Supporting the emergence of a shared services organisation: Managing change in complex health ICT projects

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## Glossary of terms

<table>
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<th>Term</th>
<th>Definition</th>
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<tr>
<td>‘death valley of change’</td>
<td>A curve depicting a process common to most change theories as described by Elrod &amp; Tippett</td>
</tr>
<tr>
<td>Action research</td>
<td>A cyclical form of qualitative research in which researcher and participants act and reflect repeatedly while gathering or generating data and learning in order to improve the plan iteratively (Waterman, Tillen, Dickson, &amp; de Koning, 2001)</td>
</tr>
<tr>
<td>AR cycle</td>
<td>Plan, act, reflect and modify action plan (Brydon-Miller, Greenwood, &amp; Maguire, 2003)</td>
</tr>
<tr>
<td>Business case</td>
<td>Documentation containing financial and other justification for a project</td>
</tr>
<tr>
<td>Business process re-engineering</td>
<td>Radical, rapid change resulting from introduction of new ICT technology, processes and interpersonal relationships in order to change and improve an organisation (Hammer &amp; Champy, 2001b)</td>
</tr>
<tr>
<td>Capability crisis</td>
<td>An expression of commitment and transition to change marked by a composite of signs including heightened sense of ambiguity and uncertainty, difficult communication and leadership, overwhelming workload, predictions of failure and demand for learning.</td>
</tr>
<tr>
<td>Change</td>
<td>Used in the sense of organisational change in which the previous ways of working are no longer useful or appropriate and new ways, usually linked to the adoption of an innovation, need to be assimilated into daily work activities.</td>
</tr>
<tr>
<td>Change management</td>
<td>The facilitation of change by means of leadership, learning, communication and support.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<tr>
<td>Communication</td>
<td>The transfer of information to people who needed it in order to be able to participate in and contribute to the project’s goals.</td>
</tr>
<tr>
<td>Complex adaptive system</td>
<td>A system in which all components interact with and influence one another and the whole, resulting in constant change, which aims at resilience of the system (Begun, Zimmerman, &amp; Dooley, 2003).</td>
</tr>
<tr>
<td>Constructivism</td>
<td>A philosophical approach to understanding reality, that assumes that we all have different understandings reflected by language and history (Appleton &amp; King, 2002).</td>
</tr>
<tr>
<td>Convergent interview</td>
<td>An interview or series of interviews, the structure of which tightens as the content becomes clearer (Rao &amp; Perry, 2003).</td>
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<tr>
<td>Critical success factors</td>
<td>Measures taken to predispose projects for success, such as cost, scope, time, project management and change management (Pinto, 2004).</td>
</tr>
<tr>
<td>District Health Board</td>
<td>In the New Zealand context this is a regional governance body for the delivery of healthcare (Ministry of Health, 2000).</td>
</tr>
<tr>
<td>Grounded theory</td>
<td>A qualitative research approach with distinct features such as the data analysis process, theoretical sampling, and constant comparison (Charmaz, 2006; Strauss &amp; Corbin, 1998).</td>
</tr>
<tr>
<td>Health</td>
<td>Although the World Health Organisation definition of health is “A state of wellbeing and the ability to lead a productive life,” people working in the health sector refer to the healthcare system, its users and providers as “health”. For this reason, “health” is used in the thesis with the latter meaning.</td>
</tr>
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</table>
Health ICT project: An ICT project implemented in a health system, usually associated with the adoption of new components of the EHR, and introducing new ICT technology and its associated processes.

Health information strategy: The strategy that provides guidance for the implementation and use of components of a country’s EHR (Wyatt & Keen, 2005).

Health system: The interaction between people, structures, policy, funding, and other components that contribute to, use or participate in the delivery of healthcare in various settings on local, regional and national levels.

Healthcare: The delivery of health services at the point of care.

Healthcare organisations: The organisations in which people work together aiming at the delivery of clinical care.

Hierarchy of evidence: In clinical care the hierarchy of evidence refers to the gold standard of evidence as encapsulated in the randomised control trial with qualitative research low on the hierarchy (Petticrew & Roberts, 2003).

