, policy orientated department should also be included in order to test whether the model held up when applied to smaller organisations. There were several of these from which to choose. The Department of Transport was chosen (arbitrarily) as being representative of this group. Finally, it made sense to include the division of the Department of Public Enterprise and Reform responsible for ICT throughout the civil service as this group would have a broad overview of the development of IS usage across the entire civil service.

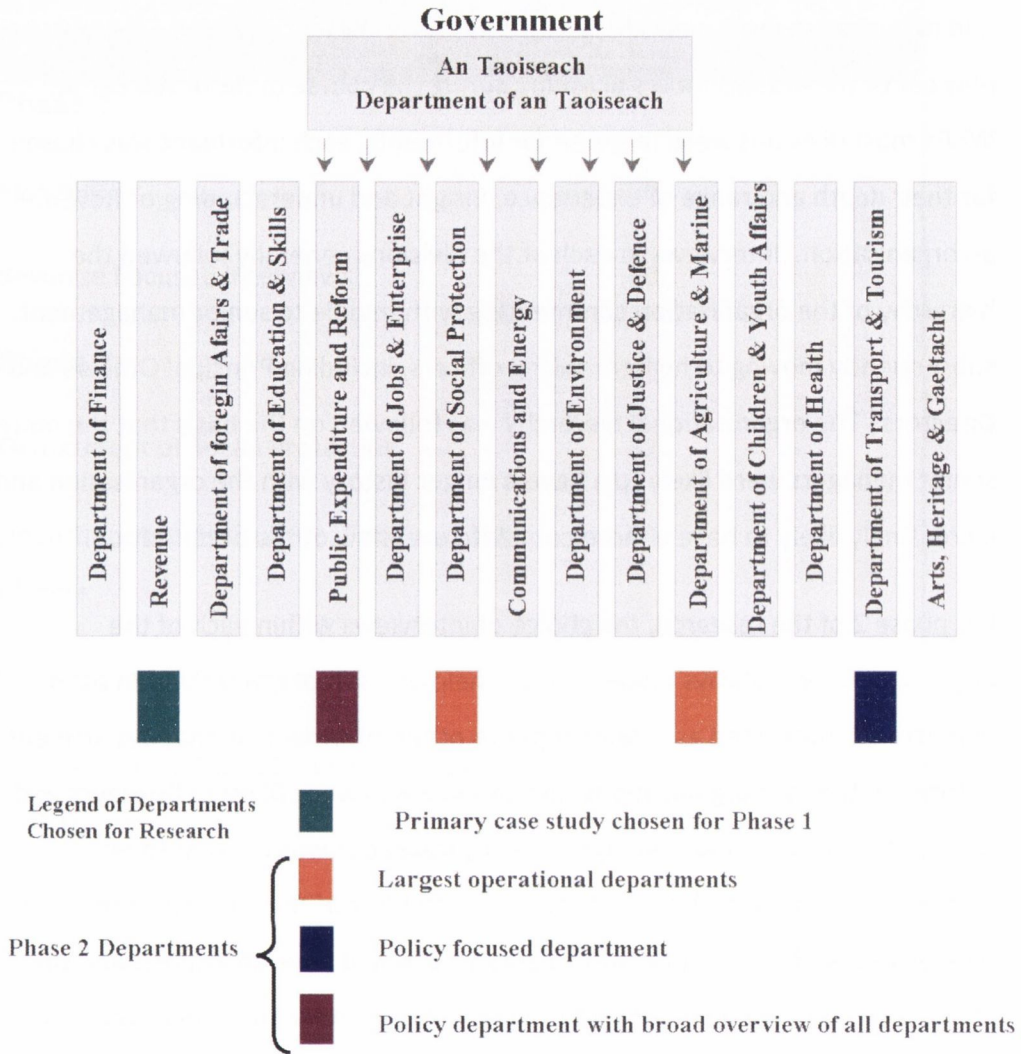


Figure 4.3: Government Departments Chosen for Phase 2

4.5 Selection of Knowledgeable Informants and Order of Interviews

Informants for Phase 1 of this research were chosen exclusively from current and retired Revenue staff. Informants were chosen for their specific experience within the organisation. Informants were chosen from the Regional divisions, ICT Division, Planning Division and Corporate Services Division; the Collector General's Division, Customs Administration and Corporate Division. Informants were chosen for their broad experience across the organisation and their knowledge of the organisation's business processes and information systems. All the informants had more than 20 years' experience working in the organisation

and many had in excess of 30 years. Each informant had typically worked in a number of the organisation's divisions during the course of his or her career. While most divisions were targeted for informants, each informant was chosen for their depth and range of experience, insight and understanding of Revenue as an organisation. Interviews in each of the divisions generally followed the hierarchy of the organisation commencing with middle to senior management, subsequently moving to higher ranking officers, including Principal Officers and Directors. The organisational hierarchy was followed on the basis that the more senior managers were likely to have a longer history with the organisation and increasingly likely to have a more complete overview of the organisation.

For phase 2 of the research, the choice of interviews within each of the organisations was always made with the help of a senior official within each department who acted as a gatekeeper to other informants in that department. In three of the four organisations, the gatekeepers were Division Directors and in the fourth it was a senior manager. Each gatekeeper was the first to be interviewed and on the basis of their understanding of the interview schedule, they were asked to nominate informants who would have an interest and the ability to engage meaningfully with the research. Gatekeepers were requested to nominate informants from the ICT Division, policy divisions and operational wings of the organisation.

Figure 4.4 shows the numbers and types of interviews held during each phase of the research. For phase 1 there were 20 in-depth interviews performed and 10 focused interviews. The 20 in-depth interviews established each of organisation's stages of development. While these interviews also helped outline the stage change mechanisms, the focused interviews concentrated on the stage change mechanisms. Some of the focused interviews were performed contemporaneously with phase 2 interviews in order to clarify and gain further insight into the mechanisms that precipitated the specific change from one stage to another.

Interview Source	Number of Interviews
Phase 1	
Revenue	20
Revenue Focused Interviews	10
Phase 2	
Department of Social Protection	12
Department of Agriculture, Food and The Marine	11
Department of Transport	3
Department of Public Enterprise and Reform	2
CMOD	
Consultants	5
Total	63

Figure 4.4: Table showing number and type of interviews for each phase.

4.6 Making Initial Contact

For Phase 1 of the research, each of the informants was given two briefing documents in advance of the interview (see documents at Appendix 4). The first document was an overview document which outlined the purpose of the interview. It included a short definition of an information system and some clarifying remarks around the concept of stage development and stages of growth models. The second document outlined a number of significant events that had occurred in Revenue since 1923. The short history was provided to bring these events back to the informant’s memory so as to assist with the line of questioning. This document was compiled with reference to Revenue’s annual reports during the period 1924 to 2008. At the outset of each interview it was

pointed out that the history was merely a memory aid, was not exhaustive and did not implicitly or explicitly set out the stages of growth that were the subject of the interview. This document was an important reference point for both the researcher and informant throughout the interview. Yin (2009) describes how important it is for the researcher to be completely conversant with all of the background surrounding the topic, including the organisation and its history and significant reference points.

For Phase 2, informants were given a different set of briefing documents which included the overview document provided for Phase 1 informants and a diagram of the Revenue stages of growth model as established during the 20 semi-structured interviews held during phase 1 of the research.

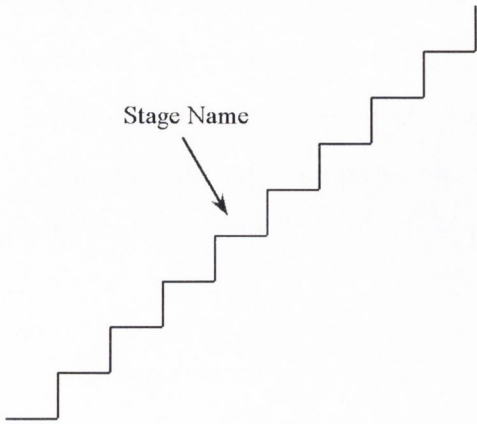
Interviews were normally held in the informant's office. Interviews commenced with a short conversation about ethics¹¹ whilst pointing out that any information provided would not be directly attributed either by a named quotation or any other method without prior approval in writing. Each informant was asked if he or she were willing to allow a recording of the interviews. It was emphasised that these recordings would also be kept confidential and later destroyed. Each interview was between an hour and a half, and two hours in duration.

4.7 The Interview Schedule – Phase 1

The interview schedule was developed with the help of three exploratory interviews. The exploratory interviews were conducted to help establish an interview protocol. The interviews were held with three senior managers selected for the length and depth of their experience of Revenue's information systems. The interviews explored how increases in efficiency and effectiveness with Revenue over time might be identified. In the course of the first interview

¹¹ In conformance with college procedures, ethics approval was sought prior to the field work. Due to an administrative oversight, ethical approval was not granted prior to the field work. The ethics committee subsequently approved the approach taken for the study.

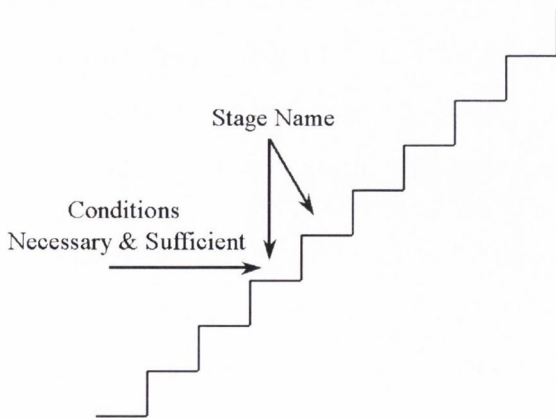
no reference was made to the fact that the research was about a stages of growth model for Revenue and other government departments. It became clear during this first interview that it would be better if, in subsequent interviews, the



purpose were explained to the interviewee from the outset. The next two interviews helped establish the interview schedule for the remaining semi-structured interviews for phase 1 of the research. The first three interviewees were chosen at random, using the criteria described above. The interview schedule

for Phase 1 of the research was a simple two-part composite question with an initial part that asked each informant to identify a significant stage of development that had been achieved by Revenue. Once the informant identified a stage, it was marked and drawn onto a 'stairs like' diagram on a piece of A3 paper (some examples of these artifacts are contained in Appendix 5). The diagram opposite describes the technique. Both naming and identifying a position on the 'stairs' help to create a starting point for the conversation. The initial stage was always placed mid-way on the stairs diagram. This gave the clear impression that there were many steps before and after this one – even if the stage chosen was clearly a late stage of development within the organisation.

The second part of this composite question asked the informant the following question: "What are the conditions that are necessary and sufficient for this stage



of development to have come about?" (in some cases this was clarified by rewording the question as follows: "What needed to have been there before this stage, to allow that stage to happen?"). This composite question would identify two stages of development – the

chosen stage and previous conditions or stage within the organisation. When a prior stage was identified, named and drawn onto the diagram the second part of the question was asked once again – “What are the conditions that are necessary and sufficient for that stage to have come about?” So each part was identified separately, but always holding the contingencies of these stages in clear view. This composite question was asked recursively throughout the interview to identify previous stages. This approach served to break down the task iteratively and also build the bigger picture incrementally.

When distinct stages were identified by the informant, the conversation was directed toward clarifying two issues; was this indeed a distinct stage of growth, and, what were the distinct features of that stage, including any supporting evidence that would identify it as an information system within the organisation. When two distinct stages were identified and agreed, the conversation was directed toward stage change mechanisms and considerations about why the organisation had moved from the preceding stage to the next one.

4.8 The Interview Schedule – Phase 2

The purpose of phase 2 interviews was to validate or amend the Revenue model with evidence from other government departments. The interviews consisted of a short presentation outlining the stages of growth model after which the informants were invited to criticise the model constructively including saying what they felt was correct or incorrect about the model in the context of their organisation. A diagram of the Revenue model was presented to each informant in advance of the interview. The diagram was used during the interview process. Differences or similarities were marked on the diagram as the interview progressed (some examples of these artifacts are shown at Appendix 6).

What emerged from each interview was either a confirmation of the existing model or an amended model. Similar to the phase 1 interviews, when the informant was satisfied that their organisation had moved through a particular set

of stages, the informant was asked 'why' or 'how' this move took place. Some examples of the diagrams used are shown at appendix 5.

4.9 Transcription of Interviews

Where an interview was recorded, the recording was transcribed for analysis. The audio recording itself involves a level of abstraction where body language, posture and gestures are lost without any annotation. A further abstraction occurred at this level when further details that were integral to the interview, such as sketches of the model, were also lost at the recording level. Although verbatim transcriptions can yield a large number of words and sentences with considerable amounts of detail, they can often appear sterile, losing some of the nuances associated with the interview itself. In this research, the first two interviews were transcribed verbatim by a third party, who was offered some instructions for the transcription process. These transcriptions offered little in terms of an understanding of how the conversation progressed and what were the significant empirical findings from those interviews.

After discussing the content of these transcripts with informants, it was decided that large amounts of the tone and positive results from the transcriptions were lost. Informants felt that they themselves sounded incoherent and confused, when in fact the interview was assessed mutually as being fluent and productive. It was decided that this method of transcription was not suitable and all subsequent recordings were transcribed by the researcher, capturing the nuances, direction and essences of the interview. This type of transcription involves an interpretive process and where appropriate to the research it can contribute toward a further understanding of the contextual whole that was the interview (Kvale and Brinkmann 2009).

Where interviews were recorded the following procedures were followed. Each recording was listened to a number of times which allowed some interpretation before the interview was transcribed. Transcriptions were interpreted and summarised to approximately three or four pages in length. Each interview was

transcribed shortly after the interview. After the initial transcription was made, some additional field notes were added, to clarify any interpretations made during the course of the interview. The informants were given the opportunity to review the transcripts to clarify or change any interpretations made.

4.10 Other Data Sources

Other data sources that had potential value were identified in the methodology chapter. These include documentation, archival records, physical artefacts direct observations and participant observation. The documentation included reports from studies performed by consultancy groups and white paper type documents as well as position papers on organisational change or annual reports. The historical narrative for the organisation was compiled by reference to the following documents:

- Three reports from Commissions on taxation;
- All Revenue annual reports between 1924 and 2008;
- A history of Revenue written by Seán Réamonn (Réamonn 1981);
- A Master's dissertation which reviewed the role of technology in Revenue up to 1986 (Connolly 1986)

Artefacts such as ICT applications, business processes and organisational structures also offered substantial insights and evidence that contributed towards the research findings. These data sources were used to triangulate, qualify or corroborate data that had already been obtained from interviews.

4.11 Phase 1 Data analysis: A Framework for Model Development

Phase 1 interviews were analysed as they were conducted in a way that approximated Cole and Avison's (2007) six step approach for hermeneutic analysis. The six steps are shown in the diagram below (figure 4.5) and

correspond to one cycle of the hermeneutic circle. Each interview was regarded as a cycle or rotation around that same circle. It should be noted that this approach to data analysis is pervasive throughout many of the research steps described above. For that reason some steps will be reviewed in the following section so as to more clearly describe how the data analysis was conducted.

Hermeneutic Approach to Data Analysis

Phase 1 – Stage Development

Hermeneutic Circle

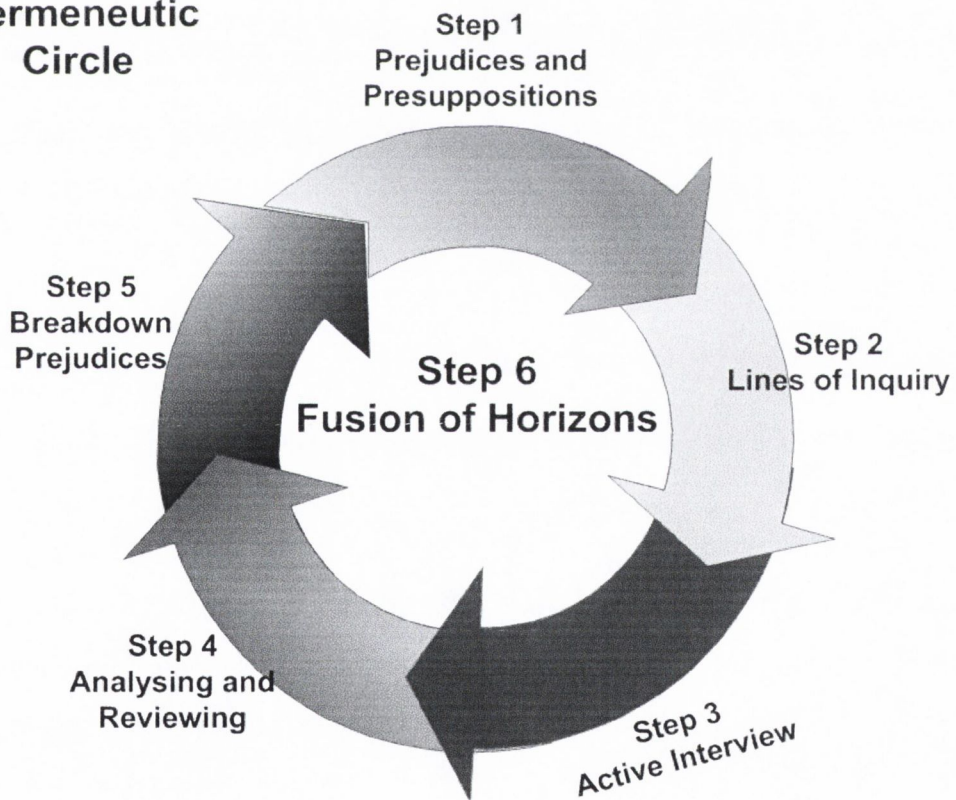


Figure 4.5: Hermeneutic Circle

4.11.1 Step One: The Explication of Prejudices and Presuppositions

The first stage of any research analysis process is to establish a research focus and transform what might be a large volume of data into more usable information. For researchers using constructivist hermeneutics, there is an additional requirement which according to Cole and Avison (2007), involves clarifying any presuppositions or prejudices that are held either by the researcher or by the content or formulation of the research question. The aim of this process is to allow the researcher to understand the interpretive lens prior to data collection and analysis. According to Darke et al (1998) there are two types of bias: the bias associated with the effects of the researcher on events and behaviour of informants at the point of data gathering. The second type of bias relates to the researcher's own beliefs, values and prior assumptions that may influence the course of the research. According to Walsham (1995) biases arising from researcher effects during data gathering is in one sense unavoidable. Effects on informants may arise either weakly by attempting to understand, describe and interpret the phenomena in question, or strongly by creating a partial reality via the constructs they use to view the world (Orlikowski and Baroudi 1991). Both of these biases were acknowledged and mitigated as part of this research.

With regard to the first type of bias, as the researcher has worked within the organisation for the last 30 years it is reasonable to expect that some prejudices would be held with regard to the organisation's stages of growth. Prior to choosing an interpretive approach the researcher held the view that the organisation had progressed through stages of growth and that these stages of growth would be observable via data associated with the variations in the cost of administration. The cost of administration was plotted in various forms in the hope that a pattern or patterns would emerge that could describe increasing or decreasing levels of efficiency or effectiveness within the organisation. No patterns were observed from this initial research. This initial conjecture and prejudice could not be grounded in numerical evidence of this nature and was therefore abandoned in favour of an interpretive approach to the research. Adopting an interpretive approach does not avoid prejudice or bias. For Miles

and Huberman (1994) biases in the researcher's collection and analysis of data can be counteracted by using multiple sources, instances and types of evidence in order to triangulate the findings. As mentioned at 4.8 above, other data sources were used to triangulate findings and so mitigate any biases that had potential to influence the findings by preventing investigation and consideration of possible contradictory data. Findings were triangulated by way of: documentation, archival records, physical artefacts, direct observations and participant observation. The documentation included reports from studies performed by consultancy groups and white paper type documents or position papers on organisational change or annual reports. Other artefacts such as ICT applications, business processes and organisational structures were also used to corroborate the findings. Some additional sources of evidence included a book written on the history of the organisation and a master's level thesis. All these additional data sources were used to qualify or corroborate data that had already been obtained from interviews.

Another potential for prejudice existed with the historical document that was presented to each of the first 20 phase one informants. While the document had some potential for bias, care was taken to mitigate this bias by presenting the events and history in a strict chronological order that reflected the sequence of events all of which were compiled by reference to the many Commissions on taxation and all of the Revenue annual reports dating back to 1924. This document was only made available to informants during Phase 1 of the research. This document was not considered necessary for Phase 2.

Some presuppositions or assumptions were made during the course of the research. Firstly the conceptual lens of a 'stages of growth' model carries a number of assumptions. The first two assumptions are that there are distinct stages through which organisations progress and that they are observable (see chapter 1 section 1.5.3). This view was explained to each informant before or during the interview in the following way. Two types of growth or learning were described; vertical growth also understood as conceptual learning and horizontal growth also referred to as operational learning (Kim 1993; Chen et al. 2003).

Vertical growth or conceptual learning occurs when members of the organisation challenge the organisation's underlying assumptions, values, and procedures, attempting to replace them with new ones. According to Chen et al. (2003) vertical growth requires that the organisation changes its pattern of thinking and that it questions its operating principles. Horizontal growth uses existing conceptual models held within the organization to create efficiencies. This type of learning or growth is concerned with detecting performance deviations from standards and goals, and reducing the level of divergence through systematic problem solving.

Thirdly, this 'stages of growth' model does not assume that previous stages are discarded once the next stage has been attained. This type of model, in line with many others (Piaget 1937; Maslow 1943; Kohlberg 1973) does not make this assumption, rather as each stage of development is achieved it is retained as a capability.

A final assumption was that each informant would define the term 'information system' in the same way. This is more a point of clarification that was settled with each informant from the outset. It was important that informants understood that the term information system included organisational processes or systems, which may or may not have technology supporting it.

4.11.1.1 *Stage Change Mechanisms*

While trying to determine the stage change mechanisms, there was a presupposition that the model taken from Phase 1 was accepted as a basis for this part of the research. During the focused interviews, informants were encouraged to adopt a less critical view of the model and focus on each stage change in an effort to review and analyse the causal mechanisms.

Finally, there was a view held by many informants that each stage change came solely as a consequence of management intervention. Where managers held this prejudice it was mitigated by discussing other influences and by broadening the conversation more widely into the political, economic and social arenas.

4.11.2 Step Two: Formulating Lines of Enquiry

“Unlike other qualitative research approaches, constructivist hermeneutics uses the deconstructed parts to inform the lines of enquiry and drive the research process. Specifically, the ‘parts’ determined by the researcher to be key elements of the ‘whole’ are used as the themes for discussion while collecting data during interviews. The first line of enquiry serves as the reference criterion for the study. This imposes structure on the research design helping to assure consistency of focus across subjects, time periods and different analytical stages.” (Cole and Avison 2007 pp.824)

The line of inquiry for Phase 1 was to establish the stages of growth and the change mechanisms that brought the organisation from one stage to the next. From the outset, this research was designed around identifying specific parts that relate to the whole. This approach influenced the choice and design for the interview schedule. As mentioned above, a single composite question was established as the interview schedule.

4.11.3 Step Three: Conducting the Active Interview

Phase 1 interviews were generally with senior managers and were conducted privately in each of their offices. The interviews took place at a table where an A3 page was used as a central source for notes for both parties. A number of coloured pens were provided so as to encourage the informant to engage with taking notes, sketching issues and scenes and also contributing toward building the model itself – as suggested above. This approach ensured that analysis and interpretation were conducted during the interview and this interpretation was generally agreed between both parties at the time of the interview and confirmed with the model drawn on the field notes page.

According to Cole and Avison (2007) the active interview is theme oriented, where two people talk about a theme that is of interest to both and where the researcher obtains data in the form of meanings offered by the informant. This requires the researcher to empathise with the informant in order to collect data where the meaning can be obscured. As this type of conversation is a dynamic

situation where meanings are fluid, complex and ephemeral, the key is to focus on nuanced descriptions that depict the many differences and varieties of a phenomenon (Kvale 1996; Cole and Avison 2007). According to Cole and Avison, there are two techniques that help uncover and verify the nuances of a phenomenon; declarative statements and contrast structures. Declarative statements are used to create a reality that allows the theme, phenomenon or aspects of the phenomenon to be placed in a context for evaluation. Contrast structures are used to identify normal and abnormal conditions that help to further evaluate the declaration. The protocol for each interview was designed to maximize the number of declarative statements and contrast structures.

All Phase 1 interviews focused on the informant making declarative statements that identified stages of development, then naming the stages and placing them on the stairs diagram. Once a stage of development was declared by the informant, the conversation quickly moved to contrast structures where the stage was put into context and an attempt was made to reify the stage by contrasting it firstly with the conditions that were necessary to bring that stage about and secondly by declaring the previous stage of development. This method was used iteratively to develop the overall stage model. At the end of each interview a stages of growth model was developed.

Care was always taken not to be overly critical about stages that were chosen by informants. Where an informant identified a stage of development this was accepted as such and the second question was applied. Being overly critical when an informant attempted to identify a stage would have been counterproductive. Firstly, it would make the informant feel that they had made the wrong choice and that it may be beyond their ability to identify one of these stages. Consequently, the informant may feel as though the researcher is the expert and that they should just sit and listen to the researcher's view on stage development. It was important to generate a sense of accomplishment with the informant and a sense that they had a good understanding and approach to this exercise. Secondly, it was important that the informant understood that each stage was a

co-construction with the researcher and as such they could be reviewed critically without personal feelings intruding on the process.

Testing and criticism of the model was approached with each interviewee, from four perspectives:

- Did each stage follow logically from the previous stage?
- Could this stage have happened at an earlier stage?
- Does the stage coincide with the concept of vertical learning or does it amount to horizontal growth within the organisation?
- If an organisation started up now, could they apply this stage immediately?

4.11.3.1 *How Stages Emerged*

New stages emerged as the research progressed. For example, the first number of interviews identified three possible stages. When those same stages emerged again at subsequent interviews, further discussion and analysis was carried out. As those same stages emerged with more frequency, there was less discussion and analysis and so the stages were accepted as valid and the discussion moved forward. Later, interviews moved more quickly through the stages, only because sufficient analysis and discussion had been carried out at previous interviews. Where stages had been encountered in previous interviews and had been verified sufficiently, discussion was kept to a minimum and the interview focused on other stages. As the interviews progressed a more complete stage model emerged. This is in line with the hermeneutic approach. Eventually a saturation point was reached for each of the stages and the model as a whole.

Change Mechanisms

The focused interviews, which formed part of the detailed effort to identify change mechanisms, were always held against the backdrop of the most current framework or stage model. These interviews helped to gain insight into the change mechanisms and also fleshed out some detail or logical inconsistencies

with the stages themselves. For instance, on one occasion a focused interview on change mechanisms helped to establish that the stage was not logically consistent with the overall model and sequence of events.

4.11.4 Step Four: Data Display, Analysis and Thick Description

Cole and Avison (2007) describe this step as the point at which the data has been collected through active conversations and where that data is displayed for the purpose of reflection and reconstruction. According to Miles & Huberman (1994) data display is a valuable way to categorise data and to make something plain, or intelligible, through a rich description of the relevant structure. The aim is to produce a thick description (Geertz 1983 cited in Cole and Avison 2007) of the phenomena and its constituent parts rather than simply an explanation of how those parts are connected.

For this research, there were two parts to this analysis of codes. Firstly, the interview itself gave the opportunity to review the model and stage construction as a narrative and also graphically. In addition there was an opportunity for analysis at the transcription stage. After each interview all the evidence including the field diagram was examined in an attempt to analyse and create a richer view of the model. Where other sources of data were available to corroborate or contradict a stage or stages, these were taken into account.

Cole and Avison describe this as a method of creating a separate awareness of each interview as a distinct opportunity for data analysis. As a result, data is analysed as it supports, or contradicts, the researcher's conceptions surrounding the dominant lines of investigation. The researcher decides which elements are significant. Verification is achieved through further interviews, the number of which ultimately depends on the degree of variance between the interpretations arrived at by the researcher and informants throughout each of the interview processes.

4.11.5 Step Five: Reflection and Logical Consistency

Reflecting on the logical consistency of the model requires the researcher to re-assess their particular understanding of the nature of each component in the overall phenomena. Instead of moving towards interpretation, the researcher is left trying to make sense of the new information before him. According to Cole and Avison, constructivist hermeneutic thought suggests we attempt to understand this new information within the context of what we already know. Here the researcher may 'borrow' preconceptions used to explain other phenomena as a bootstrapping exercise but ultimately the researcher must attempt to construct a new explanation and in doing so, remake the model once again for 'testing' through further interviews.

This was a feature of both phases of the research. According to Cole and Avison, achieving a shared meaning requires exposure to alternative lifeworlds on the part of the researcher. They explain how expanding his or her appreciation of different attitudes and behaviours may provoke a 'breakdown' in the researcher's unconscious understanding about a particular issue or theme. Different to the miscommunication of meanings that characterise active interviews, breakdown refers to the discrepant experiences, or theoretical anomalies, that may appear during data analysis. This type of breakdown occurred during or after many of the interviews. Where breakdown occurred after the interview, it was typically where, on review of the data, an overall perspective was taken on the stages outlined. Where this breakdown took place and resulted in a review of the model from that described at the previous interview, a follow-up interview or short discussion was scheduled to discuss and review the discrepant stage or detail.

According to Lee (1991) a theory that allows predictions of contrary or mutually exclusive events lacks logical consistency. Analysis of the evidence revealed logical inconsistencies that needed to be reconciled. In some instances, new stages of growth were aligned with significant events in the organisation's history. For example, four informants identified the introduction of the Revenue Online Service (ROS) as a significant stage in the development of the organisation. On reflection, this was not regarded as a stage of development. This was merely the introduction of a new technology that allowed further processes to be

automated. Process automation had already been identified as a stage of development and this did not bring a new way of thinking that computing had not already introduced to the organisation.

During the many cycles of development and analysis, a number of candidate stages such as this emerged and were discounted. One of the considerations during analysis was whether the organisation had approached this view before, and if so, was it a perspective or understanding that had persisted in the organisation over time? In other words could this have been viewed as horizontal learning or was it true vertical learning?

4.11.6 *Step Six: Fusion of Horizons*

Cole and Avison describe the final step as a fusion of horizons, a consensus of shared meaning that brings understanding beyond the current understanding and insight. With each interview or every cycle of the hermeneutic circle, there is a fusion of horizons that assimilate the partial views from each of these cycles. These fusions that are created along the way are referred to as partial fusions. For phase 1 of the research these partial fusions of horizon occurred with each interview and as each interview formed a new horizon, insight and understanding was cumulative and could be observed at intervals. Cole and Avison (2007) point out that the researcher needs to be able to distinguish between these partial fusions as they relate to specific themes or issues and to *verstehen*, which is an overarching insight into the issues or phenomena. Partial fusions occur as mid-way points towards the final interpretation and provide the researcher and sometimes the informant with a richer description of one of the 'parts'.

Within each cycle, prejudices were held, broken down and analysed, resulting in a review of the model from that described at the previous interview. Where stages or detail found at one interview were at variance with evidence from previous interviews, a follow-up interview or short discussion was scheduled to discuss and review the variance. Reconciling these variances provided an opportunity to obtain what Cole and Avison (2007) refer to as a 'partial fusion' of insight. Where a breakdown of a stage occurred in the context of the next interview, it was

decided that this was another cycle and did not warrant a return to the previous interview to fuse horizons.

As a final part of phase 1, all cycles of interpretation and refutations were assimilated. Each interview provided a partial fusion, adding recursively to Phase 1 of the research. A partial fusion of horizons for Phase 1 culminated in a stages of growth model that was brought forward to the next phase of the research.

4.12 Phase 2 – Model Validation

This phase seeks to confirm the model by validating the results with other government departments. While the stages of growth model could be shown to apply to Revenue, the question remained – could this model be meaningfully applied to other government departments of state? Phase 2 was designed to establish the transferability of the model to other contexts and settings. Four further departments were chosen to corroborate or triangulate the evidence presented from the Revenue case study. The quantitative view of reliability is based on the concept that if an experiment is true, then it should be repeatable. In this research the idea of dependability requires that a changing context be accounted for by changes to the model.

Gummesson (1991 cited in Remenyi et al. 2005) refers to theory validation as a method to help establish a ‘good fit’ between theory and reality. The researcher can triangulate a study in such a way as to draw upon evidence collection methods and use multiple informants in order to demonstrate the ‘fit’ between theory and reality. In this instance phase 2 of the research involved approaching multiple informants from four government departments to validate¹² the Revenue stages of growth model. This task was approached from three perspectives. Firstly, did the stages of the model match stages observed within each of the government departments? Secondly, was the stage sequence acknowledged as a valid interpretation of the paths of development found in

¹² Remenyi et al. (2005) acknowledge the term validity in the context of non-positivist research.

other departments? Lastly, were the stage change mechanisms similar for other departments?

Each interview for phase 2 commenced with a description of the model that was established during the first 20 phase 1 in-depth interviews in Revenue. Each stage was described along with the context in which they emerged. The interviews continued with a description of the interview schedule and how the stages emerged during the Revenue interviews. Each interview then walked through each of the stages of development starting with stage 1 and establishing whether this stage had been established within the corroborating department. Where any stage was judged to have been attained in a department, interviewees were asked why they considered that that stage had been attained so as to substantiate this finding and corroboration. Phase 2 of the research did not rely solely on the informants for refutation or confirmation of the model derived at phase 1 of the research. Evidence provided by informants in phase 2 was triangulated with documents and from the operational IT systems in each department. In addition this type of evidence was triangulated by reference to artefacts that existed within the department, such as business processes, information systems, ICT systems, organisation structures, documents, reports or statements of strategy. Documents examined in each department included:

- ICT statements of strategy or strategic plans
- ICT position papers
- Technical architecture diagrams
- Business process diagrams
- Organisation charts and organisation structure diagrams
- Project initiation documents
- Application descriptions

During the course of phase 2 it was found that as many as five stages could be corroborated with the validating departments. Where many stages were corroborated with another department the next part of phase 2 involved corroborating that the sequence of each of these phases. In addition, the stage change mechanisms were explored for differences and similarities.

During the course of phase 2 interviews the researcher sought to validate the Revenue model against each of the other government departments. The researcher focused the attention of each informant toward breaking down previous findings and so arrive at an interpretation that was more informed, one that could more accurately describe the organisation's stages of growth. In this way there was a fusion of understanding/horizons between phase 1 and phase 2 of the research.

4.13 Verstehen - Overall Fusion of Horizons for both Phases

The final stage of the framework, "Verstehen", is achieved when a consensus of shared meanings is converted into an interpretation that is more informed, and sophisticated than any preceding interpretation. The aim is to create, through shared meanings, new concepts that transcend originally held meanings. It is these transcendent meanings that culminate in what Cole and Avison refer to as "Verstehen".