IS infrastructure: An organisation’s IS infrastructure is the networks, hardware and personnel who provide the technical foundation for the delivery of information services to enable healthcare (Weill & Vitale, 2002).

Leadership: The qualities, attitudes and behaviours of some people that result in others becoming their followers (Turner & Muller, 2005).

Learning: The activities, attitudes and behaviours that result in changes in daily working activities.

Process: “The self-contained, temporal and logical order (parallel and/or serial) of those activities that are executed for the transformation of a business object with the goal of accomplishing a given task” (Rosemann, 2003, p. 18)
Project Fusion
A large and complex infrastructure project in which the IS services of two DHBs were joined into one and upgraded to the latest Microsoft versions.

Reflection
The activities (such as writing, thinking, talking, brainstorming, journaling, amongst other things) that result in learning and improved performance in subsequent AR cycles (Day, Orr, Sankaran, & Norris, 2006).

Shared services organisation
A shared services organisation is an internal, outsourced, organisational arrangement whereby a business unit is shared between multiple organisations but is set up separately from them (Dibbern, Goles, Hirshheim, & Jayatilaka, 2004).

Support
The availability of personnel to help those using new software by coaching them in the new technology and processes, and by solving problems as they emerged.

Users
Those who learn and adopt new technology, processes and relationships brought about by ICT projects.

Zone of complexity
The increase in complexity, ambiguity and uncertainty that occurs as a result of a shift from the interactively simple way of life in a complex adaptive system to a more complex way of life (Tan, Wen, & Awad, 2005).
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>ACC</td>
<td>Accident Compensation Insurance Corporation</td>
</tr>
<tr>
<td>AR</td>
<td>Action Research</td>
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<tr>
<td>BPM</td>
<td>Business Process Management</td>
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<tr>
<td>BPR</td>
<td>Business process re-engineering</td>
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<tr>
<td>CIO</td>
<td>Chief Information Officer</td>
</tr>
<tr>
<td>CMDHB</td>
<td>Counties Manukau District Health Board</td>
</tr>
<tr>
<td>COO</td>
<td>Chief Operating Officer</td>
</tr>
<tr>
<td>DHB</td>
<td>District Health Board</td>
</tr>
<tr>
<td>DRG</td>
<td>Diagnostic Related Groups</td>
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<tr>
<td>EHR</td>
<td>Electronic Health Board</td>
</tr>
<tr>
<td>FAQ</td>
<td>Frequently Asked Questions</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>HASS</td>
<td>healthAlliance Shared Services</td>
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<tr>
<td>HMO</td>
<td>Health maintenance organisation</td>
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<tr>
<td>HMO</td>
<td>Health Maintenance Organisation</td>
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<tr>
<td>HR</td>
<td>Human Resources</td>
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<tr>
<td>ICT</td>
<td>Information and Communications Technology</td>
</tr>
<tr>
<td>IM&amp;T</td>
<td>Information Management and Technology</td>
</tr>
<tr>
<td>IS</td>
<td>Information Services</td>
</tr>
<tr>
<td>LAN</td>
<td>Local Area Network</td>
</tr>
<tr>
<td>MIS</td>
<td>Management of Information Systems</td>
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<tr>
<td>MS</td>
<td>Microsoft</td>
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<tr>
<td>NHS</td>
<td>National Health Service</td>
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<td>NZ</td>
<td>New Zealand</td>
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<tr>
<td>PCT</td>
<td>Primary Care Trust</td>
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<tr>
<td>PHO</td>
<td>Primary Health Organisation</td>
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<tr>
<td>PMBOK</td>
<td>Project Management Body of Knowledge</td>
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<tr>
<td>PMI</td>
<td>Project Management Institute</td>
</tr>
<tr>
<td>PRINCE</td>
<td>PRojects IN Controlled Environments</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>SHI</td>
<td>Statutory health insurance</td>
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<tr>
<td>SHI</td>
<td>Statutory Health Insurance</td>
</tr>
<tr>
<td>TCO</td>
<td>Total Cost of Ownership</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>USA</td>
<td>United States of America</td>
</tr>
<tr>
<td>WAN</td>
<td>Wide Area Network</td>
</tr>
<tr>
<td>WDHB</td>
<td>Waitemata District Health Board</td>
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Acknowledgements

To my longsuffering family and friends, I say thank you for all the time, patience and understanding you offered me during the course of my study. It has been a solitary journey for me of deep thought that has changed me – I look forward to being with you again in mind, body and spirit.