The process of arriving at *verstehen* involved constantly reviewing the evidence against the findings and adjusting the findings to deliver a more consistent and rational model. Reviewing the model was not a single process, it was one that was approached time and again where each stage was reviewed, each change mechanism was reviewed and the overall model was reviewed. These reviews were assisted with those informants from phase 2 of the research. In addition, reviews were carried out with supervisors at regular intervals and on a number of occasions the model was peer reviewed by journal editors, conference reviewers and discussions at conferences. The model and findings were assessed according

to the level of internal and external consistency (Yin 2009). Internal validity looks to how the causal relationships are identified and distinguished from spurious ones. External validity refers to how and in what context the findings can be generalised.

Internal validity for this research required that inferences around the causal mechanism for change were consistent, rational and accorded with the evidence. In particular inferences were made where an event or events resulted in the organisations in question moving from one stage of development to the next. Arriving at *verstehen* required that these inferences be reviewed repeatedly to see if the inference was logically correct. In addition each of the inferences and change mechanisms were reviewed for rival explanations and other possibilities that may not have been considered. Explanations and inferences were also reviewed from the empirical evidence to ensure that all the evidence showed a convergence toward the same inference or explanation of the phenomena at each stage of the developmental model.

External validity was the focus for phase 2 of the research. A piece of research can be judged to be externally valid if the findings can be generalised beyond the context of the immediate case study. Arriving at *verstehen* involved reviewing the model repeatedly for external validity. The purpose of this repeated review was to maximise every opportunity to bring the particular results and findings from phase 1 to a broader theoretical model that would have application across all government departments. Phase 2 of the research tested the model by attempting to assess if the findings could be replicated in another government department where it was implied that the same results should occur.

The final part of the hermeneutic cycle as outlined by Cole and Avison is noted as the last interpretive process of communicating results of the research – as writer for reader. Elements of the research process were formed into a narrative that emphasised progress as an emerging insight and understanding.

“Weaving this story involves large amounts of intuitive decision making regarding elements of emphasis. In presenting the story to the reader, the researcher-as-author continues to refine, reject and highlight different elements into a coherent whole. Consequently, the framework explicitly acknowledges that interpretation of the data does not stop with the data analysis but is also a part of the presentation and discussion of that data.”
(Cole and Avison 2007 p. 826)

4.14 Conclusion

Overall, the interview quality was judged against criteria set out by Kvale and Brinkmann (2009). Kvale and Brinkmann set out six quality criteria for semi-structured interviews. Quality is valued in terms of:

- The informant delivering rich relevant, specific and spontaneous answers to questions.
- A shorter question from the interviewer and a long answer from the informant.
- The degree to which the interviewer clarifies relevant aspects of the informant’s answers.
- Whether the interview is used as not alone a method of data collection but also as a method of analysis and interpretation.
- The interviewer being able to verify his or her interpretations during the course of the interview.
- The interview is a self-reliant story that requires little additional explanations.

The final three quality identifiers refer to the extent to which the interview was interpreted throughout the interview itself, where the interviewer verifies the interpretation and finally, where there is an agreement between the participants. Kvale and Brinkmann describe these last criteria as the most difficult to meet.

Both phases of interviews were judged against these criteria and were considered to be successful in that each interview produced a model, to the extent that it was possible and that there was close agreement on the output from each interview with little requirement for further interpretation. Although each interview in itself held its own interpretation, there were further interpretations added as the hermeneutic circle turned with each subsequent interview.

The research strategy outlined a two phase approach to the design of the research, where the initial stage took a model building approach and the second phase looked to reconstruct the model in the context of other departments, in an effort to increase its generalisability.

In the event, both phases were executed, but there were additional focused interviews held after Phase 1 which were deemed necessary to develop a better model of the change mechanisms. This was a pragmatic adaptation to the research strategy and one that had much value. In retrospect, when considering if this should have been conducted as a separate phase within the strategy, it is conceivable that it could have been designed like this from the outset.

Chapter 5 – Findings

5.1 Introduction

This research set out to establish how information systems in government departments develop over time and why they develop in the way they do. In chapter one it was postulated that a number of distinct stages could be discerned in this process and that each stage evolved because it provided particular advantage and/or benefits relative to previous stages. While several existing models of stage development of e-government can be found in the literature, each had significant limitations and/or weaknesses and none provides a satisfactory or adequate account or explanation of how large government organisations evolve.

By its nature, this research has been exploratory and the number of stages and their characteristics therefore emerged as the research progressed. From the research, eight stages have been identified (see figure 5.1). This chapter describes each stage, its characteristics, why it can be considered distinct and separate and how it relates to other stages. The model is also divided into two distinct phases. Phase 1 is titled the Machine Bureaucracy Phase, which includes the first four stages and shows the progress toward a bureaucracy, which in many ways resembles a machine bureaucracy as understood by Mintzberg (1981). Phase 2, the Entrepreneurial Phase, incorporates a further four stages which describe how the organisation moves toward a more proactive entrepreneurial role. One informant (Appendix 7 shows each Informant's rank/position and Department) describes movement through these phases as follows:

“In broad terms it can be argued that the developments in ICT, combined with the expertise of staff have enabled Revenue to move over time from a reactive role to a much more proactive role. When ICT released Revenue from the factory type drudgery of day to day processing it gave us a chance to concentrate on various different projects and provided the means to categorise and target non-compliance proactively ...”

(SM 1R Business Division Revenue)

Another finding that emerged from the research is that while, as posited, each stage builds on the preceding stage(s), in certain circumstances it becomes necessary to revisit earlier stages to retrofit or backfill missing components of earlier stages. In addition it may be valuable to introduce new methods, techniques or competences that aid the objectives of individual stages of development. Because of this, no stage can ever be said to be fixed and final though the core substance of all stages, once established, remains largely intact. A third finding is that where a stage is not substantially completed, progress through later stages will be limited.

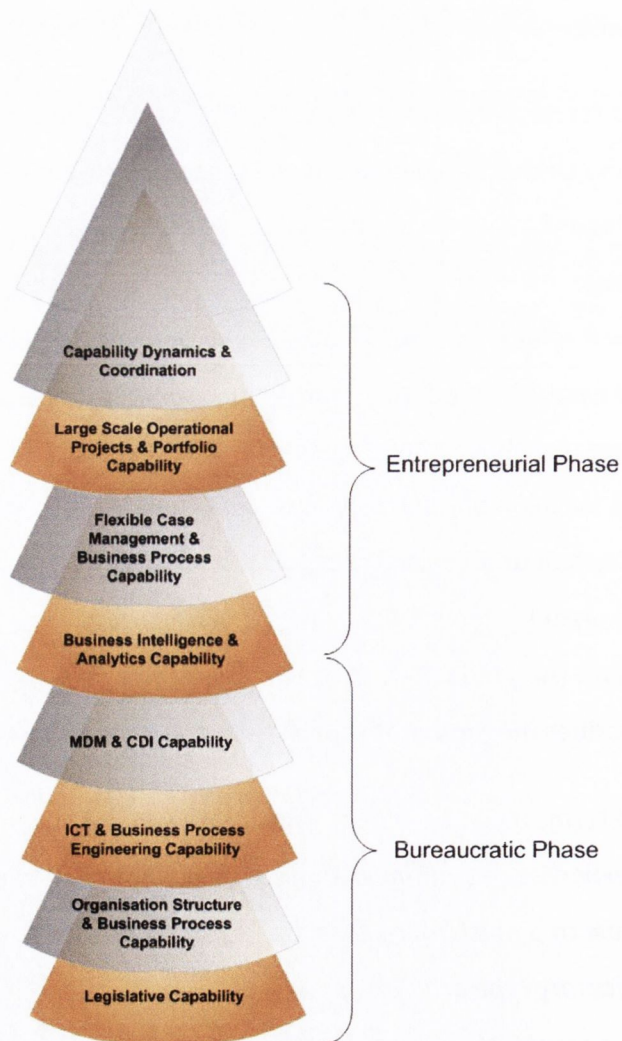


Figure 5.1: Stages of Growth Model

The model does not assume that previous stages are discarded or subsumed once the next stage has been attained. This type of model, in line with many others (Piaget 1937; Maslow 1943; Kegan 2002), describes each stage of development as a distinct capability each of which incorporates a number of competencies. The terms capability and competency are distinguished in the literature (Amit and Schoemaker 1993; McGrath et al. 1995; Peppard et al. 2000; Peppard and Ward 2004). Capability refers to the “*highest organising level and as being directed towards the strategic purpose of the organization*” (Peppard et al. 2000 p. 294). Capabilities are enabled through a distinct combination or configuration of competencies. Competencies are abilities to manage and deploy resources of all types. Resources are defined by Amit and Schoemaker as “*stocks of available factors that are owned or controlled by the firm*” (1993 p. 35). This includes: human resources (internal and external) including their skills, knowledge and experience; technology, data and other physical or intellectual inputs. Competencies are therefore a subset of capabilities and resources combine to enable competencies.

Each capability has a specific type of output that is distinct for that stage of development. Each output will typically contribute, in a specific way or ways, toward organisational efficiency and or effectiveness. Efficiency is normally measured in terms of output per unit input. Measuring the efficiency of a government department can be difficult because the value accruing from the provision of services such as education, health and justice is not easy to measure. However, an efficient government organisation can be understood as one that maximises benefits¹³ at minimum cost over the shortest time scale. A government organisation that is increasing its efficiency can be understood as, *ceteris paribus*, delivering one or a combination of the following: more benefits, less cost or less time to delivery. As each capability is acquired by the organisation it can be used many times as a solution to gain efficiencies in

¹³ While the term outputs would normally be used in this context, benefits are more appropriate in the context of government departments.

different contexts even when the organisation has moved to the subsequent stages. A move from one stage to the next does not render the previous stage redundant, rather while the next stage will carry new understanding and perspectives the previous stages are still relevant for dealing with those aspects of the existing environment that continue to impact on the organisation. Once a stage has been reached, or taken on, it remains as part of the organisation's response repertoire of capabilities each of which may contribute at any time toward greater efficiency or effectiveness.

In addition there is a recursive element to the model where a capability from one stage may impact on changes implemented from other stages or capabilities. For example changes to the organisation as a result of developments in stage three may necessitate revisiting changes that were brought about by stages one or two. These recursive impacts may affect changes brought about as a result of work at multiple layers of the model; some examples will be provided as stages are described and this feature of the model will be described in more detail along with stage 8.

The findings from this research will be presented as they emerged from the distinct phases of the research approach i.e. phase 1 and phase 2. The section relating to phase 1 will present the model as it emerged over the first 20 interviews. Phase 1 also included ten focused interviews that focused on the stage change mechanisms. The findings from these interviews will be presented as a distinct aspect of phase 1. The section describing the findings from Phase 2 will present the contributions that this phase made toward the overall model. The chapter will conclude by presenting the stages of growth model in its totality.

5.2 Findings from Phase 1 of Research

The seven-stage model that emerged from phase 1 is shown in figure 5.2. The model will be presented and built up stage by stage with each section describing three things:

1. The stage and its significant features including the capabilities, competencies and typical outputs associated with that stage;
2. The mechanisms for change including the major drivers and enablers for change and
3. The ICT solutions that are used to support this capability.

It is interesting to note that ICT will rarely emerge as a driver for change in the context of this model although it frequently acts as a catalyst that precipitates change.



Figure 5.2 – Seven-Stage Model from Phase 1 of Research.

5.2.1 *Stage 1 – The Legislative Capability*

The capability associated with stage 1 is the ability for an organisation to convert political commitments or decisions from the courts into legislative form, in a way that implements accurately the political or judicial intent. The legislative capability impacts on the efficiency and effectiveness of each government department and may be used when formulating the organisation's strategic direction. Outputs from the legislative capability take the form of legislation.

Some examples of the competencies required for this stage include: the ability to gather requirements from all influential stakeholders within the political, non-political and judicial arenas; the ability to assess the social and economic impact of prospective policies; drafting legislation; interpreting legislation and assessing organisational impact to include efficiency and effectiveness of policy proposals.

The task of producing legislation within Revenue is undertaken by the Revenue Legislation Services (RLS) which embodies an experienced and skilled legislative capability across all taxheads (a taxhead is a term used as a broad categorisation of a tax code or tax regime such as: Income Tax, Corporation Tax, Capital Gains Tax, Capital Acquisitions etc.). The RLS Division has a small staff and is responsible for consultation, formulation and drafting of all tax and duty legislation. In addition to this role the RLS has evolved another significant capability, which helps to create organisational efficiency and effectiveness.

This capability first began to emerge when the Revenue Commissioners appointed a departmental committee in 1929 to adapt and simplify legislation that had been largely inherited from the British taxation system. The task of adapting and simplifying the legislation was long and arduous and one that gradually changed to where they were called upon to consider all proposals for taxation legislation.

By 1939, this committee gradually emerged as a permanent structure of the organisation reporting to the Revenue Board on legislation, legislative policy, legislative impacts and legislative strategies (Réamonn 1981).

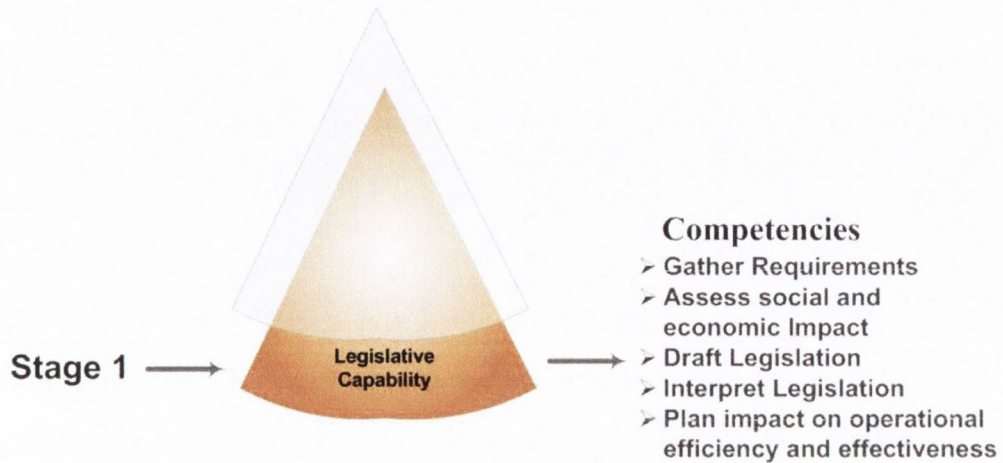


Figure 5.3: Stage 1 Legislative

The legislative capability resulted in many novel approaches to tax simplification. The first significant legislative impact on efficiency came with the introduction of the 'Pay As You Earn' (PAYE) tax in 1963. Taxation legislation changed from being largely a vehicle for taxation and economic policy to one where operational capability and administrative costs were a major consideration of the legislative process (Revenue-Commissioners 1963). This was the first time in the history of Revenue that the internal business process of assessing and collecting tax was altered radically by the legislation. At this point the legislative process provided the organisation an opportunity to become more efficient and streamline business processes. One informant put it in the following way:

"...with more taxpayers coming on-stream, the organisation began to creak at the seams, and I suppose we looked for an opportunity to alleviate an imminent crisis, and I suppose we found that in PAYE....when we used legislation to simplify assessment and collection... I suppose you could say we effectively outsourced the business process to the taxpayers themselves"

(SM 2R, Business Division Revenue)

Other legislative policies in taxation such as 'self-assessment' have enabled the processing of tax returns to become more efficient by outsourcing tasks to the taxpayer, thereby reducing administrative costs. The legislation function acts as both a foundation and source for all business processes and also has the potential to impact on many of those processes within the organisation. However, one informant pointed out how care must be taken when it comes to making radical change to business processes such as was done with PAYE.

“Legislation for taxation is like a three way balancing act that attempts to support the social need for revenue with sectoral or industry requirements for support, and the internal demands of an organisation [Revenue] looking for efficiency. So it is possible to devise legislation to bring in more tax or put in allowances to support a sector or make changes to legislation that will bring internal efficiencies. And we need to be careful to consider that any legislation we introduce can and will impact on all these areas”

(SM 3R, Business Division Revenue)

This informant is pointing to the fact that a significant part of the legislative role is that of creating internal efficiencies – efficiencies that improve or reduce the cost of business processes.

Another informant suggested that the legislative capability has scope for guiding the eventual methods used to implement the policy:

“you’re dealing with a large number of people where you’re trying to do the same thing for them so therefore you start by stating, with some precision, what it is you want to do and how...”

(SM 4R, ICT Division Revenue)

The legislative capability is complex and has an influence over the economy, society and the organisational efficiency of government departments. As such, the legislative capability is presented as the first stage and foundation level which

the organisation has to adopt in order to solve the many socio-economic demands.

Putting a legislative process in place within the organisation is fundamental to all the subsequent stages of development and so is regarded as a foundation for the structure of the organisation. Revenue as an organisation has continually relied on the ability and expertise of the legislative architects and technicians to give precise direction and advice with regard to the tax acts and case law. This legislative capability was and remains essential as a foundation and support for further stages of development. The organisation's business processes are built on the foundations of the legislation and the tax code, so it is important that this foundation be established before the subsequent stages. This legislative foundation is categorised as a stage and not merely as a foundation, as it did and continues to hold the potential for generating organisational efficiencies.

5.2.2 Overall Change Mechanism

For each stage change there is typically more than one mechanism identified that drives the organisation toward the next stage. For the model as a whole there is one overarching change mechanism that applies to all stage changes. This overarching mechanism will be described once with the understanding that it applies to all stages. After which the additional change mechanisms specific to this change from stage 1 to stage 2 will be described.

The overarching change mechanism is described here in the context of Revenue. Like taxation systems in most countries, the Irish taxation system evolves in a piecemeal fashion with adjustments, often minor, but sometimes radical, made with each annual budget and occasionally as result of decisions by the courts. These adjustments or exceptions to the tax code are often introduced in the form of tax concessions, exemption or obligations and are designed to encourage particular forms of economic or social behaviour and to give special reliefs,

incentives or disincentives to particular sectors of the economy. Put simply¹⁴, a tax can be regarded as internally efficient where the benefits accruing outweigh the administrative costs of its implementation. Complexities in the tax code to try to deal with multiple stakeholders will generally add to the administrative cost of a tax and so tend to dilute the effectiveness of each existing tax and erode its efficiency over time (Commission on Taxation 1985). One informant summed up the complexity and dynamics of administering a taxation system as follows:

“The thing about it is the more sectoral adjustments we make the more we have to make, to compensate in some other area we end up making changes to secondary legislation, or adjustments to the primary legislation that developed this complexity, it’s almost like a crisis management that introduces a complexity...the political or social system has a requirement... we have to balance a national budget... or we need to support or restrain some element of the economy and so we end up with a taxation system with many complexities.”

(SM 5R, ICT Division Revenue)

This comment reflects the reality that taxes tend to become more complex over time. This tendency for taxation systems to increase in complexity has the effect of increasing the administrative cost of running Revenue (see figure 5.4). The constraints imposed by Revenue’s administrative budget, the budget allocated by national parliament each year to run the organisation, acts as a driver of efficiency. The fact that this budget is both administratively and politically difficult to increase means that there is significant pressure on the organisation to adapt to any increasing complexities with greater efficiencies. When both tax complexity increases and budgets are constrained it was found that the organisation used administrative and management techniques to achieve this end. This mechanism was described with a diagram similar to that shown at

¹⁴ A more complex definition would take account of the cost of compliance to the taxpayer and other social costs.

figure 5.4 and was corroborated by a number of other informants. One respondent described it as follows:

“The admin budget has always put pressure on us to become more efficient, we have always found ourselves battling with the Department of Finance over budgets, but more so in times of crisis or where the economy has been in recession...if we had access to any amount of money, our innovations would probably have been less creative...we would probably have just hired more staff to deal with increasing demands.”

(SM 5R, ICT Division Revenue)

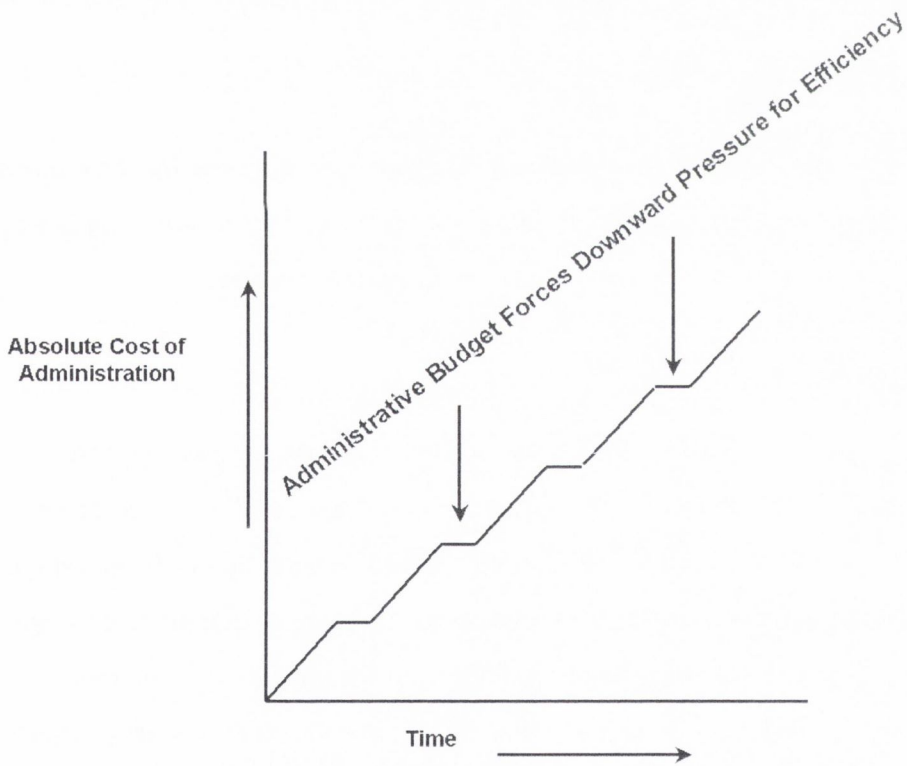


Figure 5.4: Revenue’s Forces for Growth Mechanism

(Values are not quantified for this mechanism)

This combination of the propensity to increase complexity and the restraining force of the administrative budget has acted as a driver for change and has moved the organisation through a number of stages of growth and development.

These are not the only forces for change in the organisation. The role of leadership and management as driver of change cannot be ignored. In Revenue the evidence consistently pointed toward the role played by the managers and leaders within the organisation. A number of informants described this additional driving role similarly, for example:

“You should never let a good crisis go to waste... there are managers all over Revenue waiting to push forward their own favourite idea when the opportunity arises, and very often the opportunity for change presents itself with a crisis where management are looking for immediate solutions”

(SM 5R, ICT Division Revenue)

“Change can be driven by individuals who see the benefits of change both for the overall good of Revenue and their own career. Revenue is a people driven organisation and ideas are absolutely priceless.”

(SM 1R, Business Division Revenue)

The changes that are described here are similar in some respects as the evolutionary changes within organisations described by Greiner (1972), i.e. as moving along from what he calls a revolution to an evolution or from a stage of crisis to a stage of growth. Greiner presents the stage of revolution or stage of crisis as a driver that precipitates change within organisations. The model described in the findings of this research can be understood similarly, where there will be a reason or mechanism, like Greiner’s stage of crisis that will prompt change. Unlike Greiner’s model however, this model also describes enablers that facilitate that change and the enabler for a stage change is generally understood as the previous layer or layers of development that have occurred in the organisation.

5.2.3 ICT Solutions Supporting Stage 1

ICT played had no role in this stage change and the next as technology was not available at that time. The first two stages set the foundations and conditions that facilitate the introduction of ICT. On a practical level however, two ICT solutions are used to support this legislative function in Revenue. The statistical requirements of the RLS are supported by econometric models which have been developed using a sophisticated statistical package which incorporates a broad array of econometric, time series and forecasting techniques that enable modelling, forecasting and simulation for strategic legislative planning. The drafting and submission of legislative proposals, legislation and regulations is supported by a document management system.

5.2.4 Stage 2 - Organisational Structure and Business Process

The practical implementation of legislation is carried out via organisational structures and business processes. Stage 2 incorporates a capability to undertake organisational design and business process creation. The output from this stage takes the form of a business process or an organisation structure which can implement or facilitate the aims or goals of legislation. This capability can manifest itself at the highest strategic level of the organisation and also at the tactical level of day to day operations. Some competencies associated with this capability include: business process design, organisation structural design, the ability to map and maintain business processes across the organisation and business process reengineering using Lean and SixSigma (Naslund 2008).

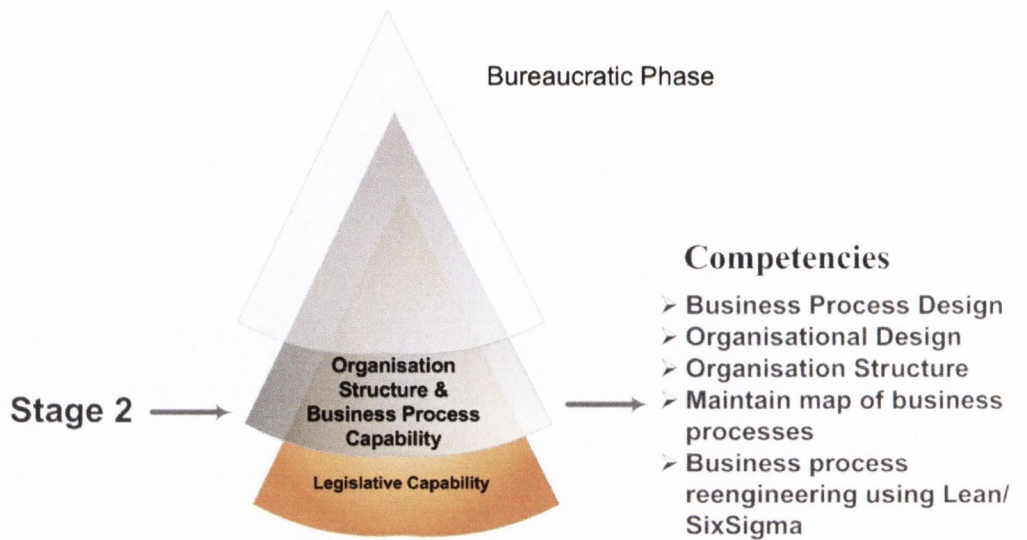


Figure 5.5: Stage 2 Organisation Structure and Business Process

Responsibility for design of the organisation falls to one or more of the Directors of the organisation and the business processes are the responsibility of the Director of the Division of the department that execute the new business process. Irish Government departments have adopted an organisational design which is hierarchical with business processes that operate within that hierarchy. These business processes are for the most part, factory-like or bureaucratic. One informant described government policy or legislation as follows:

“... you have something that says I want to apply a process in its widest sense to a large volume of people with some time constraint... and then you add in the civil service, public service type ethos which says it must be precise, consistent and it must be auditable... you’re trying to do the same thing for a number of people and therefore you start developing these bureaucratic type structures and business processes...”

(A/S 1D, DSP)

Organisation structures and business processes are put in place to accomplish tasks assigned to government organisations. As mentioned previously, a government organisation can be regarded as efficient if it can accomplish tasks that have been assigned to it and that these tasks are performed in an accurate

and timely fashion while also minimising resource costs or usage. Government departments experience demands from many sources, for accuracy, timeliness and cost reduction. These sources include: the national parliament, public representatives, Ombudsmen, personal complaints, the Public Accounts Committee, the Department of Finance and all the layers of hierarchy within each organisation. These demands have direct impact by forcing greater efficiencies and cost reductions from business processes within government departments. In Revenue's case these demands arise because taxation and income are emotive topics that can incite citizens, public representatives and governments to be exacting. One informant regarded these demands as a force that brought about more accuracy and precision in Revenue's business processes:

"Revenue's business had to be well organised and precise because we were always dealing with taxpayer's money and were always accountable."

(SM 2R, Business Division Revenue)

According to Réamonn (1981), by 1939, the organisation had emerged as a strong bureaucratic machine which was capable of manually administering the complete taxation process (including assessment and collection) for all taxpayers in the State. It is difficult to assess when exactly this competence or stage was reached, but from this point forward there was certainly the concept of using different organisation components for different functions. The organisational structures as described in the many artefacts available (Réamonn 1981), show that the organisation had taken on the classic machine bureaucracy features as described by Mintzberg (1981). The organisation had at this point already put together many analysts to maintain and design organisational structures and to standardise the complex taxation/business processes, which were being administered by the many tax units around the country. The Secretariat, a management structure as described by Réamonn is similar in many respects to Mintzberg's view of the technostructure. Mintzberg describes the technostructure as a group of "analysts who design systems concerned with the formal planning and control of the work" (1981 p. 104). Revenue's working environment was stabilised with this

technostructure and support staff¹⁵. Like Mintzberg's machine bureaucracy, Revenue has an organisational structure which has a large hierarchy to oversee the work being performed by what Mintzberg calls the operating core. This 'organisational structure and business process' stage was categorised as foundational and important to an organisation which was constantly coming under pressure with demands from the socio-economic environment. One informant described the socio-economic demands for the organisation as they emerged:

"Over time the tax net has widened, in the old days the landed gentry were probably the only ones to fall liable for tax, as the state needed more money the net widened and we came under pressure to become more and more efficient with our processes."

(SM 2R, Business Division Revenue)

Demands for more precision and more efficiency continued and Revenue responded by building more precision into the organisation's structures and processes. This progress is described by an informant in the following way:

"In the sixties and early seventies our structure and processes were very well organised, we had many tax districts and within these, there were three units in each district and you might have eight allocations within a unit and each allocation would look after a number of employers, so it was very well organised and was run like a factory where we knew the routine to follow for every eventuality, we had an annual cycle..."

(SM 2R, Business Division Revenue)

Respondents from other government departments describe this stage in very similar ways. Some examples are:

¹⁵ Support staff includes everything from mailroom services to public relations.

“Business processes and organisation structures are prerequisite to operationalise a piece of legislation and I suppose there is plenty of evidence to show we were good at this...”

(SM 6R, ICT Division Revenue)

“the fact that we were able to automate some of these processes easily shows how much we had established them.”

(SM 4R, ICT Division Revenue)

5.2.5 ICT Solutions Supporting Stage 2

As mentioned above ICT¹⁶ had no role in this stage of development although this stage is a key enabler for the introduction of ICT. ICT solutions supporting this stage of development today include a Human Resources Management System (HRMS) which provides support for the day to day recording maintenance and management of personnel records. In addition some basic support is available for implementations of Lean SixSigma which includes tools to help with the graphical modelling and display of business processes.

5.2.6 Stage 3 - ICT and Business Process Automation

The capability associated with stage 3 enables the automation of business processes using ICT where there are worthwhile benefits associated with the investment. The IS capability enables action at a strategic level (Peppard and Ward 2004) where leveraging IS/IT can enable change for organisational advantage and in response to a changing business environment. The output from this stage comes in the form of automated processes and software applications. Competencies associated with this stage can be categorised under five broad headings: the ability to define a strategic role for technology in the organisation, the ability to translate the business strategy and business processes into ICT systems and infrastructure, the ability to deliver those ICT systems, the ability to

¹⁶ ICT is used as an acronym for convenience although in this context it is anachronistic.

realise business benefits from those systems and the ability to maintain and resource those systems (Peppard and Ward 2004).

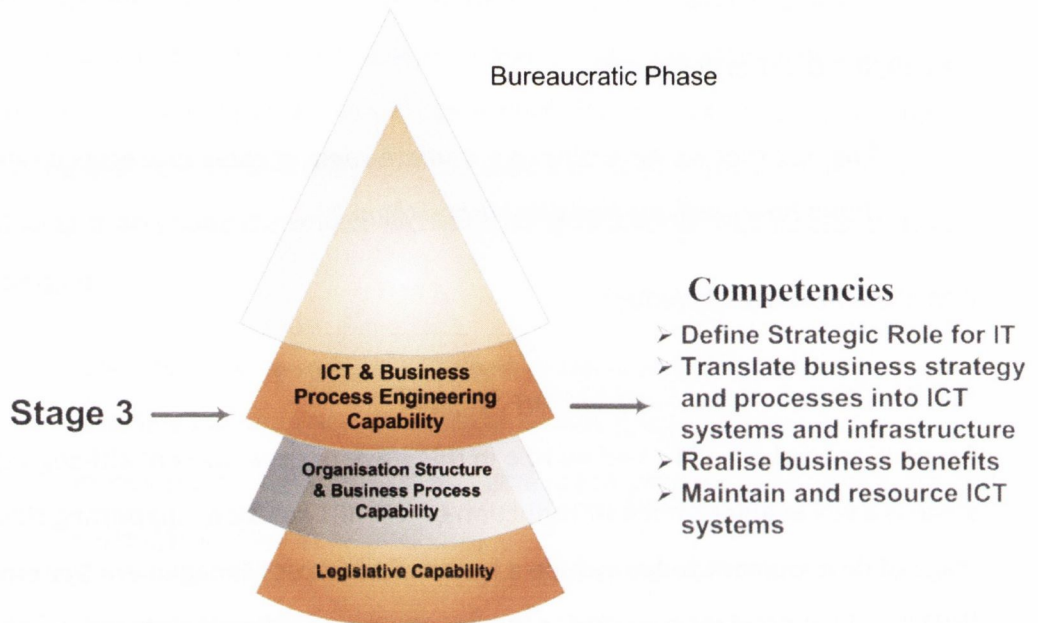


Figure 5.6: Stage 3 ICT & Business Process Engineering

In the early years of computing in Revenue information activities such as filing, retrieving, sorting and processing were, if the volumes justified it, found to be more efficiently performed by computer. Revenue's first what would, using much later terminology, be considered as an e-government¹⁷ initiative commenced with the automation of existing taxation processes. In general the earlier usages of ICT were connected with storing and retrieving information, creating and editing text and calculating and transmitting information. For Revenue the earliest applications were focused at the operational level i.e. routine high-volume activities (Connolly 1986). The main objective of computing within Revenue was to automate the routine, repetitive, clerical operations of the organisation. All the standard benefits of computing were gained from these applications: more speed of processing, greater accuracy, lower costs across a range of areas

¹⁷ As stated in chapter one, the term e-government in this context is understood as the use of all ICT in government.

including staff and accommodation, better quality output, more reliability, fewer complaints and the ability to take on more work. In keeping with a machine bureaucracy, the organisation developed its own in-house technical staff that acted as a support service and so the ICT development capability began to emerge. One informant explained:

“Technology was always seen as a clear method to bring efficiencies, it sounds a little obvious now, but it was a new era that came around the sixties”

(A/S 1R, Revenue)

Revenue absorbed the new technology without major structural changes to the organisation apart from the growing Data Processing Division that was put in place to provide for the increasing demand for computing services. Over many years the range and volume of services led to the expansion of the Data Processing Division, by the mid 1980's there were in excess of 270 staff in this division, more than half of whom were dedicated to applications development. ICT applications became increasingly complex in order to include most accounting features including payments, tax assessment and tax collection.

ICT and business process automation continue to be one of the most valuable methods of increasing efficiency and effectiveness for Revenue as an organisation. There is, however, a secondary feature associated with business process automation, one that emerges as an unintended consequence of a narrow focus on business process automation. Where business processes are automated within siloed organisation structures, the ICT applications that emerge are also siloed. It is important to note that this is not regarded as an inherent fault with the approach to automating business processes. Automating business processes within organisational silos is often the most efficient approach for an evolving process or an evolving organisation. Automating a business process to take account of the wider context of an organisation can deliver benefits, but it can also be a step too far and one that may not offer value for money in the

overall organisational context at a particular point in time. For Revenue and many other government departments the organisational context would, in time change such that the value from siloed structures tended to diminish and give way to an increasing demand for integration within the organisations. The impact of this in Revenue is discussed later in this chapter.

As a consequence of the underlying organisational structure, there was a major divide between the Inland Revenue on the one hand and Customs and Excise on the other. Within each of these, there were further divisions. For example, within the Inland Revenue there were natural silos for different tax categories (value-added-tax (VAT), income tax, corporation tax and so on (see figure 5.7)).

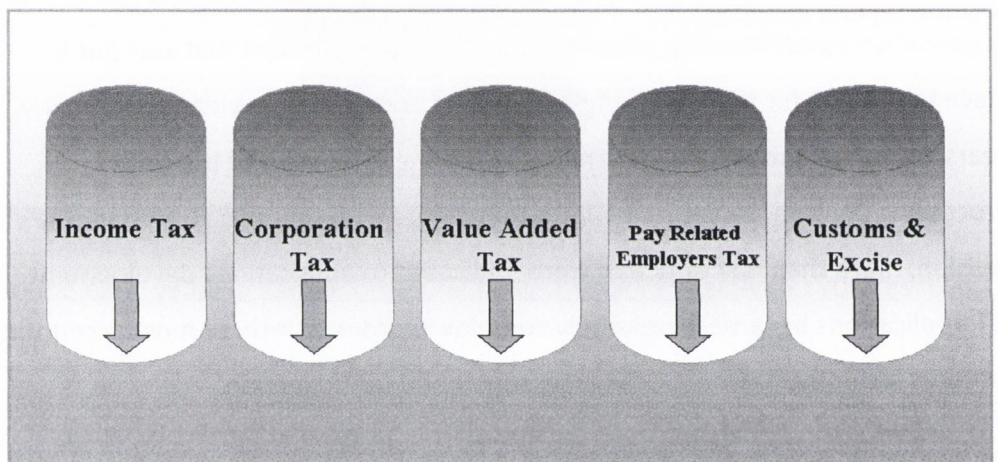


Figure 5.7: Revenue Silos

There was little if any coordination between these units. Each business process was separate as regards the legislative framework within which it operated, its organisational structure, its staffing and its business processing. When ICT was introduced into one of these silos, no attempt was made to reengineer processes or structures and so the ICT applications themselves became silo based with no connections between one system and the next.

One interesting Revenue example described by a senior manager occurred where a new tax for vehicle registration (VRT) was introduced in 1992. The informant

described how this tax was rapidly assimilated into the organisation. The introduction of this tax was time constrained by the fact that the exchequer was about to lose excise duty on cars with the advent of the Single European Market. Even with tight timescales the sequence of stages remained the same. Legislation was drafted and an organisation structure was designed and put in place. The business process was designed and was followed rapidly with a software support system. In the words of the manager concerned:

“VRT was a complete new silo, the legislation, organisation structure, the business processes and the software systems were put in place in that sequence.”

(SM 6R, ICT Division Revenue)

This example demonstrates that where the capabilities and competencies of a stage have already been attained by the organisation, they can be utilised rapidly thereafter. Although these capabilities are still applied and thought of in this logical sequence, their implementation is almost simultaneous.

Although development of the silo structure has been described pejoratively it is important to consider this structure as a natural consequence of the previous stages of development and a structure that offered value to Revenue as an organisation. One informant described it as follows:

“It must be remembered that silos served their purpose and they served it well, it’s important not to throw the baby out with the bathwater, they were of their time in Revenue...and they may be still for some organisations”

(SM 1R, Business Division Revenue)

Over almost half a century the automation of business processes continues to afford many benefits where automation has been brought to bear on a

substantial portion of Revenue's operational procedures. Over that period ICT became inextricably embedded in an organisation that was becoming increasingly complex. In fact, as was noted by Bharadwaj, the ICT capability *"is not so much a specific set of sophisticated technological functionalities as it is an enterprise-wide capability to leverage technology..."* (2000 p. 186) This capability includes having a strong relationship with the business aspect of the organisation so as to be able to convert the business strategy into long term information architectures. For this, competent resources are required throughout the organisation where many of the resources are not located in one single function (Peppard and Ward 2004). Managers in Revenue recognised that the ICT capability had this wide-ranging impact on the organisation and therefore invested in building that capability. To this end the IT- Capability Maturity Framework (IT-CMF) was later to be adopted by Revenue. At the time of writing the framework outlines 32 key IT competencies or critical processes each of which can be measured over five levels of maturity (Curley 2007). These competencies are divided into four key activities that comprise the overall capability: Managing IT like a business, Managing the IT budget, Managing the IT capability and Managing IT for business value. The framework also acts as an assessment tool and a management system with improvement maps that guide organisations toward better IT capability (Curley 2007; Carcary 2011).

5.2.7 ICT Supporting Stage 3

Much the same as the three technological eras described in Chapter 2, Revenue's technologies emerged in a similar fashion. During the 1960's and 1970's the mainframe computer was largely deployed as the primary computing resource. The first mainframe computer was installed in June 1963 and with an initial workload that increased rapidly where it was operating for a full eight hours per day in 1964, and then to 12 hours in 1965 and eventually to 15 per day in 1966. The first task assigned was Income tax assessing and later in 1964 some aspects of PAYE went operational, although the latter was not fully operational until toward the end of the 1960's. Considerable skill was required to apply these technologies even though the business processes were already well established in the

organisation. Programming the complexities of an Income Tax assessing system together with a full collection system mainly using low-level assembly languages was quite a challenge. In addition, these programs were written during 1962 and early 1963 before the first mainframe was even installed (Irwin 1993). When more accessible computer languages such as COBOL were introduced to Revenue later in the 1960s usage of computers developed more rapidly. An increasing workload demanded greater computing power and in 1973 a Honeywell H6060 provided this along with disk rather than tape storage and direct input using VDU's (Visual Display Units). It was during this period that the silos referred to above were designed and developed. Some of these applications and technical architectures proved to be quite durable with lifespans sometimes in excess of twenty years. Over time, these legacy applications and legacy architectures co-existed with later applications and architectures as newer technologies were adopted. For instance, one mainframe application with a 1970's architecture remained in live commission until 2010 (Revenue 2010).

Technologies and architectures changed during the second era which came around the late 1980's through the 1990's. This era saw the introduction of the PC's, 4GL's (Fourth Generation Languages), CASE (Computer Aided Software Engineering) tools, relational databases and applications that used client server technology and architectures, initially two tier applications, then later three tier and then n-tier applications. From 2000 onwards, Internet Web technologies and Java Enterprise frameworks began to dominate application environments and technical architectures.

5.2.8 Stage 4 – Master Data Management and Customer Data Integration

The capability associated with stage 4 is the ability of an organisation to identify master data sets (including customer¹⁸ data sets) and to utilise those data sets so as to derive worthwhile benefits for the organisation and the state. The outputs

¹⁸ The terms customer, taxpayer and citizen are used synonymously.

from this stage are data sets that enable business processes and software applications to function more efficiently while also guarding against potential anomalies associated with duplication of functions and/or data. Master Data may be roughly defined as the fundamental data sets on which transactions operate. The data classes most commonly associated with it are products and customers. Nevertheless, accounts, business partners, employees, suppliers and others are categorised as master data classes. According to Eschinger (2008) a master data set is one of the key assets of an organisation and often companies are acquired primarily for access to their Customer Master data.

Some competencies associated with this stage include: the ability to identify master data sets, the ability to identify customer data sets, the ability to integrate those sets into ICT applications and business processes, the ability to maintain and resource those data sets and the ability to identify further data sets for inclusion into the master data sets.

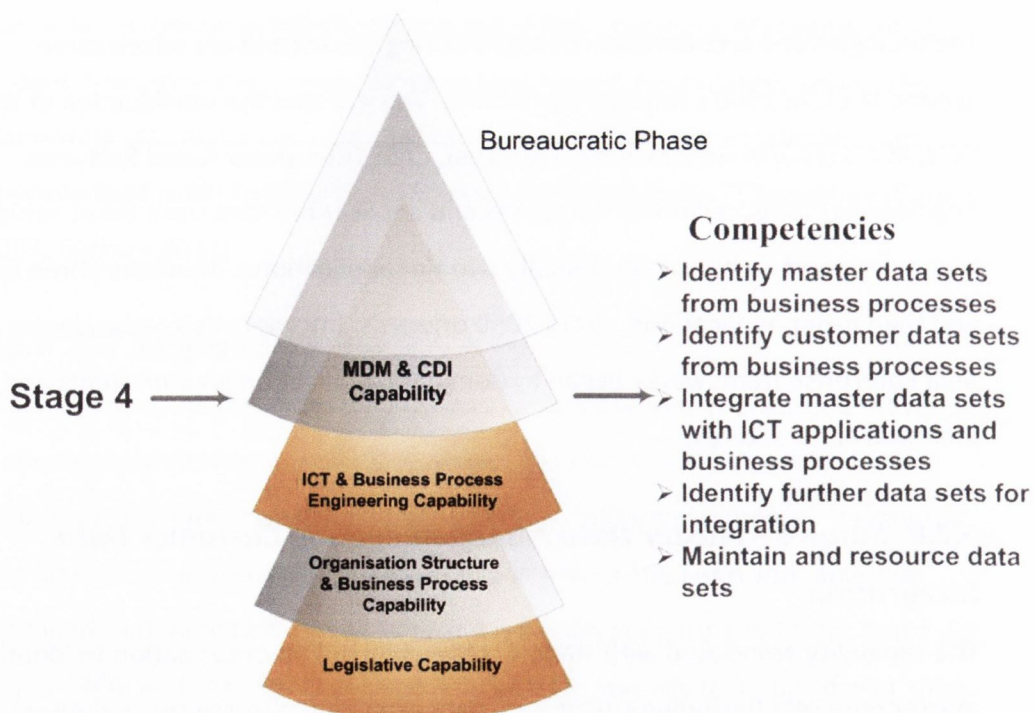


Figure 5.8: Stage 4 Master Data Management and Customer Data Integration

The 1989 internal data study (Anderson-Consulting and Revenue December 1989) mentioned above, enabled the evolution to stage 4 - Master Data Management

and Customer Data Integration (Dyche and Levy 2006; Loshin 2009). The study took the twin track approach of developing an approach to Master Data Management (MDM) and data discovery. The latter involved uncovering, profiling and understanding all of the data that existed throughout the organisation – a distinctly non-trivial problem as it turned out. It also examined the granularity of the data, its quality and the procedures that were in place to maintain its accuracy, consistency and integrity. The analysis mapped all the data across the organisational processes and usages in order to make judgements on how any form of rationalisation was likely to impact on these processes. While this may appear straightforward, in practice in an organisation with 6,000 employees and where over 20 different taxes and duties were administered for over 4 million citizens, it was highly complex to execute.

On the positive side, the project was helped by the vast reservoir of experience then available. It was noted by one informant that this study had substantial success with its findings because the organisation, by this time, had already more than 30 years of experience with data discovery, data storage and software engineering.

The study subsequently led to a project, the outcome of which was to consolidate many data sets, taxation processes and customer data. This integration project was referred to as the Consolidated Taxation project or CONTAX (Revenue 1993). This project was not a simple textbook step by step process, rather it was achieved by a mixture of formality and what Ciborra (2002) refers to as *bricolage*. During the course of the interviews, it became clear that not only was this project part of the evolution of a long sequence of events spread over almost 20 years, but that it was a social and personal odyssey for many of the individuals who drove it and who were deeply involved in the process. Informants referred to the project in emotive terms with descriptions, which were both energetic and passionate. One informant described it as:

“... a number of powerful individuals who painted the landscape of the organisation with the blood of their careers.”

(A/S 1R, Revenue)

The CONTAX project set out with a road map that not only had an overall worthwhile cost benefit ratio, but where each phase of the project was required to justify its own necessity (Anderson-Consulting and Revenue December 1989). A key aspect of the project design was that it was not an all-or-nothing bet. There had to be benefits delivered at each phase so that if the project was terminated early, these benefits could still be harvested.

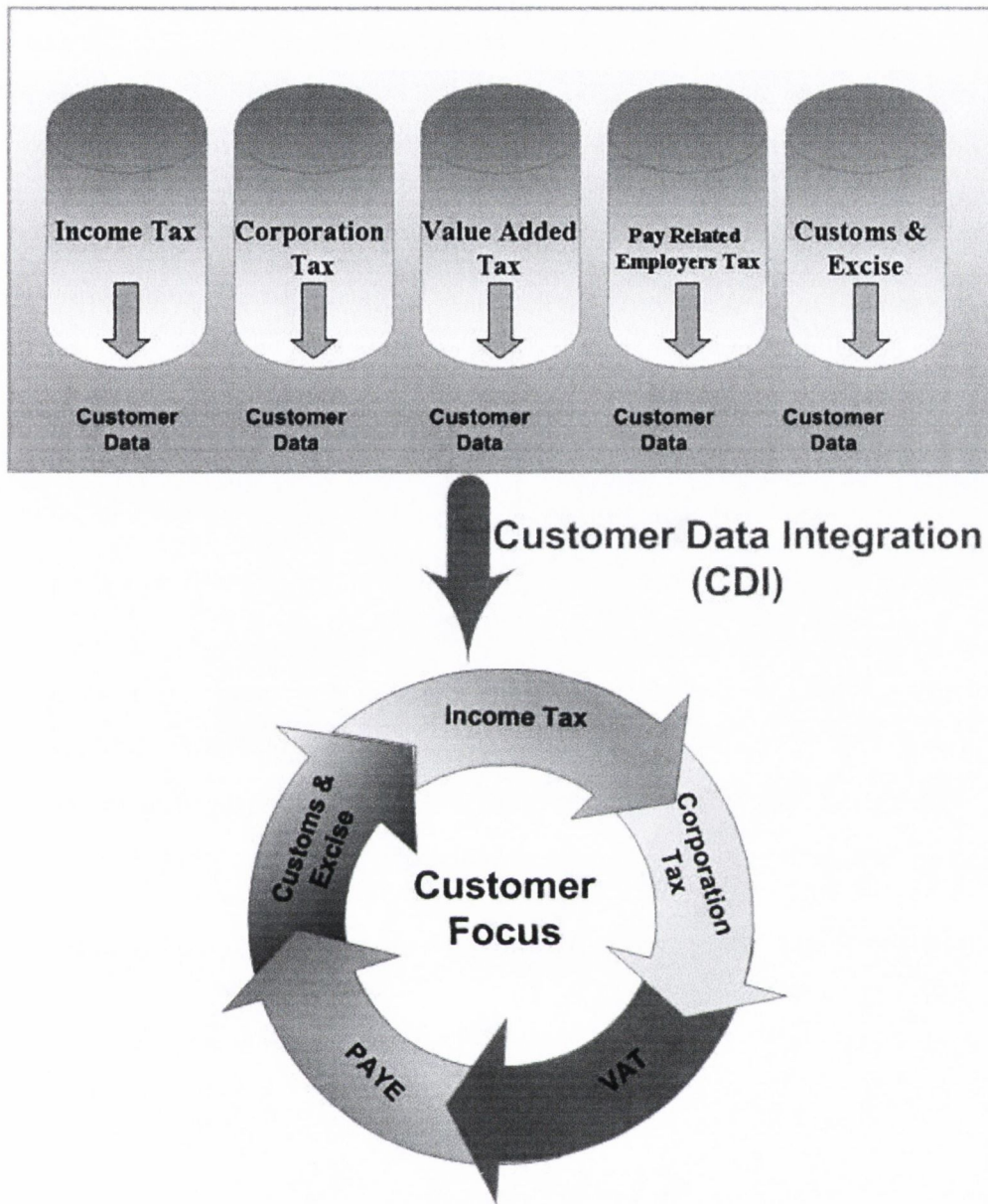


Figure 5.9: The Shift from a Taxhead-Centric focus to a Customer-Centric focus.

The CONTAX project brought about a wholesale reconstruction of Revenue's computer systems, which was, in turn, to result in both a transformation of the Revenue business processes and organisation structure. Data and applications were organised around the taxpayer rather than the tax (see figure 5.9 above). Customer data was integrated and master data management commenced with data sets managed by applications and business processes surrounding those applications. Software applications were developed to act as single organisational

repositories for those data sets and also to act as single points of access for all aspects of the data's lifecycle. Some examples of these data sets are: customer data, account data, payment data and intervention data (Revenue 1994, 1996, 1999, 2007b). One manager described part of the process as follows:

“The most basic step was to identify who the customer actually was. Was Customer A on the income tax file the same as customer A on the VAT file? This entailed a complex data cleanup and data matching process which resulted in Revenue having a “clean” file of customers where each customer could be allocated a single unique number.”

(SM 1R, Business Division Revenue)

Revenue's own studies and experience in other agencies around the world had suggested that this approach would lead to a more efficient collection of tax, a more effective method of combating tax evasion and an improved customer service for taxpayers. Subsequent events justified this belief.

The success of this project was also noted by many other Revenue agencies around the world:

“The French were amazed when they saw the level of consolidation we have... I suppose we are small enough for this to be manageable yet we're large enough for it to be meaningful.”

(A/S 2R, Revenue)

Revenue actively pursues metadata and holds a repository of metadata on all data held within the organisation.

“Metadata is structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource”

(Revenue 2012 p. 2)

A Metadata Management Repository involves identifying and relating metadata in a central repository to allow consolidation of processes and data so as to enhance and inform Revenue's business decision-making and strategic goals. Metadata provides both technical and business users with an overview of their data and processes and a common definition for each entity. Without it, there is a risk of duplicating processes, data stores and functionality that already exists and ultimately producing similar anomalies to those experienced in the past. This ongoing effort compiles metadata on operational data, technical data and business data; in many ways it is an up-to-date version of the 1989 study.

Figure 5.8 shows the Stage 4, the Customer Data Integration and Master Data Management stage, along with the previous three stages that had already evolved within the organisation. Like all stages of development, this stage also relies on the previous stages being in place for this evolution to occur. Where new business processes are created for new lines of business or to cater for customer anomalies, the structural and legislative supports of Stage 1 and 2 of development must be created along with the engineered efficiency level of stage 3, where necessary. An example may help in illustrating what this means in practice. Consider the case discussed above, where a taxpayer with a liability for one tax is simultaneously being refunded overpayment of another tax. To eliminate this anomaly, a new integration process was required at the customer level (stage 4), which outlined all rules and conditions for off-setting liabilities. Because of this, the existing processes required some reengineering at stage 3. This in turn led to a requirement for a different organisational structure, at stage 2 to support the business process. Finally, at stage 1, additional legislation was required to provide a foundation to support the new 'off-setting' process. Prior to this, it was the taxpayer's legal right to receive the refund whether or not he owed money elsewhere.

This example supports the conjecture that capabilities develop through stages, which build upon one another and that for the move beyond the silo stage(s) to be successful, requires that the fundamental building blocks of legislation, organisational structural and engineered ICT processes are in place. It also

suggests that if a problem or anomaly manifests itself in one layer it is possible that a solution to the problem lies wholly or in part in the layers beneath; and if this is the case then it must be fixed beneath. This also suggests that because each layer or stage acts as a foundation for the next, additional development at that stage will better enable subsequent stages to deliver their benefits.

Another informant added the following statement, which suggests along with the reliance on previous stages, the integrated customer view provides the basis and infrastructure for all the subsequent stages.

“The consolidated customer view provided the foundation stone for every other stage that followed”.

(SM 4R, ICT Division Revenue)

While the same can be said for all stages this one in particular brought about a significant directional shift within the organisation. This stage is significant in that it presents a foundation for the entrepreneurial phase and stages that followed. At certain points in the organisation’s development there are key changes or turning points that have major ramifications for the organisation. The move to stage four is one of those key changes. The change from the bureaucratic phase to the entrepreneurial phase is integral with the change from the taxes centric focus to the customer centric focus which took place in this stage. This stage acts both as a stage that eliminates existing anomalies and also a gateway stage for the next phase of stages.

5.2.9 ICT Supporting Stage 4

As the research progressed it became clear that ICT was, by this stage, acting as a catalyst and also sustaining the change across the organisation. The CONTAX project required substantial data clean-up and rationalisation. Software was used to match data across data sets. Over the period of the CONTAX project, Revenue developed a suite of software applications called ITS (Integrated Taxation Systems) that were developed to automate business processes and were also used to control the master data sets, including the customer data set.

This suite of applications was comprised of three major systems: the Common Registration System (CRS) which was developed to maintain and control the customer data set; the Integrated Taxation Processing (ITP) system which was developed to maintain and control a number of data sets for customer tax accounting and the Integrated Case Management (ICM) system which was developed to manage the data which accompany interventions with customers. All three of these systems are Enterprise Systems that eliminate silos and support this stage of development. They are complex, modularised n-tier client-server systems that have many similarities to many Enterprise Resource Planning (ERP) systems (Sane 2005; McGaughey and Gunasekaran 2007). The ITS suite consolidates and integrates customer level processes, i.e. processes where data is specific to customer transactions relating to such things as personal taxhead registration, company registration, assessment of liability, tax returns and tax payments. This level of integration is centered on the rationalisation of generic business found within the organisation. Revenue's system design philosophy for ITS is to approach the integration of the business processes from the customer data level. This level of integration is designed to streamline and integrate operations, processes and information flows within the organisation, to promote greater organisational effectiveness and allow for the fact that processes do not exist in a vacuum and that they can and do overlap.

5.2.10 *Stage 5 – Business Intelligence, Business Analytics and Knowledge Management*

BI (Business Intelligence) is a broad management term used to describe the technology and tools that gather, store, access and analyse large amounts of data and information about a business for the purpose of strategic decision making (Wu et al. 2007). According to Marchand and Peppard (2013) BI is about discovering relationships and meaningful patterns in data. They also contend that BI is a people centric capability that requires business users to “*get their hands dirty*” (2013 p. 110) while they gather those insights.

The capability associated with stage 5 is the ability for an organisation to use business intelligence, business analytics and knowledge management to observe customer propensities and to make inferences using those observations. In a Revenue context those inferences help identify those customers who tend toward non-compliance. This capability enables an organisation to make inferences that help to prioritise tasks that contribute most closely to realising the organisation's strategy. The output from this stage helps to prioritise tasks and so assist with the allocation of resources. Some competencies associated with this stage include the ability to: use data mining to identify risks, ranks and categories; identify opportunities for gathering further intelligence; use data analytics for use with real-time applications; maintain and continuously feed information from operations into data marts and knowledge bases.

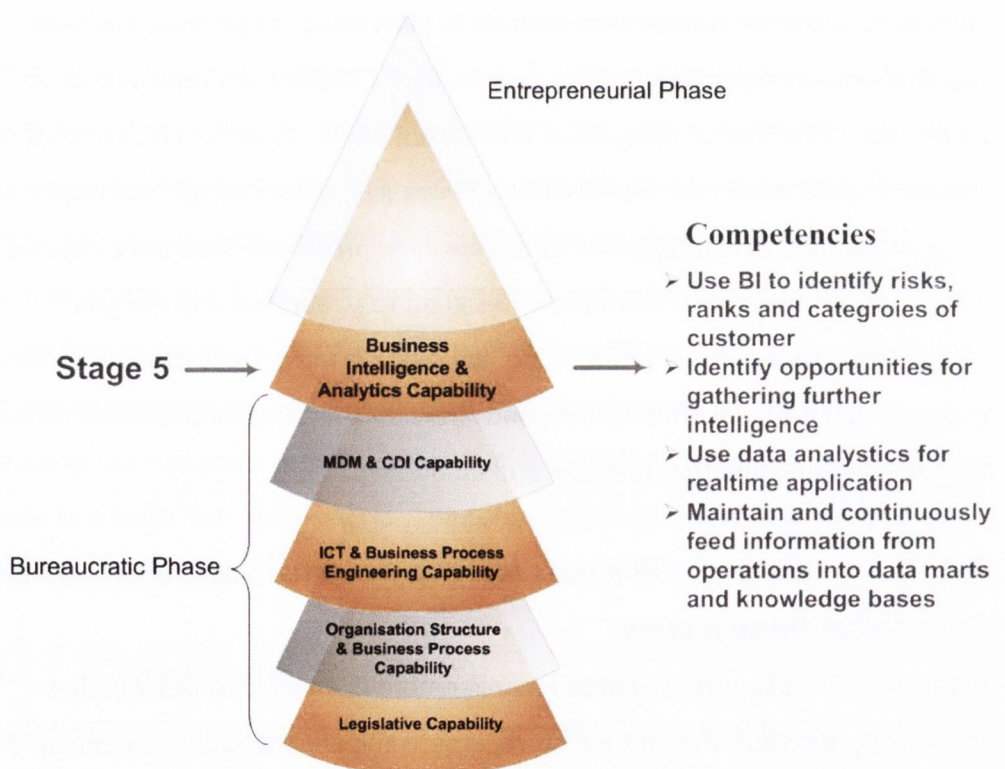


Figure 5.10: Stage 5 Business Intelligence, Business Analytics and Knowledge Management

According to Marchand and Peppard (2013) extracting value from data is not just a technical issue, it is a cultural shift for an organisation. To build a BI capability an

organisation must create an environment where people regard data and its interpretation as a strategic asset. Howson (2006) recommends that each organisation develop its own measures for BI success because BI success can have more than one meaning depending on the context in which it is being used. For Revenue this value and meaning emerged as a result of customer data integration.

The integrated or consolidated customer data opened a new vista for the organisation. As one informant put it:

“The consolidated customer view has been a great success in terms of the savings it has given the organisation...but the consolidated view also opened up many opportunities such as business analytics, knowledge management and risk analysis.”

(SM 7R, ICT Division Revenue)

Central to Revenue’s strategy of identifying non-compliant customers is the use of fully integrated customer data and the use of business intelligence and business analytics tools.

“Strategies, structures and processes must all be aligned for Revenue to be effective... and to use business intelligence and analytics tools properly and target non-compliant taxpayers successfully we also need to have all our data aligned.”

(SM 5R, ICT Division Revenue)

To this end a data warehouse was created in the late 1990’s (Revenue 1998). Data mining commenced and an inference engine was used to assess risks in areas such as debt collection, late payments and special investigations.

Revenue's ICT systems had been re-designed to provide an integrated and comprehensive overview of each taxpayer with a fully integrated tax accounting system, integrated case management solutions and business intelligence and analytical tools centred on a data warehouse. The focus switched from a traditional siloed emphasis on taxes, duties and functions to a 'whole case management' approach based on analytics and the risk of non-compliance. This risk analysis and analytics approach requires data and information gathered from many sources and integrated to provide a fuller picture of each taxpayer's propensities. Revenue began to gather information from internal and external sources in order to cross-compare it. Internal data includes all transactional data recorded over many years. External sources include credit data from Dun & Bradstreet, telephone directories for address information and data from other government agencies such as the Central Statistics Office and the Companies Registration Office. Revenue used analytics and existing knowledge held by experienced tax auditors, and a battery of inference rules, to assess each taxpayer's risk of non-compliance. This approach resulted in a new method of tackling non-compliant taxpayers. One senior manager described an example:

"We did a compliance project...where we looked up cases that were shown up in the Stamp Duty file as having sold their property, we looked at the CGT [Capital Gains Tax] record to see if they had made a CGT return and we looked at the Tax Relief at source file to see had they been claiming mortgage interest relief in which case it was a principle private residence... In the end we got nearly €9m for writing 6,500 letters and a small amount of analysis and business intelligence".

(A/S 2R, Revenue)

This new approach focused on targeting cases that have broken the rules rather than laboriously dealing with all cases. Previously a more bureaucratic approach was taken toward solving non-compliance, where each tax head registration was

examined within the confines of the current tax returns submitted. The old bureaucratic methods were ex-post operations based on those who did not make a tax return or payment. Whereas this new exception based approach relies on analytics that identify patterns and inconsistencies that display a trend toward non-compliance, inability to pay or even (in the case of corporates) likelihood of liquidation. This type of analysis and data mining relies for its information on the ability to focus on the taxpayer from many different perspectives in order to get a more holistic view of their propensities. The same senior manager cited above described a further example of this:

“Some things become clear with the data, for instance, we got great mileage when we pushed out lots of cases that were registered for RCT [Relevant Contracts Tax – a tax head that is specific to building contractors] and not registered for VAT – how is that possible? That was a beaut!”

(A/S 2R, Revenue)

This type of data mining and the use of inference engines is a distinct new stage of development, in terms of its operational approach. One informant assessed this stage of development as follows:

“We had the luxury of time and systems that enabled us to do things we may have wanted to do in the past. Business analytics gave us the opportunity to work smarter in an environment where society was demanding more compliance.”

(SM 9R, Business Division Revenue)

The data is compiled from a complete customer view of the taxpayer, which up to this point was not available. Along with many BI tools Revenue has also employed an inference engine with over 200 inference rules that were created by specialist tax auditors and are applied to all taxpayers’ operational data on a regular basis.

These rules and the inferences gained from them offer novel insights into customer propensities. These insights have revolutionised how managers in Revenue approach business. On the basis of these insights risks and ranks are assigned to each taxpayer and resources are allocated according to the level of risk identified by those rules. In addition, cases that are selected for intervention are routed to caseworkers based on their competencies. Tax auditors in the field continuously challenge the rules and inferences used for selecting delinquent cases for validity and relevance. On that basis rules and inferences are corrected and updated with knowledge and feedback from actual audits and interventions with taxpayers. This level of engagement contributes toward a culture that reinforces BI as a significant asset for an organisation. Howson (2008) identifies this type of reinforcing culture as one of the significant characteristics of a BI capability.

“Revenue recognises that this focus on risk helps the organisation better reduce and deal with incidents of tax evasion in an increasingly challenging environment.”

(Accenture and MRI 2005)

This use of business intelligence and analytics has not only revolutionised Revenue’s approach to non-compliance but it also facilitates the opportunity to focus on certain aspects of the economy, in an effort to gain insights on how a particular industry operates in terms of its propensity to avoid or evade taxation. One senior manager made the following remark:

“Just as the automated systems had created efficiencies over the manual systems, ICT developments undertook the basic day-to-day running of systems which allowed Revenue to concentrate on areas that had not been given sufficient attention in the past.”

(A/S 3R, Revenue)

According to Watson and Wixom (2007) BI has an important role in providing agility to an organisation that is operating in a rapidly changing environment. Ross et al (1996) contend that BI is a capability that offers value at both strategic and operational levels. Marchand and Peppard claim that people should be placed at the heart of any BI initiative because they see information as something that people themselves make valuable. They contend that:

“ [BI] projects should be conducted like experiments: framing questions to which the data might provide answers, developing hypotheses, and iteratively experimenting to build knowledge and understanding.” (2013 p. 107)

This is similar to how BI was seen to be in Revenue, where that type of experimentation with knowledge was built into the business process. As mentioned previously the knowledge base of inference rules is constantly put under scrutiny by tax auditors in the field who feedback the value of each rule with data and insight from each of the inferences made. This level of integration of BI is recommended by the literature. Other characteristics of this capability that were observed in Revenue and that were reflected in the literature include: highly committed business sponsors; BI viewed as an enterprise resource; adequate funding to ensure a long-term presence in the organisation and an experienced BI team assisted by vendors and independent consultants (Eckerson 2006; Howson 2008).

5.2.11 *ICT Supporting Stage 5*

From a technological perspective is an amalgamation of numerous existing data collection and analysis tools including ETLs (extract, transfer, load programs), dashboards, data warehousing, On-line Analytical Processing (OLAP), data mining, and Geographic Information Systems (GIS). These tools are used to derive intelligence from the underlying transactional data, which is then applied to enhance the customer profile and to build a customer based strategy (Smith 2008). In addition to these Business Intelligence tools Revenue has incorporated an inference engine along with over 200 inference rules that are applied to all taxpayers on a regular basis.

5.2.12 *Stage 6 – Process Improvement and Flexible Business Processes*

The capability associated with stage 6 as identified during the first 20 interviews associated with phase 1 of the research include process improvement and flexible business processes. Some competencies associated with this stage include business process improvement and a flexible approach to the design and change of business processes.

Lean Six Sigma was introduced to Revenue in 2010 and was reported by a number of informants as having had a significant impact on some of the business processes. Work in this area is on-going. During phase 1 of the research, a number of informants identified the introduction of Lean and Six Sigma as a significant stage of development for the organisation.

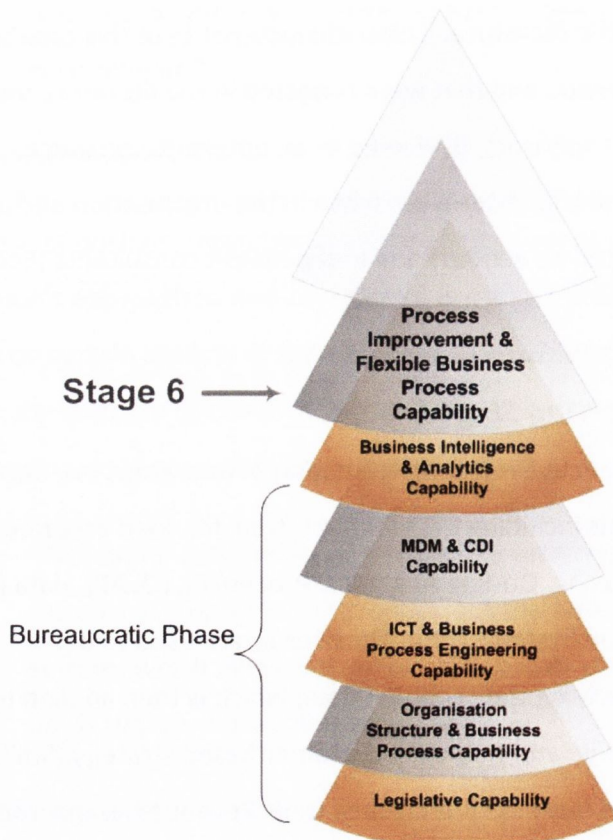


Figure 5.11 Stage 6 Process Improvement and Flexible Business Process Capability

Lean Six Sigma (Bowen and Spear 1999; Naslund 2008) is a synergy of two managerial concepts Lean and Six Sigma. Lean is a production philosophy and method that seeks to reduce wasteful practice throughout all business processes. Lean is derived from the Toyota Production System (TPS) and is often seen as a more refined version of earlier efforts at process improvement (Persse 2006). Motorola originally introduced Six Sigma in 1986 as a process improvement technique to develop the quality of manufacturing outputs (Naslund 2008). Both are process improvement techniques that originated in the manufacturing industry. More recently both have been combined and applied to all types of organisations, including service organisations.

Lean Six Sigma or more generically process improvement, was identified as a significant aspect of stage 6 for Revenue as an organisation. Stage 6 was also identified as the ability for the organisation to develop a flexible approach to business process improvement and business process reengineering.

5.2.13 *ICT Supporting Stage 6*

Service oriented architecture (SOA) and business process management (BPM) were identified as key ICT supports for this stage of development. SOA is an approach to technology architecture which allows value to be gleaned from both technology and business in terms of flexibility and software reuse (Krafzig et al. 2005; Erl 2006; Papazoglou and Van Den Heuvel 2007).

BPM is a technology stack that supports business process reengineering (Rosemann and de Bruin 2005) with an emphasis on processes and process improvement in a way that can take advantage and support the standard process improvement methodologies such as ISO 9001, and Lean Six Sigma (Persse 2006).

5.2.14 *Stage 7 – Dynamic Capability Coordination*

The capability associated with stage 7 is the ability for an organisation to identify and categorise the organisation's core capabilities and to be able to assess the

outputs from and outcomes resulting from those capabilities. The output from this stage should be a model that will track and measure potential impacts from one stage's output to another. Some of the competencies associated with this stage include: the ability to assess impacts of capabilities and competencies; the ability to build a model of those impacts; the ability to feed forward into the strategic plan for organisation.

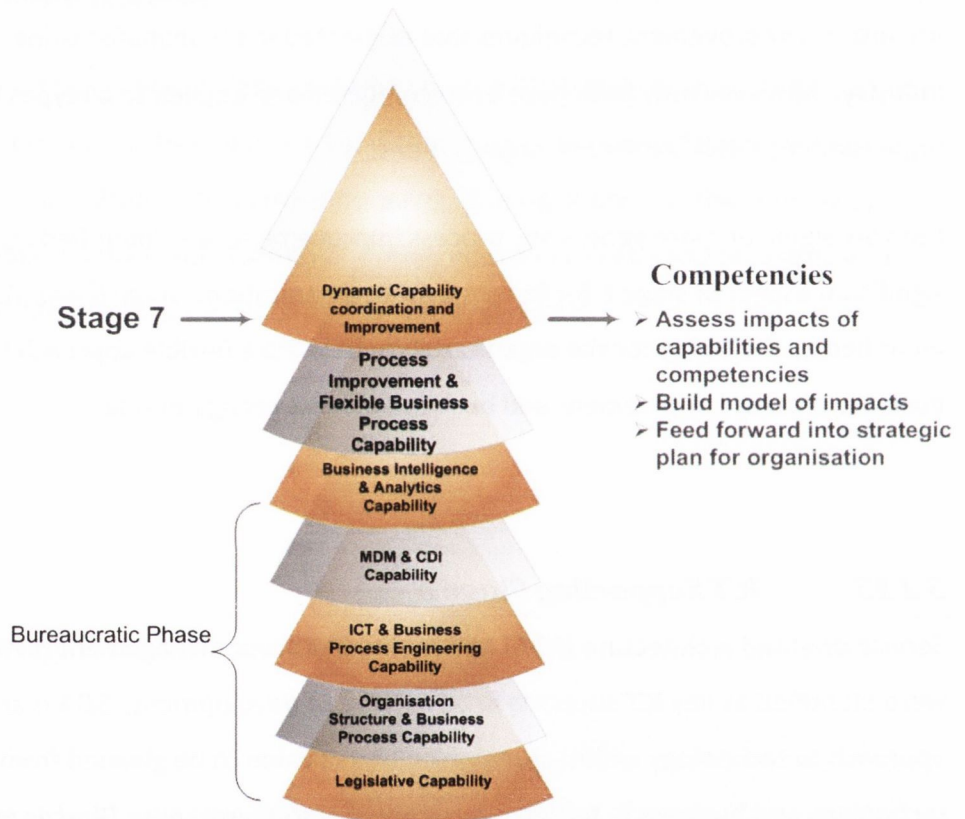


Figure 5.12: Stage 7 Dynamic Capability Coordination & Improvement

The findings of this research show that there is potential for this stage of development to emerge further within the organisation, but at this time it can only be regarded as incipient. However it was significant given the fact that it was identified by a small number of the most senior informants.

Some evidence for this stage or requirement for a capability emerged when informants highlighted the potential for wasted effort and lack of coordination that may occur with the existing relationships and connections that are relied upon within Revenue as an organisation.

“With all the systems we have we are still a human organisation and we need to be mindful of this for a number of reasons...we can have human error between systems and we depend on our senior managers to pick up on these potential problems...”

(SM 1R, Business Division Revenue)

This informant is referring to systems in their broadest sense, to include ICT systems and some of the other capabilities already outlined in this chapter. Meadows (2008) claims that a significant aspect of what happens in a system is a product of the interaction of its component parts. Boardman and Sauser (2008) agree, suggesting that component parts of a system do not deliver all aspects of a system; to understand a system it must be understood as a whole. This point was recognised by senior managers in Revenue. One informant made the following observation:

“We have insularity within our Divisions, we have small very specialised areas such as legislation that carry a huge burden on behalf of the organisation... can we say they are aware of the full strategic implications of what they’re doing for the organisation? I suspect not. We have the linear thinking, we have lots of organisations within the organisation and they’re not communicating effectively. All of these competencies have knock-on effects and this is not an indictment on RLS [Revenue Legislation Service] alone this is the same for all competencies and that’s why you may have heard senior managers identify this issue.”

(A/S 3R, Revenue)

For Dettmer (2007) ‘systems thinking’ is a matter of understanding how information creates circular cause and effect relationships; relationships that tie into a larger system together. Where those relationships are not tied together disjointed behaviour may be observed. A number of informants identified this type of disjointed behaviour in the organisation. Two informants made similar points in this regard:

“We have many aspects or parts of the organisation that may work toward the strategic plan, but very often their work is not coordinated with other aspects of the organisation, for instance sometimes we may have a piece of legislation for a taxhead that is already tied up in an ICT systems but the new addition of legislation may not be programmable.”

(A/S 3R, Revenue)

“Do we have the ability to computerise or operationalise this piece of legislation?”

(A/S 5R, Revenue)

As some interviews progressed an overview of the stages began to emerge for some of the informants. The organisation was identified as having many stages of development or independent capabilities each with separate inputs, outputs, governance and dynamic. The following quote reflects a position that was held by a number of informants:

“Yes we are existing at several levels simultaneously.”

(A/S 5R, Revenue)

Although these capabilities or stages of growth remain isolated, acting as separate rational capabilities, they must also be viewed as interacting currents with structural consequences, which should be considered as a whole for their systemic or overall impact. One informant made the following remark:

“We often get new powers in legislation and you may ask around a few years later to see has anybody used them and find no, they haven’t been used at all or very little, we seem to have these what you mentioned as competencies [capabilities] acting sometimes without coordination between areas and sometimes lacking direct control.”

(A/S 5R, Revenue)

This informant is suggesting that an approach should be taken which will account for all capabilities with a view to aligning divergent currents associated with each of them. Jackson (2003) and Senge (1990) describe this approach to the management of complex systems as the field of System Dynamics. According to Jackson (2003) the field attempts to map causal relationships between subsystems. Senge (1990) describes the field as a discipline for seeing wholes and a framework for seeing inter-relationships and patterns of change rather than static instances.

Checkland (2012) points out that a functional subsystem may itself be part of a wider system which may be described as a layered structure or hierarchy of systems suggesting that whatever one takes to be the whole might itself be seen as part of a yet larger whole. In many ways this view reflects the findings of this research and the stages of growth model that has emerged. This stages of growth model was regarded by a number of informants as a layered structure or hierarchy of capabilities that can be seen together as a larger whole. In addition a number of informants suggested while coordination occurred between capabilities there was further scope for development and understanding within this area. One informant made the following remark:

“...we do have coordination among the various competencies [capabilities]... that’s a senior management role and we also have groups and committees like BMEX [Business Management Executive] and ITEX [IT Executive] that provide coordination among the roles, but we don’t have a model or method that tells us how or what the impact is from one capability to another.”

(A/S 5R, Revenue)

Another informant remarked that there was a need for a type of analysis and thinking that could help with assessing with the impact of potential operations or changes and that this thinking could provide some level of coordination across the organisation:

“...what we need is a model that will help give us greater depth with our coordination of roles throughout the organisation... a way to look at the impacts in other parts of the organisation... in a sense a model to allow us to do an impact analysis for our operations...I think our PMRS [Performance Measurement Reporting System] system will give us a more refined measurement of our operations, but we need to be able to tell in advance the parts that need to be more closely coordinated... maybe portfolio management might help here as well... but it still doesn't give us a model of the organisation.”

(A/S 3R, Revenue)

One informant held the view that this stage of growth had already started to emerge in the organisation but acknowledged that it may take some time before the organisation came to be understood as a dynamic system.

“I suppose we've already started this when we started to map the organisation's business processes... but we have a distance to go before we can build a model of this... I suppose this work you're doing here and this model you're working on is another step toward building this type of model... you're fleshing out some of the thoughts and the requirements for it...”

(A/S 4R, Revenue)

From discussions around this topic it is clear there are many complexities associated with modelling this type of organisation and any solutions are unlikely to be simple or neat. What the findings do suggest however is that caution must be exercised by managers who mistakenly think that making a change in just one part of a complex system will solve the problems of an entire system. However compelling the simple cause-and-effect solution is, it does not take into account the many synergies and feedback loops present in a multi-dimensional system (Zemke 2001). Counterintuitive results can plague any problem solving efforts when managers fail to think in whole system terms. The systems dynamics field

models complex systems with diagrams that outline causes, effects and feedback loops. While many proponents of system dynamics expound its benefits and advocate searching for the elusive lever in a 'causal loop diagram', real-world usage of systems dynamics remains low (Warren 2004; Checkland 2012). Informants in this research identified this government department as a complex system of synergies, causal loops and feedback systems. They do not suggest that there is a lever on which the organisation pivots; they merely suggest a complexity to be observed and modelled, the purpose of which is to unify the many threads in a faceted enterprise of systems.

5.2.15 *ICT Supporting Stage 8*

This stage has no software supports in place in Revenue. The role of software in this area is still developing and it is therefore not possible at this point in time to comment on its uses within the context of a government department.

5.3 *Phase 1 of Research – Focused Interviews*

Stage Change Mechanisms and Emerging Stages

The second part of the first phase comprised ten 'focused' interviews. These were so-called because they were focused on the specific question of change mechanisms. It was noted in the literature review that none of the e-government stage models published consider stage change mechanisms as such. The purpose of this phase was to address this gap.

As noted above, there is a continuing and overarching driver for change throughout the system, i.e. the need for more efficiencies. The following sections describe specific mechanisms affecting the transitions between stages.

It is important also to note an additional nuance to the field research. While some of the focused interviews preceded phase two of the research, some of them were contemporaneous with phase two and in some instances, issues that emerged during phase two interviews were analysed during these focused interviews. As a consequence of these interviews, more clarity emerged around

three stages. For that reason changes to the phase 1 model are described in this section alongside change mechanisms.

For each stage change there was often found to be an additional set of circumstances or drivers that moved the organisation along the path toward the next stage of growth. These additional stage drivers or mechanisms will be described along with each of the stages of growth. Where each of these stage changes are described, they will also be categorised using Van de Ven and Poole's (1995) organisational change categories. Van de Ven and Poole divide change mechanisms into four broad categories as follows:

- 1) Life-cycle theory - events progress in a linear and sequential manner. Change can be anticipated in a logical way.
- 2) Evolution - change is best understood against the wider backdrop of life being a series of events relating to competitive survival.
- 3) Dialectic - all existence is shaped by opposition and conflict, where contradiction is a natural state.
- 4) Teleology - change is enacted through goal-setting mechanisms and management intervention.

Van de Ven and Poole contend that all theories about organisational change can be built from one or more of the above basic types and while some theories can be reduced to one of these mechanisms most are predicated on the interplay of two or more of these mechanisms. During the course of this research teleology or management intervention was offered by many informants as one of the most common reasons for change. Given that many of the informants were managers it was only to be expected that many would suggest this as the key mechanism to organisation change. It was important therefore to reflect on other possible change mechanisms along with the undoubted significance of management and leadership as a change mechanism.

5.3.1 Change Mechanism - Stage 1(Legislative) to Stage 2(Organisation Structure and Business Process)

While the legislative stage was regarded as foundational, many informants identified its limitations by distinguishing it from the next stage of development. One informant put it as follows:

“Sometimes it’s easier to approach efficiency by changing the business process...”

(SM 1D, Business Division DSP)

The move beyond the first, legislative stage was often described as being typical of the differentiation of tasks that emerge during the early stages of an organisation’s life – a differentiation between goal setting and doing. Katz and Kahn (1966) describe this as an emergence from the primitive organisation where a common goal is formulated into an operation and if that operation is going to survive beyond the initial project, it will develop an elaborate social structure and become an organisation in the usual sense of the word. In Van de Ven and Poole’s terms, the move from Stage 1 to Stage 2 is categorised as a Life-Cycle change where the change is immanent, by which is meant each stage emerges from the preceding one as though the stage was dwelling or lying dormant within the previous stage. Van de Ven and Poole describe this mechanism as a form that lies latent, premature or homogeneous in the primitive state, but becomes progressively more realised and differentiated.

5.3.2 Change Mechanisms - Stage 2(Organisation Structure and Business Process) to Stage 3(ICT and Business Process Engineering)

The organisation at this stage had been stabilised with organisation structures and business processes. The organisation had also developed the capability to maintain this stability over time. The relationship between stages 2 and 3 also became clear as a number of informants made similar statements, for example:

“Without these well developed set of business processes it wouldn’t have been possible to move toward any automation.”

(SM 4R, ICT Division Revenue)

“Because the manual systems were so accurate, functional and well designed they provided an ideal blueprint when bringing ICT on board or creating an automated system”

(SM 5R, ICT Division Revenue)

This stable environment with an accurate *“well developed set of business processes”* was an enabler and foundation for the introduction of ICT. These enabling conditions were further described by one informant:

“It was this type of rigid adherence to business process or factory like processes that enabled the move to ICT automation, but the driver for this move was different... and of course this came after government policy was established and the legislation was drafted.”

(SM 2R, Business Division Revenue)

The same enabler was observed in other government departments during phase two of the research. One senior manager corroborated this stage change enabler with the following comment:

“the regulations were set out.. all processes were well developed, and this is what lended itself toward automation, but this had to be in place first...”
[Informant pointing to Stage 2 on the Revenue Model]

(SM 1A, ICT Division Agriculture)

Revenue’s first IT initiative came in 1963 which was early in the history of business computing. The fact that IT was introduced at this early stage was in part driven by the socio-economic pressures of the era. In the economic boom of the late 1950’s and early 1960’s the number of taxpayers trebled (Revenue 1961; Réamonn 1981). Two senior managers described the dominant change driver thus:

“The rise in the number of employed would have been a driver and the organisation’s ability to cope with that increase in traffic or that increase in workload would have been a driver and that would have forced the organisation to look at ways of making things more efficient and that’s always been the driver, technology has always been looked at for ways of improving efficiency”

(SM 2R, Business Division Revenue)

“...we couldn’t have dealt with the surge of demand with the staff or structures that we had... we had to automate....”

(A/S 1R, Revenue)

The stage change mechanism can be categorised as both dialectic and teleological. This stage change is dialectic in nature as it reflects the conflicting demands of both the socio-economic environment and the ability of Revenue’s structures and processes to respond to these. Socio-economic demands began to increase as the number of tax returns to be processed by the organisation rose rapidly in the late 1950’s. While Revenue’s structure and business processes provided the necessary conditions for change, they also presented as a limiting factor. Efforts to further optimise these structures and processes failed to produce the required efficiencies (as budgetary constraints at the time prevented increases in staff numbers). The tension between these opposing forces precipitated the need for some creative solution. That creative solution came in the form of emerging IT developments that facilitated the automation of business processes.

The other change mechanism is or more prosaically, a function of the leadership and direction provided by Revenue managers of that era (Réamonn 1981). Réamonn pointed to a number of visionaries who he noted as significant change agents during this newly emerging era of e-government.

5.3.3 Change Mechanisms - Stage 3(ICT and business Process Engineering) to Stage 4(Master Data Management and Customer Data Integration)

An increasing strain on Revenue resources occurred again during the 1970's and 1980's when eight new tax types were introduced – among which were Value Added Tax (VAT), Corporation Tax and Capital Gains Tax. The silo type tax system resulted in a distinct set of problems - some of which were introduced with new taxes and others that had existed for some time, but which were becoming more observable.

Amongst the consequences of this silo structure for Revenue, was a substantial volume of duplicated functionality and code. Over time, an increasing number of anomalies emerged, often as a result of an externally initiated change – for example, a change to tax legislation or tax relief. Some anomalies became evident when new taxes were introduced; others became more visible as demands for more sophisticated reporting and analysis of tax revenue increased. Of these anomalies, perhaps the most egregious was that it was possible in this era for a taxpayer to have an overdue liability for one tax (e.g. income tax) whilst simultaneously being given a refund for overpayment of another (such as VAT). Another widespread anomaly was data which was held in one part of the system and which was required, but not available in another part. This resulted in taxpayers being asked more than once and sometimes several times for the same data. It also resulted in what was supposedly the same data being held in multiple locations with all the potential that ensued for errors and data integrity problems. As the number of tax types increased and the corresponding number of ICT systems increased, yet more anomalies emerged. As the number and seriousness of business anomalies grew, ICT nuances were developed within each system, which exacerbated the problem. Each time an attempt was made to remove an inconsistency or incongruity from the system, substantial costs were incurred and the knock-on effects from changes in one part of the system were often not realised or understood until after the change had been implemented.

In this instance, the mechanism for change was the constant demand for increased efficiency and the driver for change was clearly associated with the increasing costs associated with the anomalies and inconsistencies presented by these silo type systems.

The following is an extract from a report on Revenue's database management system which outlines some of the business and technical problems that were arising during the period of the 1980's:

“The main difficulty now encountered by Revenue is that data is separated and duplicated across applications – ‘islands of information’ exist with little possibility of ‘cross’ access/reference of information. This has occurred because of the historical independence of different taxes. This structure is supported by a flat file architecture; a number of large separate files for each taxhead. Consequently data held in different files about the same taxpayer is difficult to identify and multiple files store the same information about a taxpayer such as name and address... While it may be feasible to contemplate supporting some aspects of this database structure, the complexity involved in maintaining such an environment is substantial and continues to entail the development of complex programs to manage the relationships and support restart/recovery and data integrity.”

(Revenue 1988)

Reconciling anomalies and the cost of constantly developing and maintaining data extractions and data transfers between these separately siloed systems was a costly and complex affair. By the late 1980s, there was a growing awareness that this structure was becoming increasingly difficult to maintain. There were significant costs being incurred as a result of the differing and inconsistent business processes within the organisation. This increasing cost of maintenance

became a driver that precipitated change within Revenue. One informant made the following comment:

“Silos are expensive to maintain... anomalies and lack of co-ordination are costly issues to reconcile – I suppose you look on it in retrospect and think that change was bound to happen but it wasn’t entirely clear at the time, I mean it was clear to me and a few others what should happen... I suppose it became clear to more people as we went along...now it seems obvious to everybody.”

(SM 7R, ICT Division Revenue)

In 1989 an internal study (Anderson-Consulting and Revenue December 1989) was undertaken to investigate what managers felt was a lack of coordination between the various taxhead systems. This study was based on the simple premise that each taxpayer was likely to be registered for many taxes and that each system was likely to be duplicating development and maintenance costs, not to mention the larger business costs of differing business processes within the organisation. This internal study was initiated to consider how to eliminate the widespread lack of coordination between the various tax heads. As it turned out, this study was one of the significant enablers for the change from stage 3 to stage 4.

The change mechanism for the move between Stage 3 and Stage 4 is categorised as dialectic. The dialectic describes a tension that exists between the push to integrate the many isolated systems and the inertia of those very systems that continue to deliver value to the organisation. The push to integrate was driven by business users within Revenue who, in the course of their efforts to deal with taxpayers, found themselves trying to resolve the emerging anomalies. The inertia to maintain these siloed systems came in part from managers who realised the substantial cost of change and the reluctance of the same business users who had become so familiar with the many benefits offered by the siloed systems to change the systems they knew. This tension was eventually broken when it

became evident that the cost of maintenance was starting to outweigh the cost of change.

This stage change illustrates how government organisations move from the siloed view of a customer to a consolidated view of that customer. Informants from two other government departments corroborated this stage change when they agreed that this same stage change occurred in their organisations and for similar reasons.

5.3.4 Change Mechanism - Stage 4(Master Data Management and Customer Data Integration) to Stage 5(Business Intelligence and Analytics)

For many informants the consolidated customer view was a significant change in itself and was also an enabler for a number of subsequent changes. This view is captured with the following remark from one respondent:

“Having consolidated the customer data in the warehouse, the logical follow on from this was to mine this data in such a way as to achieve optimum value for the efforts put into getting it...this included business intelligence and analytics.”

(SM 8R, Business Division Revenue)

However the organisation was by this stage also having to cope with problems that had already developed which acted as additional drivers for change. In 1985 the Commission on Taxation (1985) delivered a report on tax assessment procedures. At that time taxpayer liability was assessed directly by Revenue using a method that was deemed by the Commission to be unwarranted, cumbersome and inefficient, leading to a large number of appeals from taxpayers. The Commission revealed that nearly 90% of all tax assessments were appealed. This large number of appeals was putting pressure on organisational resources and often resulted in liabilities being undetermined for several years (Commission on Taxation 1985). The Commission concluded that a system of self-assessment should be introduced whereby taxpayers would complete an annual return and

be responsible for calculating their own liability. The onus to comply was shifted onto the taxpayer and was reinforced by a penalty code that was enabled by legislation and supported by new organisational processes. Income Tax was the first taxhead to use this new voluntary compliance model with self-assessment (Revenue-Commissioners 1988). The move to self-assessment brought significant savings to the organisation. As a consequence however, Revenue found that they needed to do two things: firstly they needed to detect when taxpayers were not compliant with the new regime and secondly they needed to manage such delinquent cases appropriately. Initially, Revenue relied on interventions with taxpayers in the form of audits to discover the level of taxpayer compliance. It soon became clear that this method was not sustainable as it merely replaced one resource intense process with another - Direct Assessment was being replaced with taxpayer audits. Revenue auditors are an expensive resource to train and deploy. It is important therefore that this resource be used judiciously such that auditors' interventions with taxpayers are valuable in terms of return on investment. An audit of a taxpayer who is fully compliant is a waste of resources for Revenue and the taxpayer. The ability to assess taxpayers and to target those delinquent cases demanded better understanding of the taxpayers' propensities. One informant identified the point when this change of direction came about for the organisation:

"In the eighties our special enquiry branch was maybe 10 or 20 people, a relatively small number in terms of the operation to deal with non-compliant customers, we weren't putting the resources into [tackling] the black economy that we needed to do and I think the penny dropped somewhere along the line that we needed to start spending our resources on the non-compliant..."

(SM 2R, Business Division Revenue)

A challenge for Revenue is locating and dealing with those in the community who either refuse to participate in the legitimate economy or who are not complying fully with their obligations. According to one Revenue manager writing for an Accenture report on taxation:

“...there has been a growing public awareness and decreasing tolerance of tax evasion in Ireland, due in part to a number of high-profile tribunals of inquiry. Revenue has played its role in raising this awareness and has given an undertaking to vigorously seek out and deal with those engaged in evasion. Irish citizens are rightly demanding that all citizens comply with their tax and duty obligations.” (Accenture and MRI 2005)

Concerns about tax compliance arose as result of the move to self-assessed taxes and additional socio-economic pressures. Tax compliance was identified as a significant driver that moved Revenue as an organisation along from stage 4 to stage 5. The fact that the organisation had already broken down the siloed structure, created an integrated customer view and was well placed to begin mining data in a data warehouse was among the significant enablers for this stage move.

The stage change mechanisms for this change were identified as a combination of lifecycle and teleological. Lifecycle because there was an inherent logic associated with the availability and use of data and insights into taxpayer propensities and teleological because management precipitated change which altered the direction of the organisation toward a more proactive approach towards non-compliance; one that offered the organisation an opportunity to apply business intelligence solutions to a data set that offered many novel ways of detecting taxpayer non-compliance. This shift can be seen in the following extract taken from Revenue Statement of Strategy 2005-2007 (Revenue 2004):

“Our overarching aim continues to be the development of a more integrated organisation, which brings a whole case and risk-based

approach to the management of our business, and that dealing with risk must be at the heart of our strategies.”

5.3.5 Change Mechanisms - Stage 5(Business Intelligence and Analytics) to Stage 6(Flexible Case Management and Business Process)

The business intelligence and analytics capability was a key enabler for change from stage 5 to stage 6. One of the key drivers for change to stage 6, (like stage 5) came as a consequence of Self-Assessment, where the organisation recognised that not only did they not have the resources to audit every taxpayer to check for compliance, but that such a response was not an optimal use of resources. Instead it became clear to managers that there were many levels of non-compliance that should be matched with an appropriate response – a response that was commensurate with the level of non-compliance exhibited by the taxpayer. One senior manager described it as follows:

“...audits are expensive to deploy but not alone that, an audit is not appropriate in many cases – it’s a bit like using a sledgehammer to crack a nut; we came to realise that our methods should match the types of cases...”

(SM 10R, Business Division Revenue)

Revenue found that a valuable use of resources was to apply automated processes to compliant taxpayers and apply different business and management processes to non-compliant taxpayers.

Revenue’s first case management system was called AIM (Active Intervention Management) (Revenue 1994) and was brought into operation in 1994. This system was built to manage non-compliant taxpayers who were identified using the old bureaucratic methods. These methods provided cases from results of *ex-post* operations e.g. taxpayers who didn’t make a tax return or payment. Over time methods for choosing cases became more sophisticated with the use of business intelligence and analytics. So too did the approach to managing those

cases. During the early years of case management, Revenue employed novel approaches to debt management and non-compliance. Over time however, it became clear that the many different variations of non-compliance demanded a corresponding number of variations in case management approaches (Revenue 2007b). In addition, the variations in management approaches demanded many different skill sets which in turn often required highly trained resources. Management became conscious that highly trained resources should be assigned to customer audits and interventions which were commensurate with their abilities and that more junior staff should be assigned to case management tasks matching their abilities (Revenue 2003b, a). One informant described this management view as follows:

“What we didn’t want to do was waste money by assigning our highly trained auditors to deal with lightweight cases and also we didn’t want to go to the expense of training all our people in all the audit and debt management skill sets available – that would be a waste.”

(A/S 3R, Revenue)

What was required to cater for this view was a complex selection process that had the potential to discriminate levels and types of taxpayer delinquency or non-compliance and assign those cases to caseworkers with appropriate and optimal skills sets (Revenue 2005a). Revenue management therefore shifted to an approach to case management that optimised the use of resources by training them to a level that reflected the demands for case management interventions.

This stage change mechanism is categorised as teleological (Revenue 2004) where leadership and management within the organisation followed a path that recognised and discriminated levels and types of non-compliance while matching those with skill sets and business processes which were designed to manage those cases optimally. This stage change mechanism was also categorised as lifecycle where there is a logical follow through from the previous stage where

data mining enabled the customer compliancy to be differentiated into distinct types.

5.3.6 Stage 6 – Flexible Case Management and Flexible Business Processes

During phase 1 of the research, process improvement methods were understood as something that happens to processes after the stage six. However, during one ‘phase 2’ interview with a corroborating department who were also engaged with Lean Six Sigma, it became clear that this was not the case. That department took it as a policy to always implement Lean Six Sigma before software systems were considered. This evidence refuted the interpretation drawn during phase 1 of the research. Further consideration was given to this issue and additional evidence was sought in the focused interviews. As a result of these interviews this stage was taken out of the model and positioned alongside Stage 2 (Organisation Structure and Business Process Improvement) where it was now understood as a further broadening of an already understood capability. The informant who initially identified the inconsistency described it as follows:

“All the current emphasis on business process is actually to say no, we need to change the processes first [and after that], before we apply IT... so IT comes in second after the process... like it does here [informant points to stages 2 and 3 of the Revenue Model]”.

(SM 2D, Business Division DSP)

As the focused interviews progressed stage 6 emerged as ‘flexible case management and business process capability’.

The capability associated with stage 6 incorporates an ability to differentiate multiple customer types (harnessed from stage 5) and to build business processes and software workflow systems to deal appropriately with the specific requirements of each customer type and the conditions they present. In Revenue terms this means the ability to deal efficiently with specific categories or sectors of non-compliant taxpayers. The outputs from this stage are: efficient case

management and business processes, which will typically include software workflow systems that cater for the specific requirements of each intervention with a customer or group of customers. The software support is workflow based so as to enable each intervention to be treated consistently across the organisation. Dealing with similar case-types in specific ways enables the organisation to train and deploy resources appropriately for each intervention type. Some competencies associated with this stage include the ability to: Identify customer categories, build category specific business processes, align and match business processes with appropriate resources.

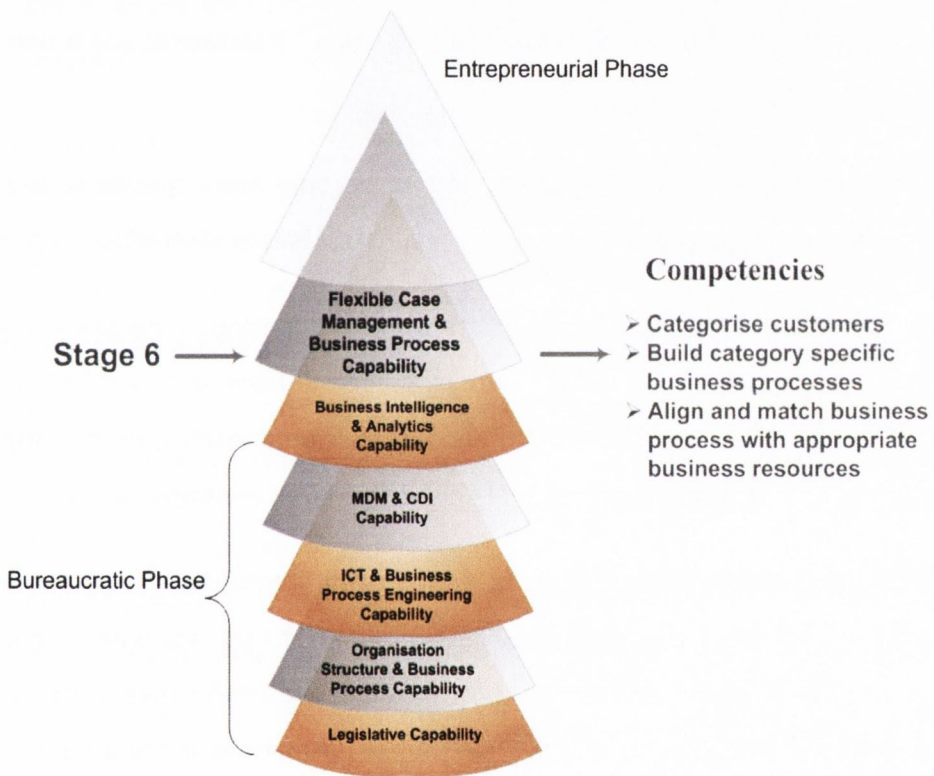


Figure 5.13: Stage 6 Flexible Business Processes and Business Process Management

This capability has been referred to as 'Patching' and Dell are cited as an example of a company that display this ability to respond to shifting customer demands (Magreta 1998; Eisenhardt and Brown 1999; Eisenhardt and Martin 2000).

Eisenhardt and Brown describe patching as a strategic process by which managers in organisations restructure their business to suit changing market opportunities.

They describe patching as follows:

“At first glance, patching may seem to be just another name for reorganizing. But patchers have a distinctive mind-set. While managers in traditional companies see structure as mostly stable, managers in companies that patch believe structure is inherently temporary. Patchers also develop corporate strategy differently. Traditional managers set corporate strategy first, whereas managers who patch keep the organization focused on the right overall set of business opportunities and then let strategy emerge from individual businesses...Patching changes are usually small in scale and made frequently.” (Eisenhardt and Brown 1999 p. 74)

Case management developed over time to become more specific to the task by providing workflow systems for various types of cases or interventions.

Some examples of these types of cases or interventions emerged from special investigations (Revenue 2002), others emerged from data analysis and data mining and as a result of insights into taxpayer propensities, propensities which were observed by caseworkers in tax districts around the organisation.

Workflow systems allowed caseworkers to follow stages and activities, which had been designed as the optimal business processes for that case type. Workflow systems ensured a consistent approach was taken to similar cases across the country and also acted as a user guide thus reducing training requirements. To that end a number of computer applications were developed over time to cater for this specific case selection, assignment and workflow management (Revenue 1994, 2000a, 2002, 2005a, b, c, 2007b, c).

From approximately 2005 onwards Revenue had begun to develop from being a machine bureaucracy with the ability to process millions of tax returns and payments efficiently, to an organisation that also took the opportunity to mine the customer base in an effort to identify high risk cases in an effort to combat tax evasion and non-compliance.

This stage of development brought a different approach to business processes, one that was less rigid and factory like, to one that was more dynamic in terms of its ability to target appropriate interventions and was flexible in its approach to working those interventions.

“Using a large machine bureaucracy to combat non-compliance was not going to give us a return on investment. We needed to be more agile. Using bureaucratic methods would not only be a loss maker for Revenue but it would also bring losses to the proprietors of the businesses we targeted.”

(A/S 2R, Revenue)

During this period many investigations were instigated along with compliance and evasion projects. The grey economy and the shadow economy became the target for significant portions of the organisation. In addition, all tax districts began to periodically switch resources from standard processing of compliant customers to a more opportunistic approach to combatting non-compliance.

“...from that data we were quickly able to work out who had a liability and how to pursue it. It requires a new way of working...it requires people to be a little bit more enterprising in how they view the world they are operating in.”

(A/S 2R, Revenue)

The organisation was described by one informant as being more entrepreneurial where a creative approach to combatting tax evasion was taken. The organisation had become a hybrid between a machine bureaucracy and an opportunistic enterprise.

“Data analytics gave us the chance to move beyond being just a bureaucratic organisation, to one with quicker responses to emerging problems and opportunities.”

(A/S 3R, Revenue)

One informant identified this requirement for new systems and the need for flexible approaches:

“Rather than having to constantly develop new systems the existing ICT architecture had to be flexible and robust enough to be easily customisable to deal with a changing environment...introduced by budgets, new compliance projects, sectoral projects or special investigations projects.”

(SM 6R, ICT Division Revenue)

To cater for this requirement for flexibility, a long-term perspective was taken with a decision to adopt service oriented architecture (SOA) and business process management (BPM) for case management systems. This allows workflow type systems to be built in a way where they can be customised to cater for the continuing requirement for flexibility in light of the changing and evolving case management processes.

5.3.7 *ICT Supporting Stage 6*

Case management has a history of almost two decades in Revenue and supported by software architectures ranging from two-tier client server applications to open-source Java based web framework architecture. The most recent case management workflow application has an architecture based on loosely coupled services in a service-oriented architecture that is centred on message-oriented middleware employing an Enterprise Service Bus. This architecture type is described by Ross (2003) as modular and is the fourth stage of her technical architecture development model (this model is described in section 2.9.1). This technical architecture allows for the reuse of software modules. Ross contends that this architecture type will help organisations to adopt an agile and affordable

approach to applications development, which in turn will help managers to be more responsive to customer propensities. While this approach to technical architecture facilitates this stage of development it is not regarded as an enabler or a prerequisite for this stage of development.

5.3.8 Change Mechanisms - Stage 6(Flexible Case Management and Business Process) – Stage7(Large Scale Operational Projects and Portfolio)

The entrepreneurial approach to non-compliant taxpayers spread across Revenue and infiltrated many parts of the organisation. For example many tax districts used standardised methods and processes at peak periods where tax due-dates arise and at other times they began to initiate compliance projects using case management processes and methods. As tax districts became more efficient at processing tax returns at peak periods an increasing number of resources were free to engage with compliance projects during the non-peak periods. As these types of compliance projects increased in number and size, management began to question whether there was a clear return on investment for those resources on these types of project. Many of these projects were showing evidence of having significant impact on tax compliance within many business sectors and industries. While these projects clearly offered a worthwhile return on investment for an increasing number of projects, they brought an increasing amount of expenditure, which required some justification. One informant remarked on this and suggested this type of approach to work had its own challenges:

“When we’re investigating sectoral compliance using analytics, we need to be scientific and rigorous about what we do. If we really are going to wash half these taxpayers in ‘New Surf’ and half in an ordinary washing powder, then we better do that...and not make big decisions about committing wider resources on the basis of botched experiments. What this requires is a level of project governance that can prove value and outline a benefits plan if the project is to be given national or even regional resources.”

(A/S 2R, Revenue)

This informant is suggesting that a scientific approach was required when assessing return on investment for the increasing number of projects that were being supported by the organisation. It was suggested that careful consideration was required before allocating funds to these projects. Many projects had little by way of targets, plans or benefits that could be clearly measured and few had established strategies that displayed returns on investment. One informant remarked as follows:

“We talk about projects in terms of “let’s do Doctors” or “let’s do Hairdressers”, but what does this mean? We tend not to have clear objectives when it comes to these projects. We need to be able to establish these more clearly as projects...projects have timelines, plans and benefits. We can often end up with projects that drift on and on. We need to establish governance on our business projects; much the same as we do with our IT projects”

(A/S 2R, Revenue)

This stage change was enabled by the prevalent use of case management and the entrepreneurial approach adopted by the organisation. The stage change mechanism was identified as teleological. The rationale for this is based on a policy document (Revenue 2011) that sets out the initiative.

5.3.9 Stage 7 – Large Scale Strategic Business Operations - Project and Portfolio Approach

During this phase of the research the evidence from focused interviews suggested that there was in fact another stage present - stage 7. This stage 7 was identified as ‘large scale operational projects and portfolio capability’ and was inserted into the model after stage 6. Stage 7 from phase 1 remained as the final incipient stage, but was renamed as Stage 8.

The capability associated with stage 7 is the ability for an organisation to identify business related strategic and tactical projects and programmes that have the potential to impact on organisational effectiveness. While Revenue had delivered many large scale ICT projects, the projects associated with this stage all relate to business operations. What was new in this stage was that there was a radical change in how management approached operations. The scale of these projects was unprecedented in operational terms. These projects and programmes tend to be applied at a national level and require significant resources in terms of manpower and expenditure. The projects were concerned with increasing effectiveness by targeting and influencing or changing tax compliance within economic sectors, industries or large corporations. Some projects were strategic and some were tactical¹⁹ - some examples are described below.

The outputs from this stage take the form of projects that have measurable benefits, specific outputs and detailed plans and schedules that can be tracked with metrics. A further output from this stage is an organisation wide portfolio of projects. Some competencies associated with this stage include the ability to:

- Assess and plan resource capacity available for large-scale business projects;
- Identify business projects, using business intelligence or other methods, that can influence compliance propensities in industry sectors or sectors of the taxpayer population;
- Compile a portfolio of national and regional projects and programmes;
- Govern and manage large-scale business projects.

¹⁹ The terms strategy and tactics are used with the same military analogy used by Hatch (Hatch, Mary Jo. 1997. *Organisation Theory: Modern Symbolic and Post Modern Perspectives*. Oxford: Oxford University Press.)

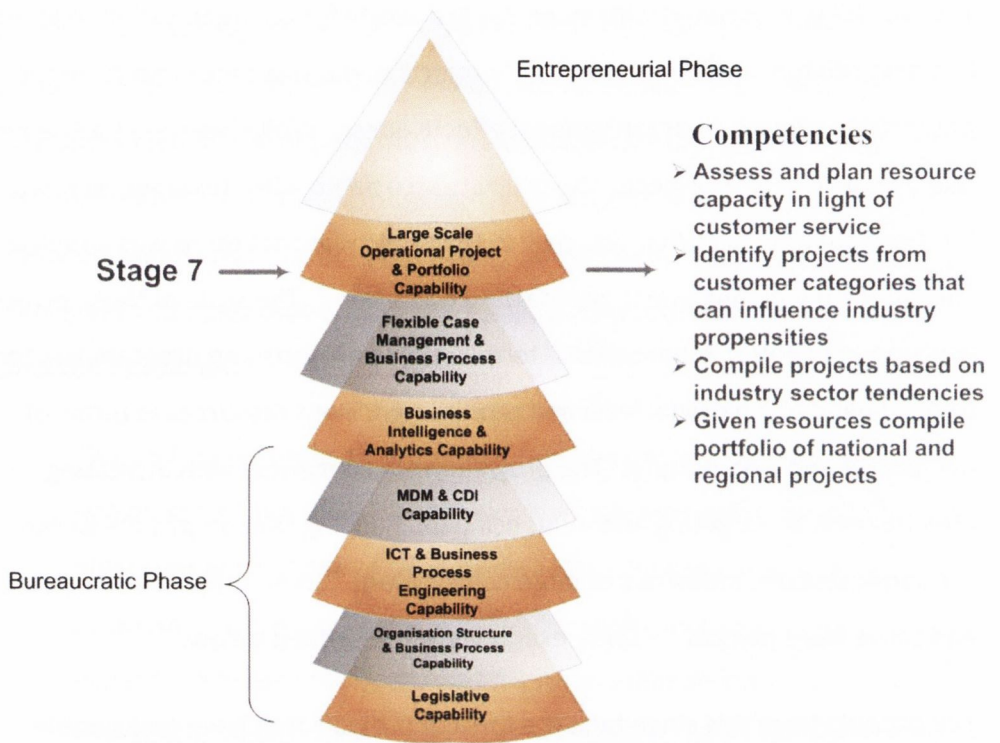


Figure 5.14: Stage 7 Large Scale Operational Project & Portfolio Management

During the course of the research interviews (phase 1) many examples of such projects were cited. One example of a tactical project was where employees of a large retail corporation with many outlets around the country were associated with a number of cases of tax relief abuse. The number of incidents of this abuse was increasing and spreading across many of the corporate outlets. From transactional data the spread was observable and rapid. There were also suspicions that an abuse of this nature could spread to employees in other similar corporations in that particular industry. The project was planned and implemented with the intention of correcting non-compliant behaviour and arresting the spread of such behaviour.

An example of a strategic project is one where a non-compliant form of behaviour was identified in the hairdressing industry. A pilot project was initiated to confirm the suspicions of non-compliance and to identify methods to combat the propensity. During the course of the pilot project a choke-point was identified that would enable the observation of key variables that would unlock the volume and scale of business carried out in the sector. As a result of this pilot project a

national project was commissioned and put in place which sent a clear message to the industry that Revenue now had traction on the industry's propensities and tax avoidance methods. A project such as this is strategic in the sense that it influences the behaviour of a whole industry.

Senior directors around Revenue had identified the requirement to have clear objectives and plans when it comes to deciding whether or not to invest in large-scale compliance projects.

"We need to be able to establish these [compliance projects] more clearly as projects...projects have timelines, plans and benefits. We can often end up with projects that drift on and on."

(A/S 2R, Revenue)

There was a growing awareness that project and portfolio management governance and skills would offer the opportunity to achieve the "scientific and rigorous" approach that managers required.

Revenue has a lengthy track record in successfully managing and delivering significant ICT projects. This success was built on the utilisation of a number of core techniques and governance structures. As Revenue's business and operational areas became increasingly involved in projects that focused on non-complaint taxpayers and the shadow economy, project management techniques and governance began to develop more widely across the organisation.

"The way we had our data invited people to set up little compliance projects... there was ample scope to build mini compliance projects based on evidence within our systems. It invites entrepreneurial management of the audit and compliance programme"

(SM 1R, Business Division Revenue)

Revenue management introduced a project management framework, one that defined a common and structured approach to project delivery. One informant commented as follows:

“We need the discipline of project management skills to be able to investigate and analyse compliance and tax evasion... we need to be able to get benefits from lessons learned both in analytics and in the operational field.”

(A/S 3R, Revenue)

One informant acknowledges the introduction of a project management framework for business projects as an important competency required for this stage of development:

“As manager of a district I was anxious to introduce this whole concept of project and portfolio management a number of years ago, but it never got any traction... I think it is the next step for the organisation and I suppose there is just a time for some of these concepts and ideas.”

(A/S 4R, Revenue)

The project management framework includes a governance structure and defines levels of authority and decision-making that provide clarity and accountability to roles. It enables effective management of project resources costs and risks while ensuring consistency in the way projects are managed. Figure 5.14 sketches out the three main decision points that are incorporated into the project management governance framework and lifecycle: Project Origination, Project Initiation and Project Review. While there is nothing new about this approach to project management (Maylor 2003) the figure itself is presented as evidence, which demonstrates the usage of a not-so-new method to support a novel business capability.

The framework was designed to help guide managers toward successful delivery of projects and to mitigate the risk of project failure and wasted effort.

Although the scale and nature of potential projects vary, the basic origination process is similar. The project’s business case is prepared by a business manager and sanctioned by a commissioning body. The business case outlines the project’s purpose and objectives, aligned with Revenue’s strategic goals, its expected benefits, high-level estimates of cost and timescale. The purpose of the business case or Project Origination Document is to provide the Investment Decision forum with a summary of the purpose and objectives of the proposed project and to seek approval to proceed with determining the feasibility of the project and the production of a Project Initiation Document.

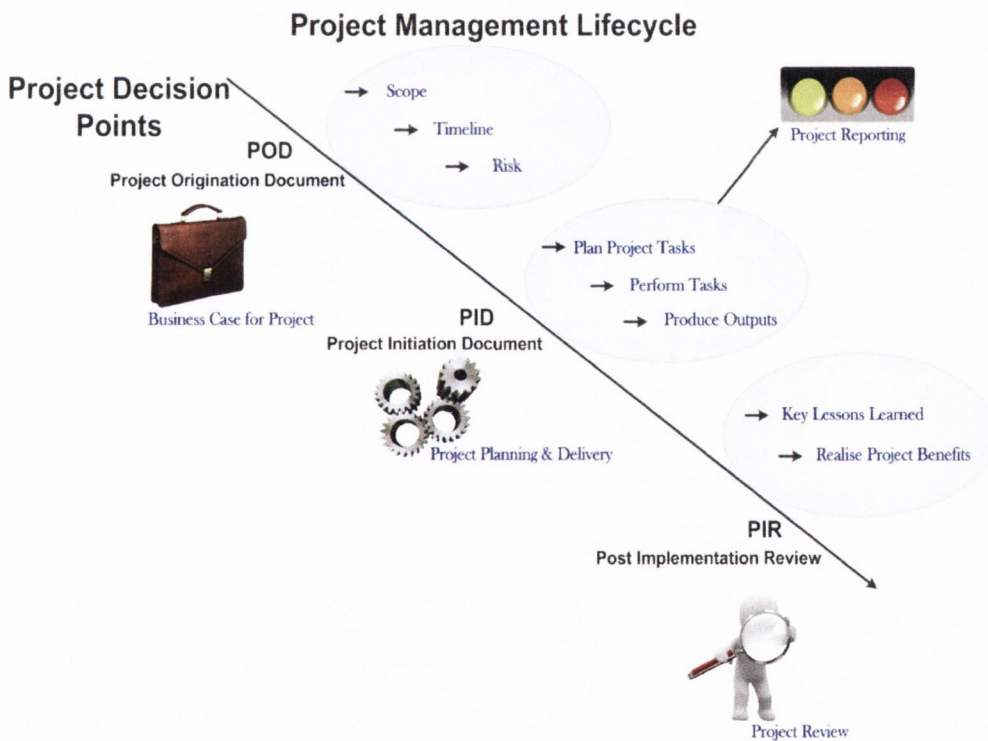


Figure 5.15: Project Lifecycle and Decision Points for Business Projects (Artefact from a Revenue policy document) (Revenue 2011)

The Project Initiation Document provides an overview of the project's objectives including details in relation to scope and cost and a summary of project timeframes, governance mechanisms, expected benefits, risks and stakeholder impacts. Approving this document marks the formal sanction to commence the project. These documents allow the organisation to make informed decisions on value and return on investment whilst committing the least expenditure.

The project governance framework was designed by Revenue to insure that project outcomes and benefits are clearly identified, measured and realised. The framework gives a consistent approach to project management throughout the organisation and ensures that projects undertaken are closely aligned with business goals.

The framework and project teams provide a structure for skills transfer and knowledge sharing. In addition a framework such as this provides the opportunity for a portfolio management approach to be adopted with projects across the organisation. One informant commented as follows:

“the entrepreneurial phase we spoke about has to be coordinated and managed properly and this [project and portfolio management] is the only way to do this. This will bring the entrepreneurial phase to another level where there is more cohesion between the stages of that phase of the organisation.”

(A/S 3R, Revenue)

In many ways the scale of operations involved with these strategic projects triggered a demand from managers for a project management methodology and the introduction of those methods enabled operations to exist at this scale and expenditure. During the course of the interviews in phase 1 of the research, informants described many projects that they regarded as successful business projects and others that were commissioned without clearly defined benefits or schedules – projects that “drifted on and on”. Informants regarded the capability associated with this stage, as the ability to bring business operations to a large-

scale. However while informants regarded this stage of development as a significant departure for the organisation they emphasised that it requires the support of a project and portfolio management competency.

The portfolio management competency helps senior management to determine the optimal mix and sequencing of proposed projects, to best achieve the organisation's overall goals. It also allows the organisation to monitor project and programme progress, get perspective on resource peaks and troughs and provide the opportunity to build capability throughout the organisation. Revenue approaches the prioritisation of projects for the business portfolio in a similar way to their software portfolio. Revenue select software projects that can deliver those benefits that are most closely aligned to the organisation's strategic direction. One difference between the business projects discussed in the context of this stage of development is that they tend to deliver value in the shorter-term as opposed to the longer-term benefits and costs associated with a software applications portfolio (Ward and Peppard 2002).

The Programme Management Office (PMO) provides the dynamic for this stage of development. The PMO provides support for project governance groups, clarifies project structure, and establishes standard project management methodologies, including tools, and a collaborative environment. The PMO also provides training, coaching, guidance and mentoring, helping to ensure that the level of project management competency within Revenue is increased and built upon. It provides current best practice for project management. It also provides a single point of contact for all project information while gathering project experience and data for use in future projects to improve project management methods, thus ensuring organisational learning.

5.3.10 *ICT Supporting Stage 7*

This stage is supported by software tools in the areas of: Project Management, Project Reporting, Portfolio Management, Benefits Management, Resource Management and Financial Management. However, this software is currently only used for the ICT projects and portfolio. Revenue has not, as yet, used this

software to monitor or control business projects. The business projects are supported by some rudimentary software tools such as spreadsheets.

5.3.11 Change Mechanisms - Stage 7(Large Scale Operational Projects and Portfolio) to Stage 8(Capability Dynamics and Capability)

The eighth stage is incipient. No significant enablers were identified for this change, neither was there any significant driver beyond the intent of management and leadership within the organisation, some of which has been recorded as part of this research. The stage change from stage seven to stage eight is notional as stage eight itself can only be regarded as an emerging stage. Allowing for this, as a notional stage change the mechanism identified at this point would have to be categorised as teleological.

5.4 Phase 2 - Stage Model Corroboration with other Government Departments

As noted above, this phase of the research comprises four secondary or validating case studies. It was decided to strengthen and extend the research by using four secondary case studies to test and validate the theory which emerged from the phase 1. The approach was to interview a number of key informants from other departments where the foci of those interviews was based around an effort to test the findings of the single case stages of growth model.

5.4.1 Stage 1 – The Legislative Capability

During the course of Phase two of this research it became clear that the complexity and influence of legislation is a perennial issue for all government departments. The legislative function was described by one informant as providing:

“...two things, it gives a legal basis to justify the action or process and it suggests how the process should be carried out... but it doesn't or shouldn't be absolutely prescriptive about how it should be done, that's

what operational policies and staff instructions are for, it should be accurately formulated at a high level with enough leeway to accommodate operational changes.”

(A/S 1D, DSP)

When the informant refers to legislation being “*accurately formulated at a high level with enough leeway to accommodate operational changes*” he implies that the legislation should take into account and make allowances for the operational policies or business processes that will further enable implementation of the policy. The legislative function was described by another informant as the foundation for all government departments and that it required some precision and care to ensure appropriate direction for all of the business processes that are built using that foundation. As one informant commented:

“Legislation is a complex force at the foundation of this department...and it must be present before you start to build business processes...”

(SM 1D, Business Division DSP)

Good legislation plays a significant role in the efficiency and effectiveness of government policy. One informant made the following remark regarding the importance and significance of the legislative capability:

“The legislative process has a responsibility that can impact on many aspects of society, the economy and the efficiency and effectiveness of the Revenue organisation. The legislative function is a sharp instrument with many cutting edges. Care must be taken when wielding it.”

(A/S 1D, DSP)

5.4.2 Stage 2 - Organisational Structure and Business Process

One informant described both stage 1 and stage 2 as two methods to achieve the same purpose. A government policy is defined broadly at stage 1 by the legislative process and is refined into a business process at stage 2. The

capabilities at each stage were described as making distinct contributions to the execution of the overall policy:

“...one interesting thing about it is that the process [meaning the overarching policy] can be defined in two separate ways at least, and by that I mean there’s an overall business process at a fairly high level that you want to achieve [legislative policy] and then there’s a process you define by virtue of your capabilities, so in trying to meet the overall objective, you’re saying, how can you work with the resources that you currently have to meet those objectives... so you define the process in terms of your current capabilities in order to meet that overall objective...”

(A/S 1, DSP)

Both stages describe capabilities that follow on from one another, where the legislative foundation focuses on the policy and the business process and organisation structure facilitate the execution of that policy. The same informant continued, saying that where the organisation’s resources change there may be an impact on the efficiency of the business process. The informant also suggests that changes at stage 3 may impact on outputs from stage 2 and that while stages 1, 2 and 3 make distinct contributions to the organisation, their outputs may have relationships that impact upon one another:

“...now if your current capabilities change then the process should change and what happened up here when you move into the computerisation stage [informant points at Stage 3 on the Revenue Model] is that your capabilities have changed, now they change very slowly initially, but because they change you have to change the process...”

(A/S 1D, DSP)

What is being suggested here is that each capability has an influence on the outputs resulting from one or more capabilities and in this example the business process may require further reengineering. This reengineering process as well as

the process creation, are regarded as having developed at stage 2. Although concepts such as business process reengineering (BPR) (Hammer and Champy 1993) and others such as Lean (Bowen and Spear 1999; Naslund 2008) and SixSigma (Hammer 2002; Persse 2006) came after this stage was first encountered in most government departments, the organisational learning type is regarded more as horizontal learning rather than vertical learning²⁰.

5.4.3 Stage 3 - ICT and Business Process Automation

The story of how ICT emerged in other government departments is consistently similar to that in Revenue. Evidence for this emerged from Phase two of this research and is also echoed in the literature (Bannister 2001). One informant during Phase 2 of the research described it as follows:

“...you looked at the logical flows and the business processes in that unit and you embedded those in the structure of your solution...if you think about a classic menu driven transaction processing type system, the business flows and processes are embedded in the menu structure itself... so you go into that screen and you do this and then you move into another screen and you do that, so there is an implicit flow in a classic system... and that type of system can only be done if the business process was well defined and had already been well bedded into the organisation...”

(A/S 1D, DSP)

“... that stage [informant pointing at stage 3 on the Revenue Model] would not have happened unless those repetitious automatable tasks within those various areas were present...[informant pointing at Stage 2 on the Revenue Model] so you had to be a certain size doing a particular type of work before you were ready to do anything like that “

(A/S 1D, DSP)

²⁰ See chapter section 1.2 for a definition of horizontal and vertical learning.

5.4.4 Stage 4 – Master Data Management and Customer Data Integration

This stage of development resonated strongly with all of the corroborating departments, where a number of them identified their positions along a similar trajectory. Two of the departments had already made substantial advances toward eliminating their silos and moving toward an integrated customer view. An informant from one of the corroborating departments described their current position as being:

“...in progress, effectively it’s in progress in the same way as it took Revenue until 2009 to get it....it’s not as if our databases are out of line, they’re kept in line through batch transfers and updates.”

(SM 1D, Business Division DSP)

“I recognize what you’re saying from some of the problems we’re having at the moment, we’re here [informant points at stage 4] in the consolidated customer stage and that’s been a great success.”

(SM 1D, Business Division DSP)

The same manager continued by pointing out that this stage, like the others, is a capability that will be returned to time and again in order to retain the efficiencies associated with customer data integration and master data management:

“In fact I don’t think this saga will ever end, there will always be changes to organisations, where new functions and silos are created that have to be integrated to an existing consolidated customer view... in fact this is probably never going to end until we have a public service view of the customers.”

(SM 1, Business Division DSP)

This view that consolidation is a perennial issue is consistent with Revenue's perspective. As mentioned above, Revenue actively pursues metadata and holds a repository of metadata on all data held within the organisation.

“Metadata is structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource”

(Revenue 2012 p. 2)

5.4.5 Stage 5 – Business Intelligence, Business Analytics and Knowledge Management

While none of the corroborating agencies (during phase two of the research) had used data warehousing, business intelligence or analytics (other than some simple management reporting), two of the departments could envisage it happening in their departments in the near future. It was felt by business managers, during phase two of the research, that business intelligence offered most when their customer data was consolidated and until they had fully consolidated their customer data, there might not be a worthwhile return on investment from that approach. One senior manager made the following comment:

“We’ve always produced reports, but we’ve never used a data warehouse, and yet we have potential to profile for instance jobseekers and the propensity for jobseekers to stay on the dole. What we need to do is model them all and intervene in cases where we feel they have a propensity to stay on those benefits for life... we also have a remit in relation to poverty and poverty traps... I know data warehousing and business intelligence is imminent... and I know we have a taxonomy group to reconcile details associated with our customer data... so maybe it might not happen until we have that detail reconciled.”

(SM 1D, Business, DSP)

5.4.6 Stage 6 – Flexible Case Management and Flexible Business Processes.

The corroborating departments agreed that this was an appropriate next stage for an organisation that was using data to drive opportunities and new ways of working. Two organisations could see this stage as relevant for their department, but as they had not approached business intelligence or data analytics in a meaningful way, this approach as yet would not provide a worthwhile return on investment for them.

5.4.7 Stage 7 – Large Scale Strategic Business Operations - Project and Portfolio Approach

While many of the corroborating departments had extensive experience with managing large ICT projects, none had expanded their operations to such a scale or brought the concept of project management methodologies to the wider aspect of the department's operations.

5.4.8 Stage 8 – Dynamic Capability Coordination

None of the other government departments corroborated this stage of development.

This chapter describes the detailed findings of this research. It describes how government departments develop through eight stages of growth and the mechanisms that drive these organisations through these stages. The complete model as derived from phase 1 and phase 2 of the research is shown below at figure 5.16.

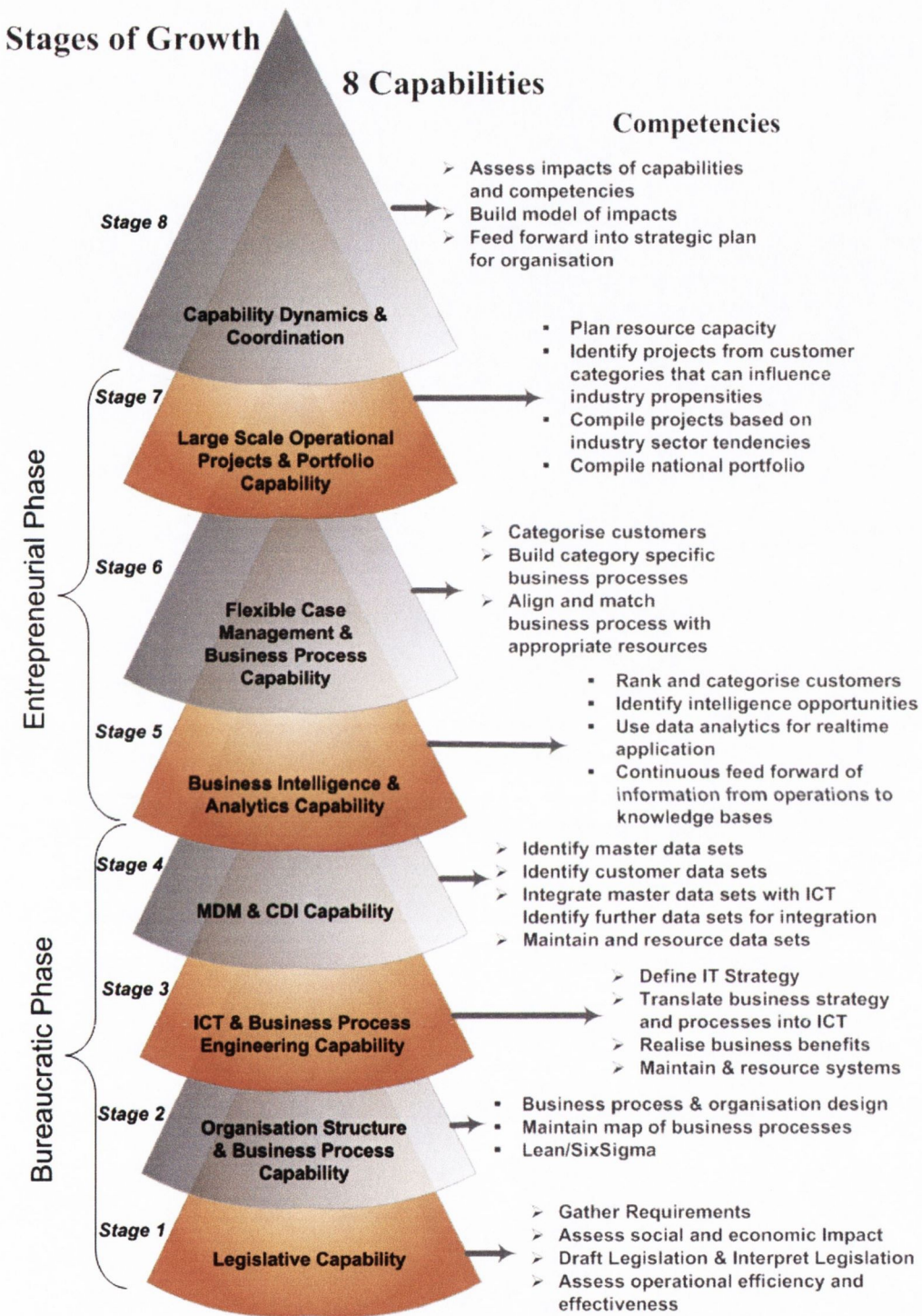


Figure 5.16 – Complete Model showing Phases, Stages/Capabilities and Competencies

The next chapter summarises these findings and draws some conclusions.

Chapter 6 – Discussion

6.1 Model Summary

The findings from this research describe how large government organisations evolve over time. The model presented with the findings identifies significant stages that were observed as one government department developed over a ninety-year period. Phase two of this research suggests that the stages of growth described in this model are found in other government departments.

Table 6.1 below summarises the model by showing each of the stages along with a description of the capabilities and some examples of their associated competencies.

	Stage Name	Capability	Competencies
Stage 1	Legislative	Convert political commitment to legislative form & develop opportunities & efficiency	<ul style="list-style-type: none">• Gather Requirements• Assess Social & Economic Impacts• Drafting Legislation• Interpret Legislation• Plan impact on operational efficiency & effectiveness

Stage 2	Organisational Structure & Business Process	Organisational design & business process creation	<ul style="list-style-type: none"> • Business Process Design • Organisational design & structure • Maintain map of organisation's business processes • Business process reengineering using Lean/Six sigma
Stage 3	Business Process Automation	Automate business processes using ICT	<ul style="list-style-type: none"> • Define strategic role for IT • Translate business strategy and processes into ICT systems and infrastructure • Realise business benefits • Maintain and resource ICT systems
Stage 4	MDM & CDI	Ability of an organisation to identify master data sets (to include customer data sets)	<ul style="list-style-type: none"> • Identify Master data sets from business processes • Identify Customer data sets from business processes • Integrate data sets with ICT applications and business processes • Identify further data sets

			<p>for integration</p> <ul style="list-style-type: none"> • Maintain and resource data sets
Stage 5	Business Intelligence and Analytics	Ability for an organisation to use business intelligence & business analytics	<ul style="list-style-type: none"> • Use data mining to identify risks, ranks and categories of customer • Identify opportunities for gathering further intelligence • Use data analytics for real-time application • Maintain and continuously feed information from operations into data marts and knowledge bases
Stage 6	Case Management & Business Process Management	Differentiate multiple customer types & build type-specific business processes	<ul style="list-style-type: none"> • Categorise customers • Build category specific business processes • Align and match business process with appropriate resources
Stage 7	Large Scale Operational Projects & Portfolio Management	The ability for an organisation to identify business related strategic projects	<ul style="list-style-type: none"> • Assess and plan resource capacity in light of customer service requirements • Identify Projects from Customer categories that can influence industry propensities

			<ul style="list-style-type: none"> • Identify industry sectoral tendencies and assess projects based on outcomes • Given resources, compile portfolio of national and regional projects
Stage 8	Dynamic Capabilities Coordination	Identify and categorise the organisation's core capabilities and to be able to assess their outputs	<ul style="list-style-type: none"> • Assess Impacts of Competencies & Capabilities • Build Model of Impacts • Feed forward into strategic plan for organisation

Table 6.1 – Summary of Capabilities and Competencies

The stages emerged within Revenue as a logical sequence where each stage built on the preceding stage or stages. In the following sections, each stage is discussed.

6.2 Discussion of Stages

6.2.1 Stage 1

In stage one, the organisation prepares the legislative basis to enable the government policy to be executed. The legislative process is a complicated one with far reaching implications; implications that stretch further than the organisational efficiency described as stage one in chapter five. There are many important influences on the formation of taxation policy among which are the political, social and economic forces that are constantly at play in shaping decisions on tax policy. Standards of public policy and the decisions of

Government are a matter of constant scrutiny and accountability. In particular, taxation policy is an issue of considerable importance and many interested parties have come to try to exert greater influence over how it is devised. Some of these influences include; the Government of the day which is the key driving force affecting all legislative decisions; special interest groups exert a significant influence on taxation policy; the Courts may interpret and even challenge existing legislation; the European Union (EU) may influence taxation policy by issuing Directives which may involve transposing EU Law into Irish domestic legislation and ensuring Irish domestic law conforms to EU Law; and tax implications for areas of government influence, such as social, environmental and industrial policy (Revenue 2007a).

Conversely, taxation legislation influences many areas of society. Taxation is the principal means of transferring monies from citizen to the exchequer so as to enable government to carry out its activities. However, a tax, like all other government policies, will have unintended consequences which may impact on areas such as the distribution of incomes and wealth, and the stability of the economy at the macroeconomic level (O'Hagan 1984). At the microeconomic level, the introduction of a specific tax policy can influence the supply and demand features of a business sector, which in turn may reverberate through many sectors of the economy. In short, a taxation policy may influence the efficiency of Revenue's business process, the level of taxpayer compliance, ultimately the effectiveness of Revenue as an organisation and the economy as a whole. At an organisational level this stage is foundational and has many implications for the efficiency and effectiveness of Revenue as a government department. Phase two of this research suggest that the legislative function plays this foundational role for other government departments.

6.2.2 Stage 2

In stage two the organisation develops the legislative basis into more precise business processes that are executed within an organisation structure. Where government departments have more than one line of business such as the distinct

tax types found in Revenue, then these lines of business will tend to be developed as siloed structures within the organisation. While the term silo has pejorative connotations it is important to recognise the function this silo type structure can contribute to organisational performance. Adam Smith (1952) described efficiencies inherent in the division of labour when he spoke about pin manufacturing. Smith describes the division of labour as:

“The greatest improvement in the productive powers of labour...seem to have been the effects of the division of labour” (Smith 1952 p. 3).

The division of labour has to do with the differentiation of work tasks and the resulting specialisation of labour. Silos are a natural consequence of the division of labour and the specialisation of tasks and are developed within organisations for efficiency reasons. Bannister (2001) describes silos in the civil service as an inevitable feature of bureaucracy and the tendency toward specialisation. It is important however to stress that the ‘stovepipes’ and ‘silo mentalities’ exist for good reasons. Well-defined vertical and horizontal organisational boundaries should not be seen as a mode of thinking which is obsolete. The division of labour and specialisation are inevitable and valuable features of modern organisations. Of course, the advantages associated with the division of labour can be lost if differentiated tasks are not integrated or coordinated in some way. According to Hatch (1997) as differentiation continues within an organisation it becomes more difficult to coordinate business processes across the organisation. However, the fact that differentiated tasks must be integrated does not take away from the value of the division of labour and specialisation of tasks. Where the problems arise with silos is when those differentiated tasks are not integrated. Un-integrated tasks may produce those anomalies referred to in chapter five.

This stage of development is primarily about the capability to develop specialised and differentiated business processes that are distinct to each business function. An example was given in chapter five where a new tax for vehicle registration (VRT) was introduced in 1992. One informant described how this tax was rapidly assimilated into the organisation. Legislation was drafted and an organisation

structure was designed and put in place. The business process was designed and was followed rapidly with a software support system. In the words of the manager concerned:

“VRT was a complete new silo, the legislation, organisation structure, the business processes and the software systems were put in place in that sequence.”

(SM 6R, ICT Division Revenue)

This business process was created as a silo within the organisation when it was originally developed in 1992. Later large parts of the processes for this tax were integrated into the organisation’s enterprise systems. However, like many other silos, some aspects of the business process still remain as siloed and separate business functions. For example, the function of valuing a motor vehicle is a distinct task that has no similarities to other business processes and functions within the organisation and therefore will properly remain as a differentiated function.

6.2.3 Stage 3

During stage three some of the business processes that were developed at stage two, are further developed into software applications. At this stage the organisation brings more speed, accuracy and precision to some of the business processes, thus creating greater efficiency within the organisation. At stage three these software applications are, like the business processes, developed as distinct silos.

Stage three saw the introduction of automation to the business processes. In Revenue, the automation of business process and their embedding in software took place at a time when computer technology was expensive and, in comparison to the time of writing, limited in capability. In Revenue, this development took place within the silos created in stage two. There was no attempt at cross silo integration or application development. This pattern was also observed in the three departments examined in phase two.

Silo based development was the product of a number of factors. These included not just the way that the legislative base was set up in the first stage, the way that this emerged naturally into silos in the second stage and the organisational arrangements that grew up to support this, it also reflected the limits of the computer technology available at the time and the risks involved in implementing this technology. A silo based computer system was a much lower risk given that this stage and its developments were happening at a time when computer technology was new to the organisation (and indeed to the country). Little was known about systems development methods at that time; much had to be invented for the first time by pioneers within the organisation. It was not possible to advertise for computer programmers or systems analysts. These had to be trained from scratch, if training were even available. There was necessarily a great deal of trial and error. Databases had yet to be invented. Programming tools were unsophisticated by today's standards.

Public servants tend to be conservative by nature and this is even more important when large amounts of public monies are concerned. This culture is still to be found today; in the 1940s and 1950s it was much stronger. These factors combined to make silo based development a logical development at the time. If managers were aware of the potential for later problems from this approach, there is no evidence for it. They would have seen the efficiencies being gained from automation as large and it might be that these were so significant that thinking outside the box so to speak would not have occurred to them.

Nonetheless, this raises the interesting question: would an organisation at the same stage of organisational and process development today behave the same way given the much better technology that it would have available to it or is the silo stage a desirable, even a necessary staging point in the move to integrated systems?

However as the silo systems succeeded and the ability of the organisation to exploit technology improved, along with the technology itself, the limitations of

silos became increasingly visible. The seeds of stage four are sown, in a sense, by the very successes of stage three. As the tedium of manual operations is eliminated, managers start to think about other problems and anomalies which heretofore might have seemed less important or less pressing.

6.2.4 Stage 4

In stage four the organisation integrates silos and data sets within the organisation and has a central focus around integrating the customer data set. This stage will be taken on where silos that are developed at stage three have data sets with large crossovers. Integrating these data sets will help reduce anomalies and gain efficiency. Where those data sets have common customers, then there is an opportunity for customer data integration and this may present an opportunity for the organisation to gain more insight into customer propensities and become more proactive with how they approach those customers.

In practical terms, for Revenue, there were many challenges and complexities associated with a project of this size and time scale. One of the first lessons learned was that the process of consolidating multiple legacy files using largely name/address matching is difficult and takes considerable manual intervention, even with software support. On the positive side, there were multiple spin off benefits including development of a case management system and one of the first data warehouses to be built in Ireland. The business and ad-hoc reporting these systems delivered was in time to underpin various data mining and analytic techniques which were later used in major investigations and fraud detection. The value of such consolidated information helped to maintain the credibility of the project. A common registration system was released in 1996 bringing further gains. In addition to the taxhead level linking, it provided a facility for tax practitioner/agent management and customer search.

A particular difficulty in any extended project is technology creep. By the mid 1990s it started to become clear that the mainframe was not the right technology for where Revenue wanted to go. Despite this, in an organisation steeped in

mainframe culture, it took time to make a business case for a change to relational/open systems as the way forward though unsurprisingly, by this time, users wanted to move away from traditional green screens to graphical user interfaces.

There were also a number of sources of delay. For example, the sequence in which taxes were to be converted to the new system led to extensive debates and exchanges of papers between various business units. Moving targets were another difficulty. Individual taxhead systems continued to be developed to meet annual budget and finance bill requirements. Later on, the emergence of the Internet and the launch of Revenue Online Service in 2000 opened up another dimension for the integration programme. In practice process integration did not (indeed could not) happen until much later for the transactional systems.

Reflecting on the exercise, there is broad agreement by the senior managers involved that there were three main tasks: business process integration, customer processes integration and governance.

Revenue's system design philosophy was to approach the integration of the business processes from the customer data level. This level of integration was designed to streamline and integrate operations, processes and information flows within the organisation, to promote greater organisational effectiveness and allow for the fact that processes do not exist in a vacuum and that they can and do overlap. Current ERP implementations are increasingly conceived in terms of not just the internal operation of the organisation, but to its environment in general and its customers and supply chain in particular. There is no reason why developments in the public sector should be different; however this requires that each business process must first have developed to a level of efficiency that allows this integration to happen. That is, each process must be fully operational within an ICT context and the data associated with each process must be at the same granular and semantic levels.

In many ways the microcosm of the Revenue experience reflects the issues and obstacles, which may be encountered with whole-of-government initiatives. The Revenue case study suggests that information systems develop through stages, which build upon one another and that for the move beyond the silo stage to be successful requires that the fundamental building blocks of legislation, organisational structural and engineered ICT processes are in place.

In terms of political rhetoric at least, it is claimed that identifying these anomalies and reconciling them is something that all public organisations should strive toward. Communication and cohesion, which is created structurally within organisations, allows these anomalies to be observed more easily. Where there are large gaps in communication between government departments a fundamental objective will be to bridge these. But it needs to be recognised that some of these problems are considerably less tractable than others and some require changes in organisation and shifts of power that are not going to be easy to realise. In the extreme case, change is required at the fundamental level of the legal base.

6.2.5 Stage 5

In stage five organisations use data mining and business intelligence to assess, target and prioritise customer interventions and future operations.

Revenue authorities have a constant demand and challenge of increasing tax revenue without introducing new taxes. One way to overcome this dilemma is to find ways to improve taxpayer compliance. According to Trotter (2005) while revenue administrations are always faced with this issue of non-compliance, in a declining economy non-compliance will tend to increase. Understanding the risk of non-compliance was and is increasingly essential for tax administration.

Revenue's success depends not alone on collecting outstanding tax liabilities, but also on being efficient in dealing with those who comply voluntarily with their tax responsibilities and on being effective in dealing with those who do not. For many government departments including Revenue, one way of tackling the issue of non-compliance is to approach citizens in much the same way as many private

sector companies tackle customer relationship management. Companies actively engaged with CRM use data analytics to analyse the behaviour of their customers. After the integration of customer data and the creation of a data warehouse the move toward data analytics and customer risk assessment was a natural progression for Revenue.

According to Davenport and Harris (2007) analytics can help propel performance of business processes to a higher level. However, some business processes are more amenable to analytics and business intelligence than others. If the business process generates substantial transaction data such as the tax returns and payments generated in Revenue then there is likely to be an increased opportunity to use analytics. In addition it is important that the quality of the transaction data is consistently recorded for each business process and across business processes where there are multiple silos involved. Where transaction data is limited or inconsistent the value of analytics will be tactical at best (Davenport and Harris 2007). It is also not enough just to have data and analytic software in order to get value from analytics. In Revenue a clear vision existed of the strategic value of analytics and how it could be applied to gain business benefit. This was not an easy task and one that required senior management support while the approaches were being developed. Although the use of analytic software is fundamental to this approach it was understood that analytics was not synonymous with technology.

Business intelligence and analytics first emerged from within the line business functions of Revenue rather than from ICT. What was required was insight into how the data could yield value. This was not a simple task and one that required substantial research and experimentation in order to prove value for the organisation. Some fundamentals were required to support experimentation and implementation. Those fundamentals included precise and consistent data identification and acquisition methods along with methods to cleanse the data where necessary. In the Revenue context much of the data cleansing had been performed at the previous stage within the organisation's development. Developing correct and appropriate storage repositories for the data in the form

of a data warehouse and specific data marts was also a significant task for the organisation. This, like many steps associated with this stage of development, was not a trivial task. For the transaction data, aggregated data and metadata used in analytics it was important to ensure that the data was precise, that it was complete, current, consistent and controlled in the sense that the processes to extract this data were performed in the same way each and every time. For Revenue, many years of business, technical and analytical development were and continue to be applied to bring and sustain this stage and capability within the organisation.

6.2.6 Stage 6

In stage six the organisation categorises customer types and creates specific business processes to deal more efficiently with those customer types. During this stage the organisation refocuses on gaining efficiency with the new proactive approach toward their customers. At this stage the organisation adopts a renewed approach to developing skills and competencies within the organisation. Management develops and trains an appropriate number of resources with specific skills and assigns those resources to each of the specific business processes in a way that seeks to optimise resource allocation. At stage six the organisation adopts a proactive approach to dealing with clusters and types of customers. This approach builds on understandings about customers that were established as a result of the move to stages four and five. The customer centric view and the ability to apply analytics allowed clustering of certain customer types. Eisenhardt and Brown describe this approach to the customer and the ability to change business processes with the concept of patching. For Eisenhardt and Brown (1999) the traditional corporate strategies often fail because processes become quickly outdated.

Eisenhardt and Brown contend that it is impossible to predict which strategies will be successful and for how long. The implication is that it is more important to build corporate-level strategic processes that enable dynamic strategic repositioning rather than static business processes. In many ways Revenue have

developed this type of approach to capabilities that enable novel approaches to efficiency and effectiveness as taxpayer propensities change. These strategic processes are not just accelerated versions of traditional corporate processes. This is not strategic planning on steroids, as was remarked by Eisenhardt and Browne (1999). Traditional planning and resource allocation tend to be top-down and are focused on control. In contrast, the new corporate-level strategic processes are bottom up and centered on change. Later Eisenhart and Martin develop this concept of patching into a more abstracted view of the firm termed dynamic capabilities:

The firm's processes that use resources – specifically the processes to integrate, reconfigure, gain and release resources – to match and even create market change. Dynamic capabilities thus are the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve and die.” (Eisenhardt and Martin 2000 p. 1107)

Case management processes in Revenue rely extensively on new knowledge regarding customer propensities and emerging situations as regards the sector or industry within which the customers are operating. Routines and case management process can be simple enough to allow for adaptation although they are not completely unstructured. Typically they have a structure that accords with a specific skill or expertise that is available to deal with the demands of the business process. Much of this ability to configure new case management processes relies on flexible software applications that are typically built using a service oriented architecture, where components are used and reused in different combinations and configurations.

A simple yet valuable feature of any organisation is if it could identify those parts of the business processes that are reused for many operations within the organisation. The concept of reuse has long existed in the area of ICT. Routines, procedures, objects and methods have all had a part of their purpose focused on reuse. Service Oriented Architecture (SOA) is the most recent method, which can

enable the whole enterprise to identify and build those common business services once and reuse them over and over. This approach provides a more flexible and agile structure, which enables speedy and a less costly introduction of new or modified business processes. SOA is an approach to software design that involves assembling systems from reusable components or services (Erl 2006). SOA is concerned with a more architectural view on the organisation. It suggests a fundamental shift in how the organisation implements business systems. This has implications for more than just the technological aspect of the organisation. It has implications for technology, rapidly changing business processes and organisational structure. While it is not suggested that a service oriented approach is essential for this stage of development or capability to emerge within an organisation it was found that there were some synergies to be gathered when Revenue applied both approaches to this emerging business opportunity.

6.2.7 Stage 7

At stage seven the organisation engages with large-scale operations that may have strategic or tactical value for organisational goals. The main benefits of these large business projects were noted in chapter five as the impact or positive effect on compliance that they had on business sectors or industries within the economy. It is important to note however that there are many other benefits that accrue from projects such as these. For instance the main benefit associated with these projects is the immediate and future stream of revenue that is gained. Other benefits include the insights that are gathered from such projects. Insights from these projects may help managers and caseworker to understand customers, their propensities and how those customers are related in terms of statistical clusters. These insights may help to change how case management processes are applied to increase compliance rates even further. These insights may also contribute some additional metadata that will help with data analytics or business intelligence initiatives. Insights may also help to change some of the more permanent collection processes and routines within the organisation – not just those case management processes that are subject to a more dynamic rate of

change. In some instances these large projects can even contribute toward changes in the legislative foundations of the taxes themselves.

For many managers one of the important features of this stage or capability is the governance that is applied to these projects. Projects are undertaken to deliver benefits for Revenue and its stakeholders. When considering expected benefits, managers expressed how important it was that those benefits are both tangible and achievable. This focus on tangible benefits is necessary in order to help avoid situations where benefits are overstated to secure project sanction, but turn out later to be impossible to realise, as they were either only inferred or too vague.

For this stage of development much of the key to successful realisation of project benefits is the clarity of the benefits plan. This plan is produced at the start of the project and lists the expected benefits, indicates the person responsible for their delivery and how and when each benefit will be measured and proven to exist. While the benefits will have been stated at the outset many of these benefits will only be realised when the project has been completed. In some instances the final realisation of the benefits may not be achieved for many months after the main project work has finished. These types of projects rely on clear governance procedures and processes as part of this organisational capability.

6.2.8 Stage 8

At stage eight, management recognise that the organisation has some core capabilities that can be applied to achieve strategic goals and when they are applied many aspects of the organisation may be impacted on. Organisations that reach stage eight will attempt to understand how the outputs from each of the stages impact each aspect of the organisation. For example the adoption of self-assessment in Revenue was a change at the legislative level, which impacted a change for the organisation structure and many of the business processes. The move toward an integrated customer view (stage four) also impacted significantly on the legislative foundation and the business process and the organisation structure.

While this is a stage that is regarded as incipient there are some benefits that seem to be worth pursuing. Firstly it is considered valuable to observe the overall system that is the organisation. A review of the organisation in terms of a system dynamics perspective may offer insights in terms of patterns or feedback loops that determine system behaviour. An understanding of how these feedback loops operate may assist managers as they apply stage capabilities to deal with organisational demands. Even without having identified feedback loops a simple understanding of the unintended consequences of a manager's actions may help with planning, coordination and control. Taking into account unintended consequences may help to inform managers before they jump to what appears to be obvious solutions in a complex environment. However, the insight to complex systems that is offered by the field of systems dynamics has many values which are often exaggerated (Jackson 2003) and therefore should be approached as an additional method which offers some insights to the organisation's operations and strategies.

6.2.9 Other Issues to Note

Research indicates that while IS capability as identified by Peppard and Ward (2004) has a focus within one organisation structure i.e. the ICT division of the organisation, many of the competencies associated with that capability are not located solely within that single functional area and that they in fact transcend the functional boundaries of an organisation (Peppard et al. 2000).

The findings of this research concur with this. While most capabilities and their accompanying competencies are associated closely with an organisation's structure or function, many of the capabilities transcend those functional boundaries with which they are closely associated. In many ways this could be regarded as one defining feature of a capability. For a capability to have a strategic role in the organisation, its focus must have potential to influence beyond the implementation of a single functional aspect of an organisation.

6.3 Change Mechanisms, Enablers and Drivers

A second aspect of this research has been to study the change mechanism and driver as each stage transitions to its successor. The enablers, drivers and change mechanisms for each of the stages are summarised in table 6.2 below.

Each stage of growth is described in chapter 5 as being built on the basis of the preceding stage. The conditions that are set by the preceding stage of development are necessary conditions for the next stage change to occur.

Preceding stages are therefore regarded as enablers for the next stage change.

There is one exception to this observation however. The siloed structure set by stage 3 acts more as a driver for the change to stage 4 rather than an enabler for that change.

Stage Change	Enablers	Drivers	Mechanisms
Stage 1 to 2	Stage 1	Legislative Intent Efficiency & Effectiveness Demands	Life-Cycle (Immanent) Teleological
Stage 2 to 3	Stage 2, ICT	Efficiency Demands	Dialectic (Socio-economic demands against limiting factors of business processes to deliver efficiencies) Teleological
Stage 3 to 4	Data Analysis, ICT	Stage 3 Impact (Silo Structure) Efficiency Demands	Dialectic (Push to integrate against inertia to change) Teleological

Transition from Phase 1 to Phase 2			
Stage 4 to 5	Stage 4, ICT	Effectiveness Demands	Life-Cycle (Immanent) Teleological
Stage 5 to 6	Stage 5, ICT	Efficiency Demands	Life-Cycle (Immanent) Teleological
Stage 6 to 7	Stage 6	Efficiency Demands	Teleological
Stage 7 to 8	Stages 1 to 7	Efficiency & Effectiveness Demands	Teleological

Table 6.2 - Summary of enablers, drivers and mechanisms for change

ICT also acts as a significant enabler for stage changes with the exception of the first and last stage changes. It is interesting to note that while ICT rarely emerges as a driver for change in the context of this model it frequently acts as an enabler or catalyst that precipitates change. In many ways ICT is necessary, but not sufficient for a stage change to come about. Without the particular technology being present many of these stages would not have been possible. For example without data warehousing technology, data mining and business intelligence would not have been possible. Although informants regarded ICT as a significant enabler and catalyst for many stage changes it was not regarded as a driver for change. For most stages the change drivers appear as demands for greater efficiency. The first stage has a number of change drivers including efficiency, effectiveness and the political intent itself. The stage changes to stages four and

eight also include drivers for both efficiency and effectiveness. All other stages have efficiency demands as significant change drivers.

Informants identified multiple change mechanisms for each stage change. All stages were influenced by a teleological mechanism. In one respect it is an unremarkable insight to say that manager's intentions were involved in all changes. In another respect it does indicate that all changes were consciously taken on by the organisation and that none of the stage changes were unconscious shifts or changes similar to those that appear in the evolutionary processes found in the natural sciences.

In addition informants identified a single overarching change mechanism that applied for all stage changes. This mechanism was described within the context of a taxation administration. Taxation systems tend to become more complex with time for a variety of reasons, not least the tendency of politicians to make numerous small adjustments to it. Increasing complexity leads to increased cost and against this must be set a continuing pressure to keep costs down if not actually reduce them. Resolving these two conflicting forces requires continual improvement in efficiency. This in turn gives rise to a need to innovate and find new ways of being more efficient. This overarching mechanism is categorised as dialectic.

Some additional mechanisms were identified for stage changes to stages two, four and five. These stage changes were influenced by life-cycle mechanisms. That is, for each of these stages the stage that emerged could have been regarded as immanent or dwelling within the previous stage. For stages three and four a dialectic mechanism was identified, where opposition and conflict between two opposing forces shaped the change.

During the course of the phase two of the research informants identified the fact that each of their own government departments had moved along through a number of the stages of growth and all in the sequence described by the model. While none of the other government departments had reached the higher stages

identified within Revenue, nonetheless all informants agreed that the later stages were, for them, a logical progression and likely to be manifested in their departments over time. One further point was made regarding the progress of an organisation through the stages. Simple organisations that remain static may not find a requirement or pressure to advance beyond the initial stages. For the model proposed in this research to apply beyond the initial stages, the organisation should provide a service, which is analysable in a way that its processes have some application to ICT. For an organisation that has only one service type and remains as such, Stage 4 (customer data integration) does not apply. An organisation will not move to the next stage unless there is value in doing so and sometimes there is no value as was pointed out by one informant:

“Some organisations may never need to get to the consolidated customer stage, because they have only one service... they have only one silo... they have one system and they have only one thing to do... this type of organisation will never need to move to this consolidated customer stage.”

(SM 1D, Business Division DSP)

6.4 Two Phases of Growth

Two Phases were identified within this stages of growth model. The phases were described as the difference between efficiency and effectiveness. Phase one, the bureaucratic phase, incorporates the first four stages of growth which are mostly focused on bringing efficiency to the organisation by building processes, structures and systems that can react to the demands placed on the organisation. The organisation begins to change after stage four. One informant described this broad shift within the organisation as moving:

“...from a reactive role to a much more proactive role. When ICT released Revenue from the factory type drudgery of day to day processing it gave us a chance to concentrate on various different projects and provided the means to categorise and target non-compliance proactively ...”

(SM 1R, Business Division Revenue)

Another informant described the difference between both phases as follows:

“It’s the difference between a symphony orchestra and a jazz band, the symphony orchestra has the sheet music and plays it the same way, whereas with jazz bands... you’re asking the district managers to look around and find funky compliance themes and play them.”

(A/S 2R, Revenue)

Phase two, the entrepreneurial phase is defined here as the ability for an organisation to take a more proactive role. An informant (SM 1R, Business Division Revenue) described that role as one where the organisation seeks out categories of customers and prepares an approach to those customers such as to alter their pattern of behaviour. Stage 7 also contributes in a significant way toward the entrepreneurial phase by proactively identifying strategic and tactical projects that will positively impact on non-compliance within whole business sectors and industries within the economy.

The bureaucratic and entrepreneurial phases are in many ways similar to the Miles and Snow (1978) typology of ‘Defender’ and ‘Prospector’. Miles and Snow describe the Defender type of organisation as one whose success comes from creating a stable environment by the efficient use of resources, whereas the Prospector’s prime capability is that of finding and exploiting new product and market opportunities.

6.5 Other Stages Considered

During the course of this research a number of candidate stages emerged, which were later dismissed as they were found to be inconsistent or were repeating capabilities delivered in other stages. Discussing some of these candidate stages is interesting for two reasons. Firstly they demonstrate how some capabilities have the potential to deliver benefits to the organisation many times over. Secondly they help illustrate the difference between the vertical learning

associated with a stage change and the horizontal learning involved with using a capability multiple times.

To recap briefly, as mentioned previously (chapter 4), two types of growth or learning were outlined to each informant in the context of describing the basis for stages of growth models, namely vertical growth also understood as conceptual learning and horizontal growth also referred to as operational learning (Kim 1993; Chen et al. 2003). Vertical growth or conceptual learning occurs when members of the organisation challenge the organisation's underlying assumptions, values, and procedures, attempting to replace them with new ones. According to Chen et al. (2003) vertical growth requires that the organisation changes its pattern of thinking and that it questions its operating principles. Horizontal growth uses existing conceptual models held within the organization to create efficiencies. This type of learning or growth is concerned with detecting performance deviations from standards and goals, and reducing the level of divergence through systematic problem solving. Organisations typically engage with both types of learning or growth. Vertical growth is mapped using distinct stages of development whereby the organisation understands its environment differently and develops aptitudes, understandings, methods or capabilities to deal with it.

Three examples of candidates for stages which were rejected are:

- Web Technology
- Lean/SixSigma and
- Organisational Restructuring

6.5.1 Web Technology

The introduction of a fully interactive and transactional web presence was a milestone within Revenue and was significant in terms of the efficiencies it brought. Although this type of direct contact between the customer and Revenue's internal systems was not new, web services provided the first opportunity where this type of direct contact could be applied to many of

Revenue's business processes. While this was certainly a significant stage in Revenue's development it does not fit quite so neatly within this stages of growth model. A number of informants identified this as a stage of development within Revenue, but it became clear that although it was a milestone for the organisation it was not a stage of development. The ICT industry had merely introduced another method that allowed business processes to be automated. Any emerging government department would incorporate this type of processing as part of stage three - ICT and business process engineering. While there is a temptation to think of any major new technology as a stage (relational databases, PC, distributed computing, e-mail, etc.), a move to a new technology does not of itself deliver a new business competence or capability though it may deliver a new technical competence. Adopting new technology is a form of horizontal growth or learning. Horizontal growth uses existing conceptual models held within the organization to create efficiencies. In this instance the introduction of web technology to the organisation was regarded by informants as something that could happen as early as stage 3 where ICT was being introduced to the organisation – thus suggesting that the use of web technology was within the scope of the existing conceptual model.

6.5.2 Lean Six Sigma

Lean Six Sigma (Bowen and Spear 1999; Naslund 2008) is a synergy of two managerial concepts Lean and Six Sigma. Lean is a production philosophy and method that seeks to reduce wasteful practice throughout all business processes. Lean is derived from the Toyota Production System (TPS) and is often seen as a more refined version of earlier efforts at process improvement (Persse 2006). Motorola originally introduced Six Sigma in 1986 as a process improvement technique to develop the quality of manufacturing outputs (Naslund 2008). Both are process improvement techniques that originated in the manufacturing industry. More recently both have been combined and applied to all types of organisations, including service organisations. Lean Six Sigma was introduced to Revenue in 2010 and was reported by a number of informants to have had a significant impact on some business processes. Work in this area is on-going.

During Phase 1 of the research, a number of informants identified the introduction of Lean and Six Sigma as a significant stage of development for the organisation. Lean Six Sigma was placed at later stages – after stage four, the master data management and customer data integration stage.

These methods were understood as something that happens to processes after stage three. However, during one interview with a corroborating department who were also engaged with Lean Six Sigma, it became clear that this was not the case. That department took it as a policy to always implement Lean Six Sigma before software systems were considered. This evidence refuted the interpretation taken at phase 1 of the research. Further consideration was given to this issue and additional evidence was sought through focused interviews. As a result of these interviews this stage was taken out of the model and positioned alongside Stage 2 (Organisation Structure and Business Process Improvement) where it was understood as a further broadening of an already understood capability. The informant who initially identified the inconsistency described it as follows:

“All the current emphasis on business process is actually to say no, we need to change the processes first [and after that], before we apply IT... so IT comes in second after the process... like it does here [informant points to stages 2 and 3 of the Revenue Model]”.

(SM 2D, Business Division DSP)

Lean Six Sigma is another in a line of techniques that have been adopted by organisations for process improvement. This is a form of horizontal learning, but not vertical which is what the stages are about.

6.5.3 Restructuring the Organisation around the Customer

In Revenue’s 2000 annual report (2000b) the existing organisation structure was seen by management as inconsistent with the newly adopted approach to customer integration. The organisation structure was seen as an obstacle to sharing knowledge and information across taxes, duties and functions and lacked

the flexibility to respond to changing circumstances. For these reasons Revenue management decided to restructure the organisation. To accommodate the new approach to customer integration, Revenue was divided into five regions. Each regional manager was given responsibility for all of the Revenue affairs of taxpayers in their regional area. Responsibility for implementing individual taxheads was no longer centralised in a division of the organisation. This change aligned the organisation structure with the new integrated approach to taxpayers – stage 4 master data management and the integrated customer view.

While this was a significant change and understandably identified by some informants as a stage change, this was viewed by subsequent informants as horizontal learning and therefore was a reuse of the capability acquired at Stage 2 ‘Organisation structure and Business Process’. The ability to manipulate business processes and organisation structure is an earlier stage of development and one that was applied again in this instance. Speaking about the second stage of Revenue’s development, one informant had the following remark:

“Business processes and organisation structures are prerequisite to operationalise a piece of legislation and I suppose there is plenty of evidence to show we were good at this, we’ve created new business processes for each new taxhead as they came on stream and we’ve often changed our organisational structure to accommodate these new processes...”

(SM 6R, ICT Division Revenue)

Given that the capability to change organisational structure was one attributed to stage 2, it is reasonable to regard the reuse of this ability as horizontal learning rather than vertical learning.

6.6 Concluding Remarks on the Stage Model

The stages of growth model presented with this research, outlines how one government department has evolved. Phase 2 of the research corroborated these

stages of growth with observations made by informants from a number of other government departments. Eight stages of growth were identified at distinct points in time when underlying assumptions, values and procedures within the organisation were challenged and where the organisation's existing conceptual models were replaced with new ones. The evolution of the organisation in question was abstracted and presented as a stages of growth model for government departments. For most organisations the process of adjusting to environmental change while also managing internal interdependencies is a complex and uncertain path (Miles et al. 1978). While it is hoped that much of that path for government departments has been captured with this model, it is expected that additional stages will emerge in the future.

The model outlined in this chapter has reduced the reality of a diverse area to a perspective. This type of model is discriminatory in the sense that it includes certain features and leaves out others. A model represents the phenomenon; it is not the phenomenon and if it were identical in all respects to that which is modelled it would be useless. This model is valuable if organisations are given conceptual traction on e-government with a roadmap that charts the stages of growth, and describes the change mechanisms around stages.

Chapter 7 - Contribution, Implications for Practice, Limitations and Further Research

7.1 Contribution of this Research

In chapter one it was noted that the challenges of a changing and evolving organisation can create complexities and consequences such that ICT systems have, amongst other things: a shortened life-span, a reduced stream of benefits, lack of sustained use and sometimes even result in a failed investment. One way to guard against these problems would be to assess how information systems evolve over time within organisations; create a model of that evolution and use that model as a template or guiding principle to monitor and assess stages of growth and also to assign appropriate technologies throughout the organisation, phasing investment accordingly.

The stages of growth model presented with this research describes how information systems and organisational capabilities develop within large multi-service government departments. The model allows managers to observe how capabilities are developed within organisations, see the sequence through which they are developed, gather insight into what benefits accrue from each stage and examine the key mechanisms that drive those changes and evolutions from one stage to the next.

The research is based on a detailed study of one government department over a 90-year period. It addresses several gaps and weaknesses in existing IS and e-government stage models and proposes a new comprehensive stage model outlining the stages of growth for government departments.

A review of the literature in the IS and e-government fields shows that of the many stages of growth models proposed/postulated over the last four decades, only two of these are theoretical models i.e. models which include descriptions of causal mechanisms (Whetten 1989; Sutton and Staw 1995; Weick 1995). The first was Nolan's 1973 model, which had its theoretical basis invalidated by Lucas and

Sutton (1977). The second and only remaining theoretical model was presented by Ross (2003), which describes the stages of growth for technical architecture. Almost all of the other models focus on governance or technology assimilation of one kind or another with a small number taking the broader more comprehensive scope of an Enterprise Information Systems model. In fact the scope of an Enterprise Information Systems model has only been attempted on three occasions, the first of which emerged from Harvard university and was presented by Nolan (1973), the second from MIT presented by Venkatraman (1991) and none since Ward and Griffith's (1996) simplistic three stage descriptive model in 1996²¹. While these models provided some descriptive value when they were first presented, none of them provided a theoretical framework or survived as much more than historical references in the field.

Although there have been many stages of growth models produced in the e-government field, none have approached the scope of an Enterprise Information systems type model. The term e-government is often narrowly defined and typically associated with the Internet; stage models in this field were also found to have narrow definitions and scope. The model arising from this research assumes a broader definition for e-government and as a consequence produces a more comprehensive model that includes a broader spectrum of information systems and ICT applications.

The findings from this research make an important contribution to the IS and e-government body of knowledge. The model presented with this research is the first and to date the only theoretical Enterprise Information Systems model produced in the IS and e-government fields since 1973. The model provides a unique set of theoretical insights into the process of growth and development of IS in large government agencies. The model is a descriptive and theoretical model and as such it offers some predictive elements that outline what may happen in

²¹ As noted in chapter 2, one additional stage was added to this model by Peppard and Ward in 2004.

the context of this organisation type. The research findings show that information systems within government departments evolve in a stage like fashion, through eight stages. The findings describe how these stages develop and importantly why they develop. The findings outline drivers and enablers for change along with key stage change mechanisms, which offer insight to how and why each stage emerges.

7.2 Implications for Practice

7.2.1 Strategic Information Systems Planning

The model provides a number of practical insights into how government departments grow and develop. The model maps the changes through which information systems in government departments pass, as they become more sophisticated and better able to meet and support the needs of the organisation as a whole. It provides insights to help reduce complexity with e-government initiatives. The model provides both a tool for government departments to help assess their current state of information systems maturity and a method to plan for the most effective development of those systems and the supporting ICT solutions going forward. The model offers a view of the challenges and the potentials for efficiency and effectiveness for government organisations. This research addresses a practical requirement within government agencies, to give direction and focus to ICT expenditure, given the overarching twin demands for budgetary control and the efficient execution of public policy.

7.2.2 Use of Commercial Maturity Modelling Tools

It was noted in the literature that maturity models come in many forms. One form which has become commercialised in recent years are normative stage models such as the Capability Maturity Model Integrated (CMMI) and the IT Capability Maturity Framework (CMF). These models are now used as frameworks on which to build advisory and consultancy services to organisations who wish to develop their ICT management capabilities and structures. These models differ from other stage models in that rather than representing the

evolution of ICT in the organisation as a whole, in the tradition going back to Nolan, they break up ICT maturity into a range of headings (currently 35 in the case of the IT-CMF) and propose a fixed number of levels of maturity for each (five such levels in the case of the IT-CMF). Examples of these in the IT-CMF are strategic planning, demand and supply management, budgeting, knowledge asset management and so on. Within each of these there are deemed to be five levels of 'maturity': initial, basic, intermediate, advanced and optimising.

While there is a certain elegant simplicity about such models, the findings of this research suggest that, for major government departments at least and possibly for other large and complex multi product, multi client organisations, that the interrelationships between developments in different parts of the organisation are much more complicated and interdependent than models such as CMMI and IT-CMF make them out to be. The model developed in this research suggests that many aspects of IT 'maturity' develop in a synergistic and highly interrelated way and that absence of one or more components, or failure to complete an earlier component, may hinder or even cripple developments elsewhere/later. This poses a question for organisations (including Revenue) who adopt models such as the IT-CMF of whether there is a risk of much wastage of resources arising from a failure to understand the coordination and sequencing implications of change management on several fronts at the one time. Tools such as the CMM (forerunner of CMMI) were originally developed as health check or diagnostic tools and only later evolved into the road-mapping tools for organisations that they are today. The implication for practice of the stage model suggested by this research is that use of CMMI/CMF type frameworks may need to be moderated by a deeper understanding of the interrelated dynamics of IS evolution in organisations.

7.2.3 Elimination of Operational Anomalies

The model may have the following significant values for government departments.

In the research reference was made to anomalies. Anomalies can come in many forms, for example data consistency and integrity problems or customers finding themselves going around in circles trying to obtain a service or get an answer to a question. It can also result in customers receiving inconsistent messages from different parts of the organisation, customers in similar situations being treated differently and so on. Responses to anomalies vary. Sometimes organisations attempt to fix them with an ad hoc solution. Other solutions range from moving to packaged software to changing the organisational structures.

An implication of this research is that one way to understand how to best eliminate anomalies is to understand how they emerge from problems in the stages of growth. This is not the only source of anomalies of course, but it is an important one. The stage model provides an explanatory tool for anomalies which may emerge as a result of disjointed development of ICT in the organisation. By looking at possible gaps in stages or earlier stages, the source of anomalies or possibly risks of future anomalies might be diagnosed and corrected or anticipated and pre-empted.

7.2.4 ICT Investment Timing

One problem that all organisations encounter is the “hype curve” (Gartner Group). Organisations are prone to follow fashion for various reasons including a fear of being left behind in some critical development and a perceived need to be seen to be up-to-date. The result of this generally and in e-government in particular has been a vast amount of wasted resources as organisations go down what might be called evolutionary cul-de-sacs. If organisations better understood where they currently stand in their stage of development, they are less likely to make this error not least because they may have a better understanding of the capabilities needed to deliver and support services.

The model provides insight to managers indicating when it is appropriate to invest in a particular technology. This may reduce the risk of misconceived technology investments or projects. For example there is most likely not going to be a return on investment for an organisation who invests in business intelligence and

analytics technology at the point when most of the organisation's business processes have not been automated.

This model may provide milestones to evaluate ICT development architecture and so help to control cost. The model may help describe and evaluate the organisation's maturity and sophistication as regards information systems and its use of ICT. This stage model may help management when formulating an ICT strategy, which in turn may help with organisational investments and pursuit of its business objectives. A model such as this is useful for understanding the growth of ICT in government departments and so contributes to strategic ICT planning, ICT investment evaluation and benefits realisation.

7.2.5 Capabilities – Implications for Organisational Transformation

The model contributes to how large government organisations can define capabilities thus giving management the ability to integrate, build, reconfigure and transform their business so as to address rapidly changing environments.

This stages of growth model describes the evolution of significant capabilities within the organisation - capabilities that continue to deliver benefits to the organisation. This model helps describe how these capabilities are developed, what the sequence is and what benefits accrue from each stage, along with the key mechanisms that drive those changes and evolutions from one stage to the next. Two distinct phases are described that emerge within government departments - The Bureaucratic Phase and the Entrepreneurial Phase. These phases represent two broad strategic directions for government departments. The Bureaucratic Phase describes government organisations as they progress toward a meticulous standardisation that strives to produce increased efficiencies. The Entrepreneurial Phase drives the organisation toward a more effective version of itself and emerges as the organisation becomes efficient at executing its bureaucratic responsibilities.

The model has potential to help managers evolve their governments departments into more efficient and effective organisations. As mentioned in chapter five, each stage of development is presented as an opportunity to develop a distinct capability each of which incorporates a number of competencies. The terms capability and competency are distinguished in chapter five. Capability refers to the “highest organising level and as being directed towards the strategic purpose of the organization” (Peppard et al. 2000 p. 294). Capabilities are enabled through a distinct combination or configuration of competencies. Competencies are abilities to manage and deploy resources of all types. This includes: human resources (internal and external) including their skills, knowledge and experience; technology, data and other physical or intellectual inputs. Competencies are therefore a subset of capabilities and resources combine to enable competencies. Each capability has a specific type of output that is distinct for that stage of development. Each output will typically contribute, in a specific way or ways, toward organisational efficiency and or effectiveness. As each capability is acquired by the organisation, it can be used many times as a solution to gain efficiencies in different contexts, even when the organisation has moved to the subsequent stages. A move from one stage to the next does not render the previous stage redundant, rather while the next stage will carry new understanding and perspectives, the previous stages are still relevant for dealing with those aspects of the existing environment that persist to impact on the organisation. Once a stage has been reached, or taken on, it remains as part of the organisation’s response repertoire of capabilities each of which may contribute at any time toward greater efficiency or effectiveness.

7.2.6 Maturity Assessment

The model provides a framework for strategic planning and development.

The model can be used for auditing or evaluating the current status and level of development in a government department. The model can also help managers decide which areas of improvement should be targeted in order to further develop the improvement process. The model provides reference points for

managers to gauge the current level of organisational maturity in respect of each of the major capabilities and stages of development. It may help gain an understanding of the key practices which can help government departments become more efficient and effective. It may help managers to identify the key competencies and practices that need to be embedded within a government department for it to improve a capability and achieve the next level of development. It may help managers of a government department to understand and improve all the organisation's capabilities, how they may impact on one another and suggest ways to map and manage those synergies and effects.

From the model an assessment questionnaire or interview schedule could be developed which could help managers explore the model in the context of their organisation. By completing such an assessment a manager could make an evaluation of the current organisational maturity and capability with respect to the overall organisation. The results of this assessment may help draw up an improvement plan outlining where managers want the organisation to be positioned in future. This plan should underpin any subsequent improvement initiatives.

The assessment will consist of a number of questions relating to each of the 30 or more competencies associated with each of the eight capabilities. This assessment method may help with capability assessment and providing insight into an organisation's stage maturity level.

The maturity assessment may be undertaken by:

- an individual, with knowledge of the organisation's structures, operations and processes;
- a group of people, either individually, or as a team to arrive at a consensus;
- an internal or external facilitator, to identify key individuals and collate answers from key personnel either individually or in groups, analysing the response(s).

Having decided upon the assessment and determined the approach and who will contribute to answering the questionnaire, the assessment can be completed. Where a group of individuals have provided their answers an appropriate scoring mechanism must be devised.

The next step is to analyse the results of the assessment in the context of the organisation's strategic goals. The assessment may be undertaken to establish the current maturity level for the organisation; alternatively it may be used to help justify the case for investment in some programme of management methods or capability or competency training.

The results of the assessment should contribute toward a course of action which should be reflected in either the strategic ICT plan or the organisation's overall strategic plan. This course of action should set out how further vertical or horizontal learning is approached. These approaches may help management with methods that contribute toward improved efficiency, improved quality and/or successful delivery of the organisation's initiatives.

Much work needs to be done at a detailed level of the questionnaire and assessment methods, but key capabilities and competencies have been identified with this research. Some further research to develop assessment methods and further competencies is outlined in the next section.

7.2.7 Understanding the Drivers for Change

The model provides managers with an understanding of drivers (teleological, dialectical, etc.) and enablers that play a role in the move from one stage to another. For instance the move from stage three to stage four is driven by the increasing costs associated with the anomalies and inconsistencies presented by these silo type systems. Reconciling anomalies and the cost of constantly developing and maintaining data extractions and data transfers between these separately siloed systems is a costly and complex affair and was shown in chapter five to be a significant driver for change.

7.2.8 Progress Path for New Government Products

For all government departments the model offers a progress path for new business products that are assigned to the department. The model also offers an opportunity to allocate new business products to appropriate departments. Where stage four has been achieved by a department, it is possible to identify master data sets to include customer data sets. Many government departments have their portfolio of functions merged or divested into other departments often without significant thought beyond political expediency. At stage four it is possible to begin to identify the possible synergies that could be created by the data sets and the business intelligence opportunities that emerge from those sets. This capability within a government department may help managers to assess the best mix of tasks and functions or business products for each government department.

7.2.9 Capabilities and Competencies - Implications for Training

In addition the model can guide managers as regards the appropriate competencies that are required to support the emerging capabilities at each stage. For instance the model informs managers that in order for the stage two capability to emerge, competencies in business process and organisational design (among others) must be acquired. Similarly for the stage four capability to emerge the managers in the organisation must be able to identify master data sets, identify customer data sets and continually integrate new data sets to these master sets where appropriate for the organisation.

7.2.10 Communication of Organisational and Team Identities

The model creates an opportunity for managers to articulate organisational and team identities. The model also creates an opportunity for managers to communicate possible changes to the rest of the organisation and also to enhance a shared understanding within the organisation. The model may also serve as a teaching tool to socialise individuals and teams. This type of institutional memory can help teams to articulate their identity to other significant constituencies within the organisation.

7.2.11 Implications for Whole-of-Government (WofG)

Where government administrations operate with a siloed structure, problems persist in the form of anomalies (inconsistent outcomes or conflicted behaviour, as described in Chapter five) across departments – just as they occur within departments. While Government policies may cohere at a macro level, detail at the micro level often produces unintended consequences resulting from poor coordination across government agencies where processes diverge, use similar or duplicate data and often completely replicate work. The response to these deficiencies has been much talked about in both the academic and professional literature under a number of headings including one-stop-shops, portals, joined-up-government, integrated government, transformative government, seamless government and whole-of-government. While there are subtle differences between some of these concepts, they are all in whole, or in part, about eliminating silos and creating efficiencies (and as a consequence, better service). Whole-of-government in particular is about making more effective use of scarce resources by reducing or better still eliminating the types of anomaly which are the inevitable result of a silo structure (Christensen and Lægreid 2007; Pollit 2003).

However, despite a great deal of talk, progress toward either eliminating silos or their anomalous consequence has been limited. Ling (2002) suggests that one of the reasons for this is that the incentives to achieve each organisation's or silo's aims may be greater than the incentives to achieve more system-wide objectives. For these reasons, many whole-of-government initiatives have failed to deliver expected benefits.

In many ways the Revenue experience reflects the issues and obstacles which may be encountered with whole-of-government initiatives. The Revenue case study and stages of growth model suggests that information systems develop through stages, which build upon one another and that for a move beyond the silo stage to be successful, it requires that the fundamental building blocks of legislation,

organisational structural and engineered ICT processes are in place. This research contributes to a WofG initiative, by suggesting that an organisation structure is required to accomplish this - a structure that has foundation in law and one that can affect significant changes to legislation and processes across government agencies, while also offering the capacity to build and support new business processes (de Brí and Bannister 2010).

7.3 Limitations of this research

All research has limitations and in this instance there are three possible limitations that are associated with this research. These have been discussed in detail in chapter three, but are briefly reviewed here:

The first limitation is the fact that this is a single case study. The single-case design has distinct value in certain types of research, which include where the case is a typical or representative case of others in the domain, where the case reveals some extraordinary phenomenon which is being researched and where a longitudinal study is being performed. In this instance a single case study was chosen because the organisation in question offered a rich and extensive canvas, which provided almost a century of organisational change and more than half a century of involvement with information technology.

One risk with this approach, discussed in chapter 3 is that a single case study, like a single experiment, can establish the existence of a phenomenon but this may not be enough to provide robust generalisations. Two comments are appropriate. First, this research was about theory building and the single case study is an accepted approach for this. Secondly, a further phase using three further cases was used to validate the research. While the latter cases were not studied in the detail and depth of the core case, they provide some degree of robustness beyond a single case.

A second limitation is that Revenue may be unrepresentative of other government departments. Revenue is a specialised agency whose function is to collect monies in the form of taxation in contrast to other government

departments who are concerned with the provision and delivery of social goods and consequently with spending monies. Revenue was also an early adopter of technology. While this fact contributes toward a rich and valuable case study, it distinguishes it from many other government departments. However Revenue's adoption of computer technology only preceded that in the Departments of Agriculture and Social Welfare by about five years which in the scale of this study is not a long time. Another distinction between Revenue and other government departments is the fact that Revenue is not under direct control of a Cabinet Minister. While taxation policy is directed by the Minister for Finance, the organisation is controlled by a board of three Commissioners and a Chairman who like other departmental General Secretaries is deemed to be the Accounting Officer for the department. One consequence of this is that Revenue has been more stable in contrast to, say the Department of Agriculture which has at various times in the past four decades had its remit extended to include Food, the Marine and Forestry and Fisheries only to see some of these moved out again. This stability may have influenced the developments discussed in this research.

Another possible limitation to the research is the fact that the researcher works in the organisation which was chosen for the main case study. This is an advantage for some aspects of the research and these were noted in chapter four. Specifically it facilitated substantial access to many aspects of Revenue and its operations. Working in Revenue for over 30 years, including two decades in the ICT Division, meant that making contacts, access and willingness to be open were much less problematic than they would have been for an outsider. In other respects this level of contact with the organisation could be viewed as a possible limitation to the research. There is a risk of bias or of a lack of objectivity with the researcher when considering issues relating to Revenue. In addition an internal researcher may be subject to more (or at least different) preconceptions than might otherwise be the case. These preconceptions and lack of objectivity may have manifested with some informants or documentary evidence being overlooked.

To minimise researcher bias, care was taken to report accurately the evidence delivered by respondents and a systematic approach was adopted to the analysis of interviews and documents which offered additional objectivity.

In addition purposeful/snowball sampling was used to choose respondents and to ensure views were representative of all perspectives. The criteria for credibility of the research are set out in detail in chapter three. Among these some mitigate lack of objectivity, in particular there were frequent debriefing sessions with supervisors and many opportunities were taken to ensure peer scrutiny of the research project.

Finally it is worth noting that loss of objectivity, real or perceived, is a perennial issue with many forms of qualitative research and in particular with action and participant observation research and even in ethnography. A fundamental challenge to the hermeneutics process is how to avoid becoming trapped where thoughts and understandings are self-reinforced. However, according to Gadamer

“receptivity is not acquired with an objectivist “neutrality”: it is neither possible, necessary, nor desirable that we put ourselves within brackets...”
(Gadamer 1988 cited in Bernstein p. 138)

Rather than trying to corral prejudices within brackets, they are accepted as the personal backdrop from which understanding and interpretation operate.

Whilst accepting any possible limitations with the research, it is important to note that the research process has followed good practice in terms of the criteria set out in chapter three for credibility, dependability and confirmability. On the basis of those and the protocols and procedures described in chapter four for the fieldwork it is reasonable to be confident in the validity of the findings of this research.

7.4 Further Research

During the course of the research two main opportunities were identified for further research in the field. Firstly the stages of growth model should be tested in a number of different multi-services, multiple customer government departments. The model could be tested in/extended to other state agencies, to include state-sponsored bodies. The model could be validated at the level of the public sector in a Whole-of-Government context (WofG). The model could be validated in government departments in other countries and or political systems including the UK, Northern Ireland and other EU countries. In addition, there is an opportunity to extend this model to private sector organisations.

Secondly there is an opportunity to further develop understanding of each of the capabilities that are associated with each of the stages of growth. Further research could develop a maturity model for each capability that would outline the required competencies, resources and processes that would be considered necessary for each capability to be incorporated into a government department. A design science type model could thus be developed for each capability. This approach and model type is described in chapter 2. This type of model defines the desired endpoint and the maturity scale and is therefore a model from design. Design science maturity models are described by Carcary (2011) as being located between models and methods in that they offer descriptions of the current maturity level and guidelines on how organisations can achieve higher maturity. Some of this research has already been carried out by researchers in the IS field, but this work only relates to the stage three capability within private sector organisations (ICT and business process automation capability) (Peppard et al. 2000; Peppard and Ward 2004; Curley 2007). All eight capabilities could have maturity models developed around their distinct stages of maturity. Each of these maturity models could provide benchmarks, measurement metrics and a progress path with prescriptions for progress within organisations.

7.5 Reflection and Conclusion

Reflecting on this research, it is apparent that there have been a number of distinct episodes, each of which appear in the chapters of this dissertation and each contributing to the overall research outcome. Alvesson and Skoldberg (2008) suggest that there is an interpretive process performed at several levels throughout the research and that these interpretive processes may have what they refer to as a reflexive impact on each other i.e. where two or more interpretive processes “may be in a state of interaction, mutually affecting one another” (Alvesson and Skoldberg 2008 p. 248). It is suggested that reflexivity occurs at these interfaces and that care should be taken to ensure each interpretive process plays an appropriate part while none are allowed to dominate the research outcome.

The evidence collecting and analysis stage of all research is often reflexively impacted on by the research question, and this research is no exception. As noted in Chapter 4, while each interviewee was influenced by being informed that the purpose of the research was to establish a stages of growth model, this was minimised by being vigilant as regards any evidence that could suggest that this was an unreasonable conjecture.

For each of the interpretive processes it was important to be conscious of not dominating each of the previous interpretive processes. In this regard every effort was made to minimise biased rhetoric in the narrative while ensuring that the findings rely on logic and empirical evidence.

The purpose of this review, is to reflect on the interpretive processes and to show that while each of the interpretive processes were put in place, they were done so consciously and deliberately, all the while ensuring that each held its own place and none played a dominant role.

The opportunity to take part in each of the roles associated with this research and to become part of what Popper (1992) calls ‘the scientific game’ has been a

challenge. Part of that challenge as Popper also points out, is an obligation to abide by the rules of this game and this has been carefully complied with:

“Those among us who are unwilling to expose their ideas to the hazard of refutation do not take part in the scientific game.”

(Popper 1992 p.280)

The scientific game continues with more research and further interpretations inspired by ideas to refute or corroborate previous contributions. Babbie and Mouton (2001 p.8) point out:

“There is no such thing as an instant verification of a hypothesis or a theory. Even when a scientific community accepts certain points of view, hypotheses or theories, as valid and plausible, the acceptance is based on the best available evidence at a given point in time ... If we were to accept a particular point of view as ‘certain’ or ‘infallible’ we are in fact saying that no amount of new evidence can ever lead us to change our belief. Such a view is not only obviously false, but clearly makes a mockery of the whole scientific enterprise. The commitment to true and valid knowledge is, therefore, not a search for infallible and absolute knowledge.”

Rather it is an opportunity to take part in a continuing enterprise where creativity, ingenuity, reflection and tenacity combine in a laboratory that rarely offers a clear ‘yes’ or ‘no’ and where the most that can be expected is a cautious ‘yes, but’.

Appendix 1 - Maturity Models Listed for Review

1	Nolan 1974, 1979,1982	27	Luftman (2003) Business Alignment
2	McFarlan, McKenney, Pyburn (1983)	28	Prananto McKay & Marshall SME ebusiness
3	Earl 1983 in HC Gallier & Sutherland	29	Rao et al (2003) eCOM
4	Huff et al. 1987	30	Martin et al (2004) Relationship Management
5	Bhabuta 1988 in HC Gallier & Sutherland	31	Renken (2004) ICT Management MM CMMI
6	Hirscheim 1988 in HC Gallier & Sutherland	32	Anderson & Henrickson (2005) e-Gov
7	Magal et al. (1988)	33	April & Hayes (2005) Software Maintenance
8	King (1988) ISP Planning	34	Due et al (2005) MM for ERP
9	Cooper & Zmud (1990)	35	Jansen and Van Veenstra (2005) (Tech arc)
10	Galliers & Sutherland HC ISJ 1991	36	Roseman and de Bruin 2005
11	MIT90 1991	37	Siau and Long (2005) (e-Gov)
12	Burn (1991) SIS Planning	38	Crawford (2006) PM MM
13	Cash et al 1992	39	Dayan & Evans (2006) km&cmmi
14	Paulk Curtis Chrissis Weber (1993) CMMI	40	Malinverno and Barnes (Gartner) (2006) SOA
15	Harkness & Kettinger (1996)	41	Erl SOA 2006
16	Teo & King (1996) IS Planning	42	Gottschalk (2006) KM MM
17	Ward & Griffith 1996	43	Ross & Weill 2003
18	KPMG. (1997) eBusiness	44	Inaganti & Aravamudan (2007) SOA MM
19	Doukidis & Galliers (1999) eBus SMEs	45	Chen & McQueen (2008) extension of Rao
20	Earl (2000) eBusines	46	Curley (2008) Innov. MM
21	Holland and Light (2001) ERP	47	Solli-Sæther & Gottschalk (2008) Outsourcing

22	Layne & Lee (e-Gov) 2001	48	Gottschalk 2009 (WofG)
23	Rajkumar & Mani (2001) Outsourcing	49	Klievenk and Jansen (2009a) WofG (e-Gov)
24	Watson Ariychandra & Matyska (2001)	50	Urwiler & Frolick (2009)
25	Moon (2002) (e-Gov)	51	Lukman (2011) Business Intelligence
26	Ward & Peppard 2002		

Appendix 2 - Models by Subject Matter

	Enterprise Information Systems Models	Technology Assimilation Models	Architecture Models	Governance & Management Models
Nolan 1974, 1979,1982	✓			
McFarlan, McKenney, Pyburn (1983)				✓
Earl 1983 in HC Gallier & Sutherland				✓
Huff et al. 1987				✓
Bhabuta 1988 in HC Gallier & Sutherland				✓
Hirscheim 1988 in HC Gallier & Sutherland				✓
Magal et al. (1988)		✓		
King (1988) ISP Planning				✓
Cooper & Zmud (1990)		✓		
Galliers & Sutherland HC ISJ 1991				✓
MIT90 1991	✓			
Burn (1991) SIS Planning				✓
Cash et al 1992				✓

Paulk Curtis Chrissis Weber (1993) CMMI				✓
Harkness & Kettinger (1996) Org Learning				✓
Teo & King (1996) IS Planning				✓
Ward & Griffith 1996	✓			
KPMG. (1997) eBusiness Model no paper yet		✓		
Doukidis & Galliers (1999) eBus SMEs				✓
Earl (2000) eBUS		✓		
Holland and Light (2001, ERP)		✓		
Layne & Lee (e-Gov) 2001		✓		
Rajkumar & Mani (2001) Outsourcing MM				✓
Watson Ariychandra & Matyska (2001) Data Warehousing MM		✓		
Moon (2002) (e-Gov)		✓		
Ward & Peppard 2002	✓			
Luftman (2003) Business Alignment MM based on CMMI				✓
Prananto McKay & Marshall SME ebusiness Stages of Growth 2003		✓		

Rao et al (2003) eCOM MM		✓		
Martin et al (2004) Relationship Management MM				✓
Renken (2004) ICT Management MM CMMI				✓
Anderson & Henrickson (2005) e-Gov extending Layne and Lee		✓		
April & Hayes (2005) Software Maintenance MM				✓
Due et al (2005) MM for ERP		✓		
Jansen and Van Veenstra (2005) (Tech arc) (e-Gov)		✓		
Roseman and de Bruin 2005		✓		
Siau and Long (2005) (e-Gov)		✓		
Crawford (2006) PM MM				✓
Dayan & Evans (2006) km&cmmi				✓
Malinverno and Barnes (Gartner) (2006) SOA			✓	
Erl SOA 2006			✓	
Gottschalk (2006) KM MM				✓
Ross & Weill 2003			✓	
Inaganti & Aravamudan (2007) SOA MM			✓	

Chen & McQueen (2008) extension of Rao		✓		
Curley (2008) Innov. MM				✓
Solli-Sæther & Gottschalk (2008) MM for IT outsourcing				✓
Gottschalk 2009 (WofG)			✓	
Klievenk and Jansen (2009a) WofG (e-Gov)		✓		
Urwiler & Frolick (2009) Maslows model to gauge ICT maturity	✓			
Lukman (2011) BI MM from Slovenia		✓		

Appendix 3 - Models by Contribution Type

	Prescriptive	Descriptive	Reflective	Theoretical
Nolan 1974, 1979,1982	✓	✓	✓	✓
McFarlan, McKenney, Pyburn (1983)		✓		
Earl 1983 in HC Gallier & Sutherland		✓		
Brancheau & Wetherbe (1987)		✓		
Huff et al. 1987		✓		
Bhabuta 1988 in HC Gallier & Sutherland		✓		
Hirscheim 1988 in HC Gallier & Sutherland		✓		
Magal et al. (1988)		✓		
King (1988) ISP Planning		✓		
Cooper & Zmud (1990)		✓		
Galliers & Sutherland HC ISJ 1991	✓			
MIT90 1991				
Burn (1991) SIS Planning	✓	✓		
Cash et al 1992	✓	✓		
Paulk Curtis Chrissis Weber (1993) CMMI	✓			

Harkness & Kettinger (1996) Org Learning		✓		
Teo & King (1996) IS Planning		✓		
Ward & Griffith 1996		✓		
KPMG. (1997) eBusiness Model no paper yet	✓	✓		
Doukidis & Galliers (1999) eBus SMEs		✓		
Earl (2000) eBUS	✓	✓		
Holland and Light (2001, ERP)		✓		
Layne & Lee (e-Gov) 2001		✓		
Rajkumar & Mani (2001) Outsourcing MM	✓	✓		
Watson Ariychandra & Matyska (2001) Data Warehousing MM	✓	✓		
Moon (2002) (e-Gov)	✓	✓		
Ward & Peppard 2002	✓	✓		
Luftman (2003) Business Alignment MM based on CMMI	✓			
Prananto McKay & Marshall SME Stages of Growth 2003	✓			
Rao et al (2003) eCOM MM	✓			
Martin et al (2004) Relationship Management MM	✓			

Renken (2004) ICT Management MM CMMI	✓			
Anderson & Henrickson (2005)	✓			
April & Hayes (2005) Software Maintenance MM	✓			
Due et al (2005) MM for ERP	✓			
Jansen and Van Veenstra (2005) (Tech arc) (e-Gov)	✓			
Roseman and de Bruin 2005	✓			
Siau and Long (2005) (e-Gov)	✓			
Crawford (2006) PM MM	✓			
Dayan & Evans (2006) km&cmmi	✓			
Malinverno and Barnes (Gartner) (2006) SOA	✓			
Erl SOA 2006	✓			
Gottschalk (2006) KM MM	✓			
Ross & Weill 2003	✓	✓		✓
Inaganti & Aravamudan (2007) SOA MM	✓			
Chen & McQueen (2008) extension of Rao	✓			
Curley (2008) Innov. MM	✓			
Solli-Sæther & Gottschalk (2008)	✓	✓	✓	

MM for IT outsourcing				
Gottschalk 2009 (WofG)	✓	✓		
Klievenk and Jansen (2009a) WofG (e-Gov)	✓	✓		
Urwiler & Frolick (2009) Maslows model to gauge ICT maturity	✓			
Lukman (2011) BI MM from Slovenia	✓	✓		

Appendix 4 -Phase One Reference Documents Supplied to Informants

Document 1

A Chronological view of Revenue – From 1923 to 2009

On February 21st 1923 the recently formed Government established the Office of the Revenue Commissioners in order to assess and collect taxes and duties on behalf of the State.

The main areas of revenue collection were:

- Customs duties on imported goods
- Excise duties on beer, spirits, tobacco, wine and hydrocarbon oils
- Licenses for publicans, brewers and distillers
- Income Tax and Super Tax
- Estate Duties and Stamp Duties

1924

Staff Numbers: 1768

Revenue Business

The Administration struggled with recruitment and organisational methods however by 1924 the total staff complement was 1768. Some of those had been given the option to transfer (under Article 10 of the Treaty) from UK administration but most had been recruited from citizens of the State.

The State's formative years were dominated by tight controls on finances. Public service wages and old age pensions suffered cuts during this period.

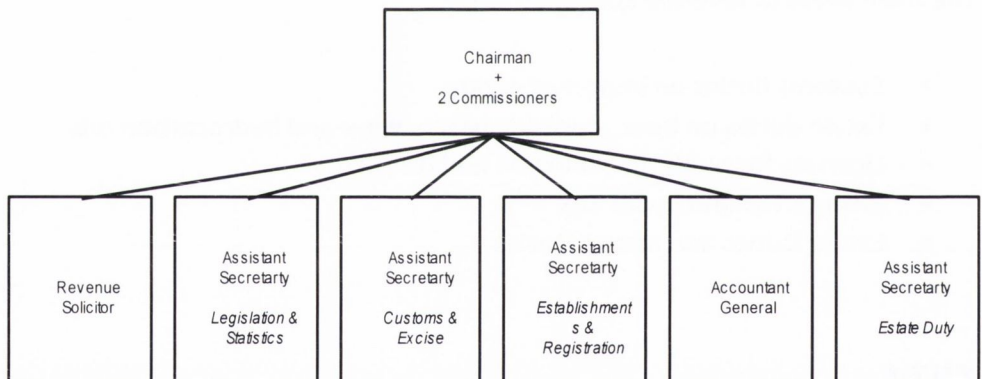
1930

Staff Numbers: 2024

Revenue Business

Along the land frontier between the State and Northern Ireland there was 240 of miles of newly created border which was not based on natural features or broad geographical considerations. It cut through streets, farms and townlands.

'Emergency' import duties during this time brought about a substantial increase in smuggling into the Irish Free State. This in turn put a strain on Customs resources.



Despite the turbulence of the times and staff shortages by 1939 the foundations of the organisation was laid to encompass the various taxes and duties. At this time the nucleus of a Secretariat had begun and the organisation as charted above emerged.

1940

Staff Numbers: 2646

Revenue Business

The war period assigned additional duties to Revenue particularly in the area of Customs. The Emergency Powers Act dominated Revenue activity during this period. Foreign exchange resources had to be protected so importations were only allowed on certain goods. Purely luxury products were eliminated from purchases abroad. The Emergency Act granted Customs Officers additional powers and also additional responsibilities with regard to imports.

1950

Staff Numbers: 2619

Revenue Business

Structural Changes to the Taxation Code

The Minister for Finance in 1953 set up a committee of inquiry into taxation on industry. They were to examine the effect of taxation on industrial production, with particular regard to the extent to which it inhibits the productive capacity. The report was complete in March 1956. The government received the recommendations favourably and legislation followed to make the appropriate amendments to the tax code.

In 1957 a Commission on Taxation was set up to enquire generally into the present system of taxation of profits and income. Its scope and structure included the provisions for collection and for the prevention of evasion. The Commission released an initial report in 1958 where it recommended the introduction of the Pay as You Earn (PAYE) scheme.

The Commission tried to ascertain why enforcement measures had become so necessary and why, even with their extended use, arrears were still so large. The

slowness of manual accounting had exacerbated a worsening position brought about on the one hand by the employee's difficulty in meeting half his yearly liability every six months. The threat that employees would transfer their services to another employer before the employer made the deduction was possible (particularly in the building trade) and in some cases may even disappear from Revenue's vision.

ICT in Revenue

The first Revenue eGovernment initiative began with mechanised accounting in 1957 using tabulators and sorters. Use of these machines continued and by 1962 they were dealing with 90,000 tax collection cases.

1960

Staff Numbers: 2884

Revenue Business

On October 6th, 1960, PAYE came into operation and set the tone for the following decades in Ireland, which then had the lowest rate of personal taxation in Europe. The number of taxpayers to be processed trebled.

Revenue trends were reflecting what was happening in the country. The Irish economy boomed with jobs and money flowing into the State.

The Finance Act, 1962 introduced powers to tackle evasion of tax including the requirement that tax-payers make their business records available to Revenue.

The volume of work, generated by PAYE, was labour and time intensive. It was at this point that a further investment in computing was instigated.

Collector General

In 1964, a new arm of Revenue came to life with the opening of the Office of the Collector-General (CGs), a central collection office. Previously, collection had been carried out by local Collectors of Taxes.

The next year, Saturday attendance ceased for most Revenue staff.

ICT in Revenue

In 1961 a decision was taken to install a 'second generation' computer. This machine was a 1301 ICT and was one of the first series of medium-priced commercial computers to be put on the world market and was the first of its kind in Ireland. The first computer was primitive by today's standards. The data and programs were input from punch cards every time a job had to be carried out by the computer. The programs were written in a language that consisted of numeric codes only.

By 1967 Revenue's computer had insufficient capacity to deal with the volume of business and so, was replaced by two state-of-the-arts Honeywell 1200. This established Revenue as one of the earliest and largest mainframe computer users in Ireland. The new programming language, Common Business oriented Language or COBOL, was used for developing systems on the Honeywell mainframes. The data was now punched on paper tape for entry to the computer. It was stored in electronic format on magnetic tape for use whenever required by the computer. At that time IT consisted of 12 analyst/programmers, 6 computer operators on shift work and a data preparation area of 20 key-punch personnel.

By 1969 the number of development staff had doubled.

The initial computer applications were in the Taxes area. They included PAYE, Income Tax, Corporation Profits Tax, Turnover Tax, Wholesale Tax and later VAT. The first Customs applications were introduced in 1972 and included Duty Accounting and Trade Statistics.

1970

Staff Numbers: 3897

Revenue Business

Once again in the 1970's a rising economy saw increased building activity. Special procedures were introduced, empowering Revenue to cope effectively with the tax regulation of sub-contractors. To this end, the Chief Inspector of Taxes set up special Construction Industry Divisions and Sections in its offices.

In 1973, Revenue also began collecting Pay Related Social Insurance contributions (PRSI) on behalf of the Department of Social Welfare.

ICT in Revenue

In 1974 the new Revenue Computer Centre was opened in St. John's Road, Dublin. Staff numbers were increasing in this area. The Data Processing Division (DPD) as it was called then designed and developed Revenue-specific programs. Systems were upgraded to the extent that by 1976 VDU's were on many officials' desks.

A formal program design method was adopted in 1975 (Michael Jackson)

By 1977, the Data Processing section had assumed such importance in operations that it became a Revenue Division.

1980

Staff Numbers: 7584

Revenue Business

Increased revenue yields were reflected mainly in the new taxes, the operation and administration of which required more hands on deck. Almost half of the 7,588 people working in Revenue during 1981 were engaged on taxes work.

Revenue's PAYE customers exceeded one million, self-employed taxpayers would surpass 200,000 and over one hundred thousand VAT repayment claims were processed each year. In 1986, a forerunner to Revenue audit was introduced with the critical examination of accounts systems.

1988 also saw one of the most fundamental changes in Irish taxation and Revenue structures when Self- Assessment was introduced for Income Tax, followed by Corporation Tax and Capital Gains Tax.

In 1989 Revenue introduced a new era with an emphasis on voluntary compliance, improved communications and increasing public confidence. There was a stronger focus on customer service which was reflected in Revenue's new Charter of Rights. The Charter informed customers of their rights when transacting business with Revenue.

In that year Revenue also reviewed its functions and adopted a mission statement. Revenue also took a more proactive role in media relations by establishing its own Press Office. Revenue continued formal consultation with its customers where its main objectives were to simplify and consolidate existing tax practices and to provide a standing forum for exchange of views.

ICT in Revenue

A programme of phased rewriting, involving two million lines of code, was undertaken in these years to develop Revenue's PAYE, VAT and Income Tax computer programs. Another significant development saw the Revenue computer memory banks increase 16-fold in 1985. The tax official's desk began to take on a high-tech aspect as more computers came on stream. In the quarter of a century since the introduction of PAYE, 100,000 employers were now operating the

system, there were 1.2 million employees and £3 billion plus was being collected. As more employers began using computerised payroll systems, ISD developments enabled them to receive Tax Free Allowance details electronically after Budget Day.

The first Personal Computers PC's were installed in Revenue.

1989 introduced a project to automate Customs entry processing (AEP) using Electronic Data Interchange.

1990

Staff Numbers: 6275

Revenue Business

1992 saw the introduction of the Single Market which abolished frontiers left many customs functions redundant and gave Revenue a major redeployment and reorganisational task.

In 1994 Revenue's first Assistant Secretaries Conference agreed on a draft corporate plan to co-ordinate the organisation's activities and set down strategic goals for the future. The final version of the Plan (1994-1996) was the first of its kind in the civil service.

By 1995, Revenue's customer service record was second-to-none and its offices afforded comfort and privacy for taxpayers. Its range of forms and information leaflets was continually expanded and improved.

Staff Numbers 1997: 6034

ICT in Revenue

In 1991 the first statistical package was installed (SAS) and used to model taxpayer data and assist with economic forecasting and inference for taxation policy. I

By 1993 there were already 13 local area networks LANs interconnected with 2,200 mainframe terminals and 1,400 PCs hooked up to them.

In 1992 a CASE tool was implemented for use in a major development project. The Consolidated Tax project was launched. This was a major reconstruction of the Revenue computer systems, enabling a subsequent transformation of the Revenue business processes and organisation structure. The intention was to organise data and applications around the taxpayer rather than the tax. Revenue's own studies and global experience in other agencies had demonstrated that this led to a more efficient collection of tax, a more effective combating of tax evasion and an improved customer service for taxpayers.

The new approach, titled Integrated Taxation Services, replaced the multiple systems for individual taxes. It was phased in, starting in 1994 with an exception case tracking and management tool which adopted this integrated taxpayer approach.

As part of its programme for consolidating taxation services, Revenue introduced a common register of customers and agents in 1996 after a massive clean-up and matching of data which had in separate systems over the previous three decades. A taxpayer's basic identification details, such as name and address, were recorded once on the new register. This registration system is used by all Revenue's computer systems when processing customers' taxes and duties.

By 1999 a common framework was also established to process payments and tax returns for all the major taxes by Revenue. This now covers 22 taxes and duties.

2000

Staff Numbers: 6500

Revenue Business

A root and branch review of existing structures was commissioned to ensure the best possible fit between strategies and the organisational structure. This review recommended a move away from a traditional functional and individual taxhead approach to one which deals with customers in a more modern and holistic way.

The restructuring was designed to improve Revenue's effectiveness and efficiency, both by improving service to compliant tax and duty payers and facilitating a sharper and more focused response to non-compliance. To achieve this it was decided to consolidate responsibility and accountability for all tax and duty payers in a new Large Cases Division and five new Regions. It was also decided to streamline the National Office activities through the consolidation of key legislation and policy functions and the establishment of a central Operations Policy and Evaluation Division (OPED) to evaluate performance and set standards. In addition, a new Prosecutions Division and a Debt Management Division were established to focus on key strategic issues such as tax crimes and managing the tax debt.

In 2001 Revenue moved to a calendar tax year and made final preparations for the introduction of the Euro. In addition tax relief at was introduced and Phase 1 of the bogus non-resident accounts collection campaign was completed.

In 2002 Revenue published a Customer Service Plan for the years 2001-2004, which set out 12 Quality Customer Service Principles for the organization. Increasing numbers of taxpayers and exceptional demands in audit and

compliance put our customer service standards under some pressure so initiatives such as our 1890 telephone service for PAYE customers and the Revenue Online Service (ROS) were deployed to continue a service-oriented approach.

Internally, the majority of staff grades were rationalised. This restructuring facilitated a 'whole case management' approach to taxpayers, which was expected to both improve service levels and allow a sharper focus on those cases that pose the highest risk of non-compliance. It also provided greater flexibility and improved career and location opportunities for staff.

Major investigations commenced, identifying tax evaders who use offshore accounts/structures or who have acquired overseas property or other assets, which were funded out of undeclared income or gains.

The 'Large Cases Division' adopted a new strategy of proactive engagement with large companies so as positively to influence corporate compliance behaviour. This new "Co-operative Compliance Framework" was founded on the premise of Revenue and business working in partnership to promote a high tax compliance ethic.

Revenue's new organisational structure was built on the principle of 'whole case management' that views customers in a holistic way, taking account of all of their interactions with Revenue across the full spectrum of taxes and duties.

In 2005 Revenue increased its ability to tackle non-compliance with enhanced ability to identify, measure and prioritise risk – the risk posed by non-compliant behaviour to Exchequer returns. To this end Revenue piloted a powerful risk analysis system prior to full implementation across the organisation in 2006. This system enables Revenue to direct interventions against non-compliance in a structured and cost effective way.

ICT in Revenue

ROS, the Revenue On-Line Service, was introduced in 2000. Business customers and the self-employed could now file their returns and pay their taxes on-line. The number of people using this popular facility increases every year. PAYE self service was added in 2006, as part of an overall redesign of that system, allowing taxpayers to claim credits or seek a review of their liability on-line.

The data warehouse has powered innovative new systems. One of these evaluates and analyses case profiles and uses that analysis as the basis for selecting cases for audit. This system ensures the most efficient use of Revenue resources by targeting cases with the highest risk of being non-compliant in their tax affairs.

In 2006 Revenue completed the implementation of the new computer-based Risk Evaluation Analysis and Profiling System (REAP). The REAP system enables Revenue to identify, measure and prioritise non-compliant cases which pose the most risk to Exchequer returns.

In 2006 the tax simplification programme made further by developing a series of proposals for the automatic granting of certain tax credits and refunds based on third party information.

Legislation to facilitate these measures was contained in the Finance Act 2007.

2008

Staff Numbers: 6700

Revenue Business

National Structures

ICT in Revenue

More than 400 now work in the ICT Division on application development, technical architecture and computer operations, supporting 7000 Revenue employees who carry out their functions using on-line connections to Revenue computer systems.

The ICT organisational structure in Revenue has evolved and expanded over the years. An IT Executive, consisting of senior business and IT managers, ensures the efficient planning and monitoring of IT development and operations in Revenue.

Project and portfolio management has become the focus of a Project Management Office. The Project Management Office (PMO) defines and maintains the standards of process, generally related to project management, within the organisation. The PMO strives to standardise and introduce economies of repetition in the execution of projects. The PMO is the source of documentation, guidance and metrics on the practice of project management and execution.

Revenue – Some Significant Events

- PAYE 1960
- Introduction of Turnover Tax
- Introduction of VAT
- Customer service Charter
- Consolidated Customer View
- REAP
- ROS/electronic filing-payment
- 1989 introduced a project to automate Customs entry processing (AEP) using EDI

- Restructuring
- ECT and AIM 1994
- Periods of organisational expansion – e.g. 70's
- In 1970's CI's set up special Construction Industry Divisions to combat evasion in that sector.
- 1991 first statistical package was installed (SAS) and used to model taxpayer data and assist with economic forecasting and inference for taxation policy
- 1973, Revenue began collecting PRSI on behalf of the Department of Social Welfare
- By 1993 there were 13 local area networks LANs interconnected with 2,200 mainframe terminals and 1,400 PCs hooked up to them.
- Introduction of TRS
- Introduction of ITEX
- Strategy development 1990's
- Collector General (1964)
- CONTAX, ITP 1990's
- ICT 1960 in Revenue
- In 1977 the Data Processing section became a Revenue Division.
- Press Office
- Introduction of PMO
- Cross-departmental connectivity – (CRO, CSO, DSFA, Dept. Ag, etc.)
- A formal program design method was adopted in 1975 (Michael Jackson)
- PAYE Online

- Almost half of the 7,588 people working in Revenue during 1981 were engaged on taxes work.
- Structural Changes to Taxation Code 1957
- ICT Data Centre moved to John's Road 1974
- 1988 Self Assessment and Voluntary Compliance
- 1992 Single Market
- Introduction of PC's to Revenue
- Corporate and Strategic Planning in 1990's

Document 2

Some Definitions

Business Process

A business process or business method is a collection of related, structured activities or tasks that produce a specific service or product (serve a particular goal) for a particular customer or customers.

There are three types of business processes:

Management processes, the processes that govern the operation of a system. Typical management processes include "Corporate Governance" and "Strategic Management".

Operational processes, processes that constitute the core business and create the primary value stream. Typical operational processes are Purchasing, Manufacturing, Marketing, and Sales.

Supporting processes, which support the core processes. Examples include Accounting, Recruitment, and Technical support.

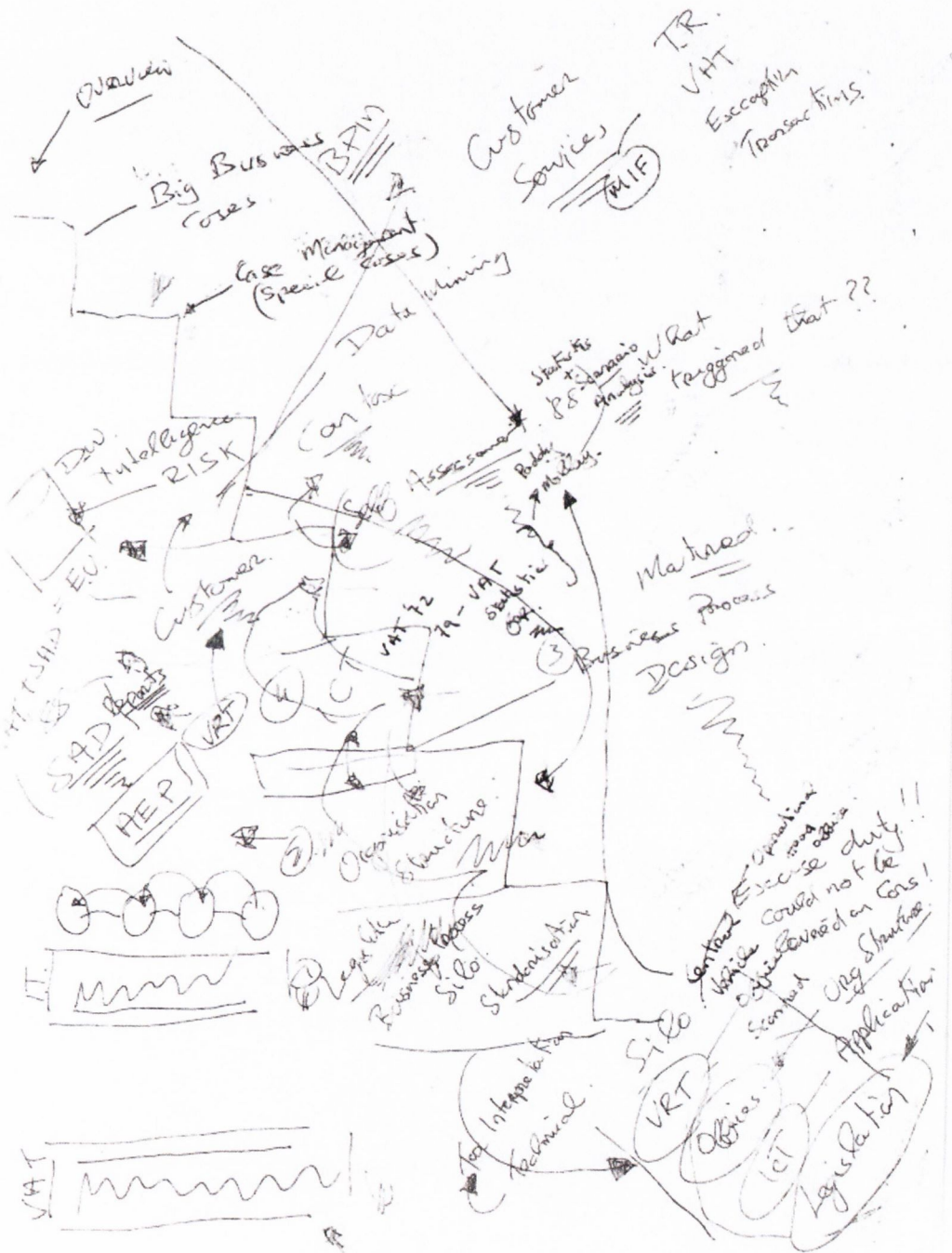
Information System

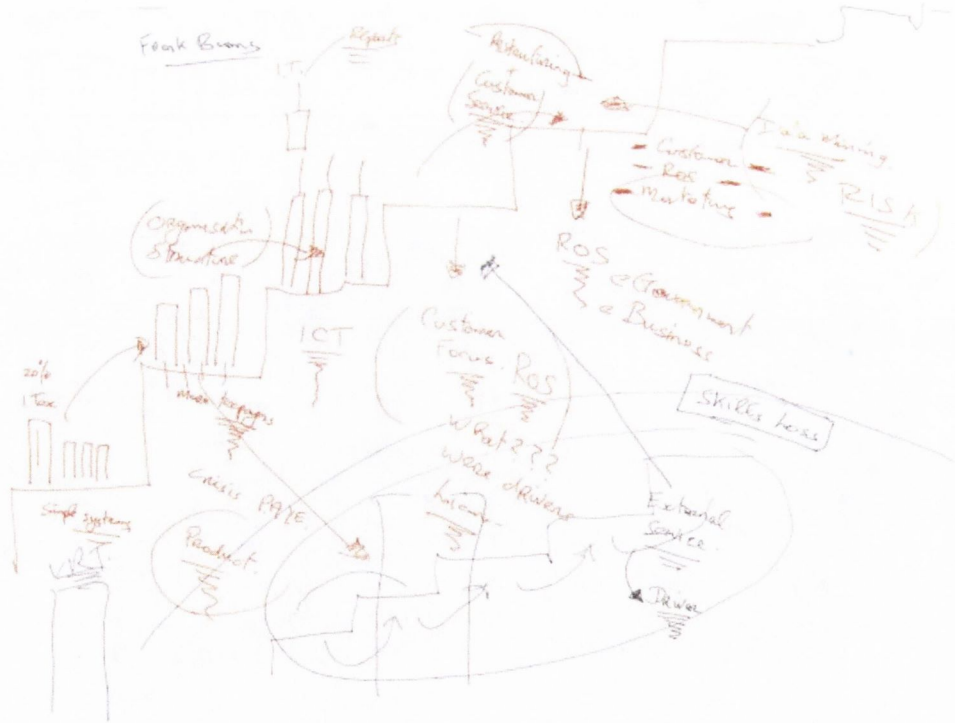
An information system is a system, automated or manual, that comprises people, machines, and/or methods organized to collect, process, transmit, and disseminate data that represent user information

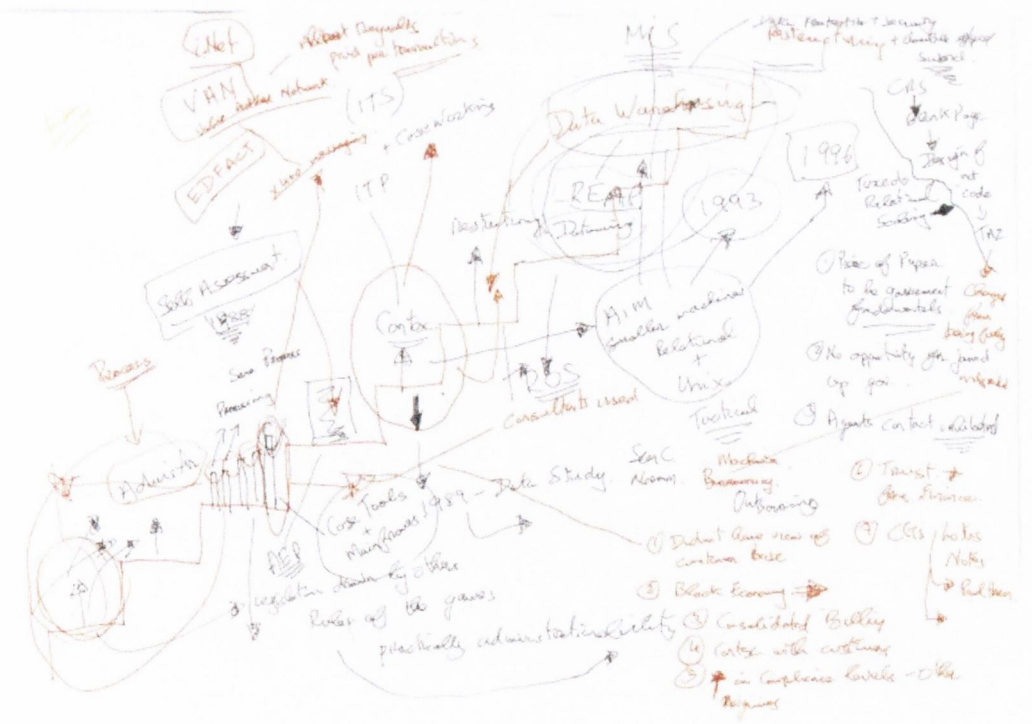
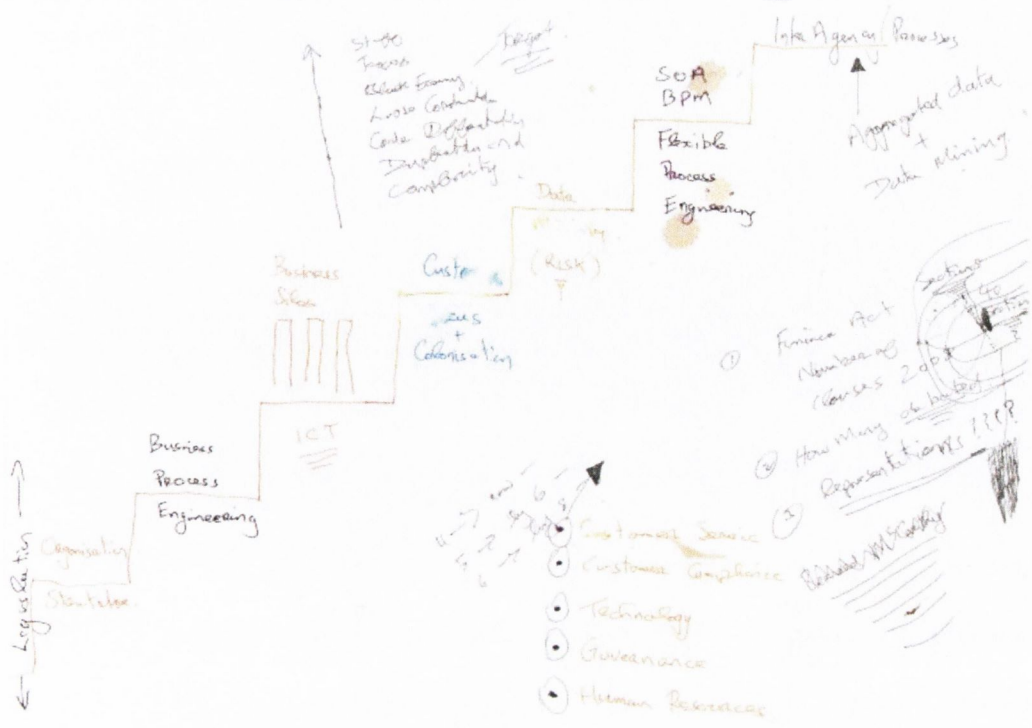
ICT Solution

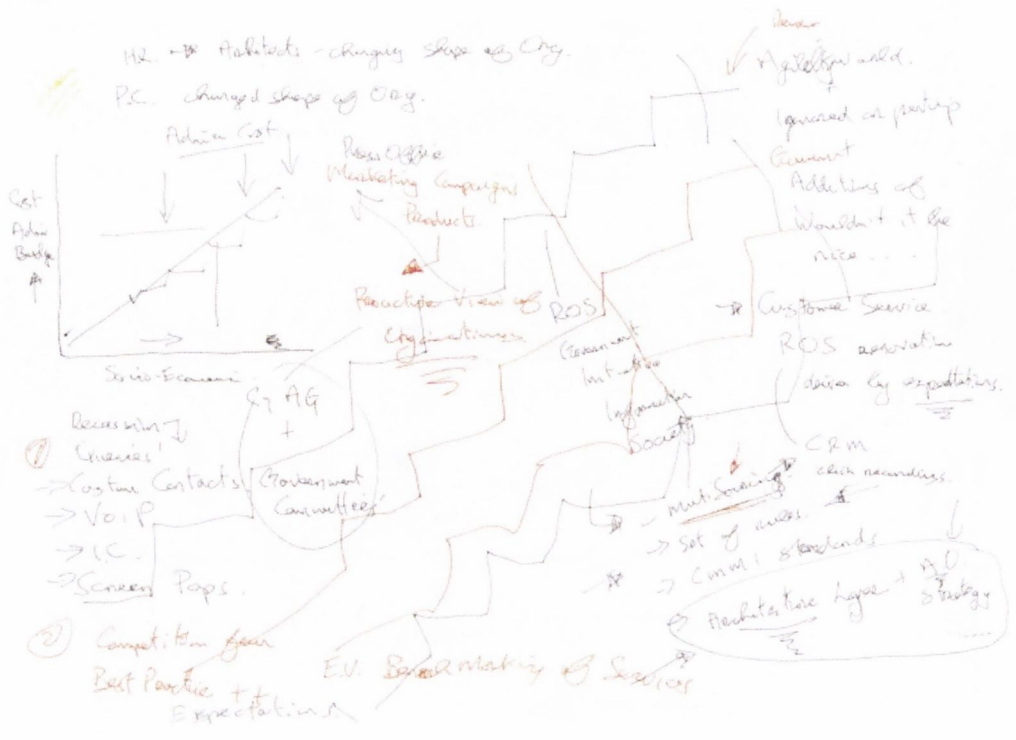
An ICT solution is typically built around an existing information system and normally augments that system by adding more precision, automation or speed to the execution of the task.

Appendix 5 - Examples of Phase 1 Informant Models

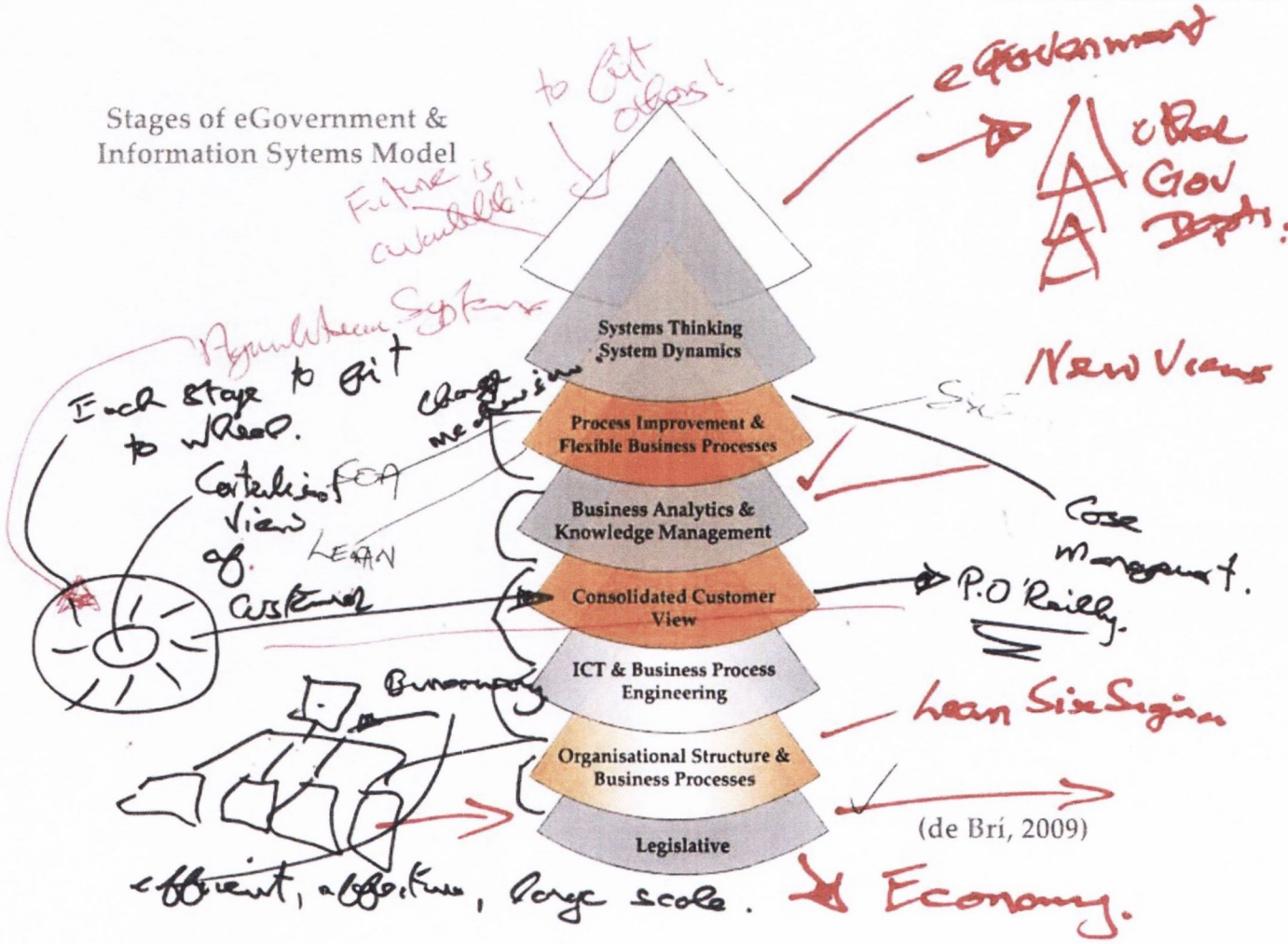


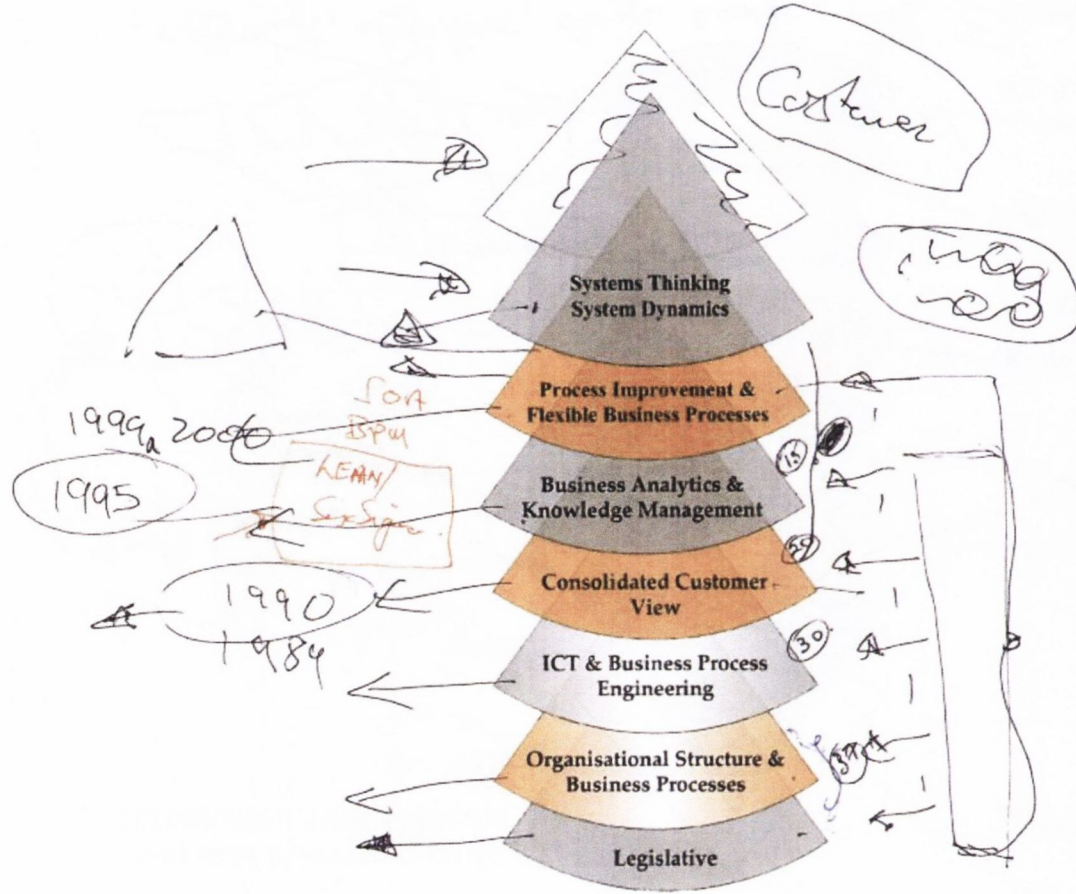




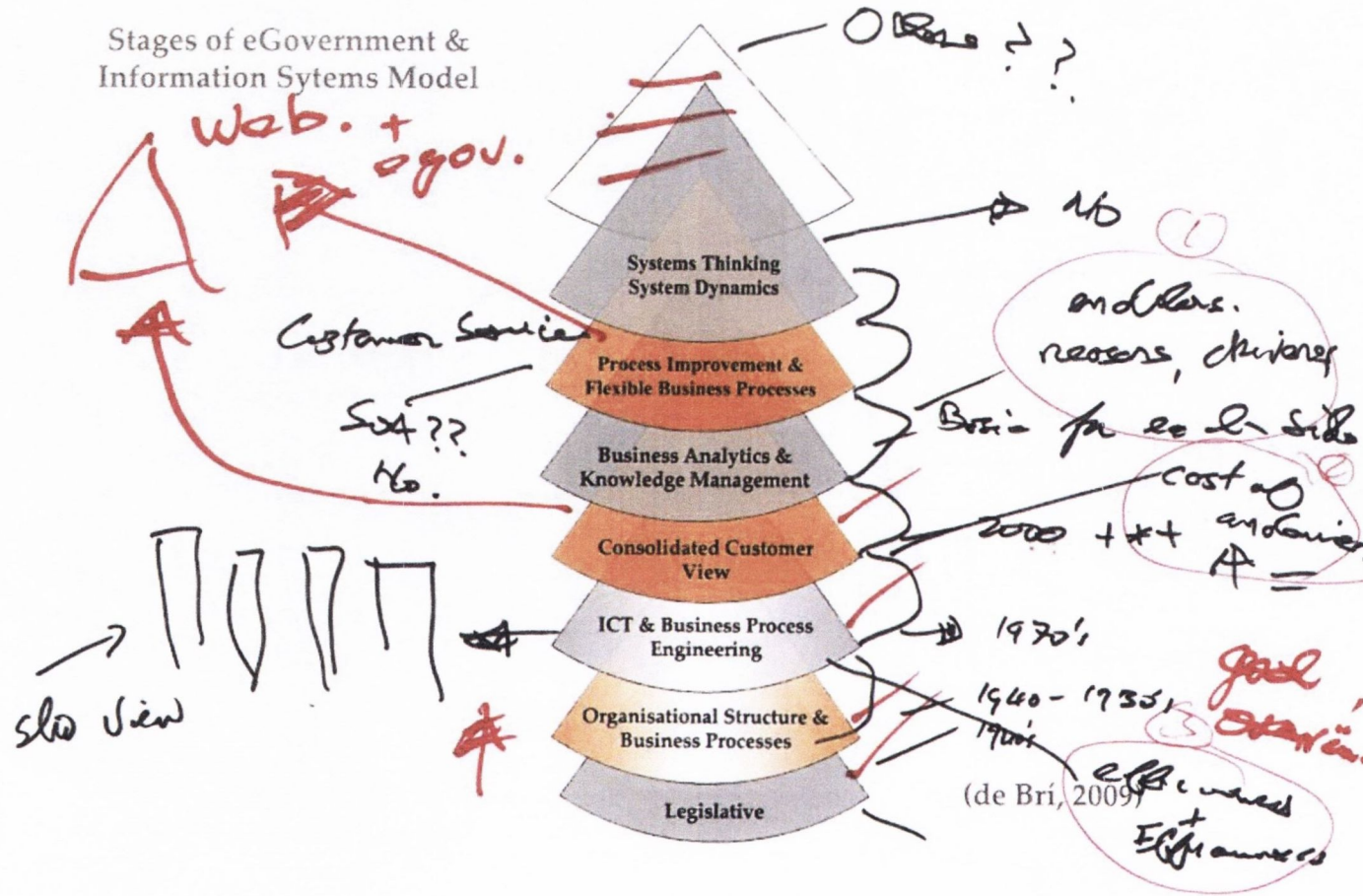


Appendix 6 - Examples of Phase 2 Informant Diagrams

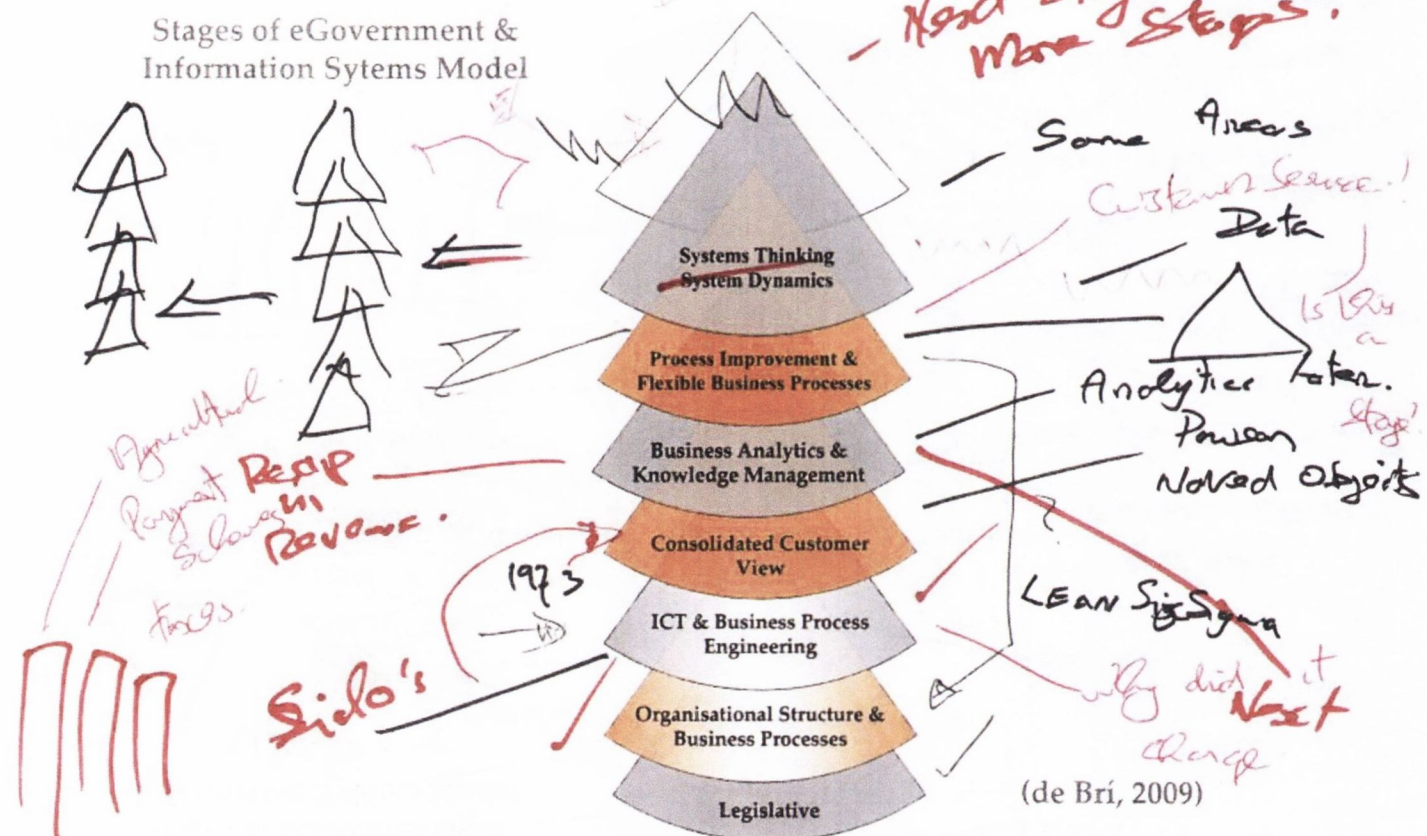




Stages of eGovernment & Information Systems Model



Stages of eGovernment & Information Systems Model



Appendix 7 - Informant's Rank/Position and Department

	Alias	Position	Division	Department
1.	SM 1R	Senior Manager	Business	Revenue
2.	SM 2R	Senior Manager	Business	Revenue
3.	SM 3R	Senior Manager	Business	Revenue
4.	A/S 1D	Assistant Secretary		DSP
5.	SM 1D	Senior Manager	Business	DSP
6.	SM 4R	Senior Manager	ICT	Revenue
7.	SM 5R	Senior Manager	ICT	Revenue
8.	SM 6R	Senior Manager	ICT	Revenue
9.	SM 1A	Senior Manager	ICT	AG
10.	A/S 1R	Assistant Secretary		Revenue
11.	SM 2D	Senior Manager	Business	DSP
12.	SM 7R	Senior Manager	ICT	Revenue
13.	A/S 2R	Assistant Secretary		Revenue
14.	SM 8R	Senior Manager	Business	Revenue
15.	SM 9R	Senior Manager	Business	Revenue
16.	A/S 3R	Assistant Secretary		Revenue
17.	SM 3D	Senior Manager	ICT	DSP

18.	SM 10R	Senior Manager	Business	Revenue
19.	A/S 4R	Assistant Secretary		Revenue
20.	A/S 5R	Assistant Secretary		Revenue

Senior Manager = Principal; A/S = Assistant Secretary or Divisional Director

DSP = Department of Social Protection; AG = Department of Agriculture

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