I thank healthAlliance and the IS personnel who gave me this opportunity to use the change management programme associated with Project Fusion as a platform for my research. Thank you for the many conversations, the opportunities to form communities of practice with you, the overheard discussions, the fun times, the sharing and confiding, the partnerships and friendships that allowed us to reflect on how we change and to bring those reflections into the research. Thank you for the time you gave me to include the research in the project activities and to form alliances of learning as a result of using action research.

Thank you, Tony Norris, my supervisor whose wisdom led me through such a demanding and rewarding experience. Your quiet confidence and your unwavering support are deeply appreciated. Thank you for helping me take advantage of opportunities to publish my research as I progressed and seeking out occasions for sharing my findings at conferences during the course of my studying.

Thank you too, for others who have participated in and supported my research: the community of practice formed by other action researchers, qualitative researchers, and interested and supportive colleagues. Thanks go also to my project management mentor who helped me think through difficult concepts and kept my thinking grounded in real-world project management practice. Thank you also, my committee who supported me in the background of all this activity.
Abstract

Although there is a high risk of failure in the implementation of ICT projects (which appears to extend to health ICT projects), we continue to implement health information systems in order to deliver quality, cost-effective healthcare. The purpose of the research was to participate in and study the change management as a critical success factor in health ICT projects, and to examine people’s responses to change so as to develop understanding and theory that could be used in future change management programmes.

The research was conducted within the context of a large infrastructure project that resulted from the emergence of a shared services organisation (from two participating District Health Boards in Auckland, New Zealand). Action research (AR) formed the basis of the methodology used, and provided the foundation for a change management programme: the AR intervention. Grounded theory (GT) was used for some of the data analysis, the generation of themes by means of constant comparison and the deeper examination of the change process using theoretical sampling. AR and GT together supported the development of theory regarding the change process associated with health ICT projects.

Health ICT projects were revealed in the findings as exhibiting the properties of complex adaptive systems. This complexity highlighted the art of change management as a critical success factor for such projects. The fabric of change emerged as a composite of processes linked to project processes and organisational processes. The turning point in the change process from the before state to the after state is marked by a capability crisis which requires effective patterns of leadership, sensitive targeting of communication, effective learning, and management of increased workload and diminishing resources during the course of health ICT projects. A well managed capability crisis period as a component of change management can substantially contribute to health ICT project success.
Chapter 1  The problem of change linked to health ICT projects
1.1 Introduction

The research reported in this thesis is about change management linked to health ICT projects. The approach in this thesis is that ICT projects tend to fail (Shore, 2005) and that critical success factors are used to predispose these projects for success (Bentley, 1992; Pinto, 2004; Project Management Institute, 2000). Change management is one of these critical success factors. When new technology is introduced in the workplace, processes and relationships between people change (Cleland, 2004). In the healthcare system of any country, the delivery of quality healthcare services is linked to having the right information in the right place at the right time: quality healthcare requires quality electronic health records (EHRs). However, different countries express their EHR in different ways, such as the smart card in Germany (within the context of the compulsory health insurance system) and the continuous EHR of the British National Health Service (NHS). In this thesis the role of change management will be explored in terms of supporting people’s adaptation to the new technology, processes and relationships that come with health ICT projects in attempts to build a distributed EHR in New Zealand.

To do this the researcher and participants used a qualitative form of action research (AR), following a cycle (in its simplest form) of action and reflection (Waterman et al., 2001). This was conducted within the constructivist paradigm in which language and history are used to construct an understanding of the ways in which people adapt to change associated with innovative ICT project implementations within the healthcare context (Appleton & King, 2002; Golinski, 2005).

The traditional positivist form of reporting research is the five chapter thesis, consisting of research question, literature review, methodology, findings and conclusions. Because of the complexity of the research topic of this thesis, the cyclical nature of AR, the emergence of unexpected and additional findings, and the iterative development of themes supported by grounded theory principles, this thesis is not structured in a positivist manner. As pointed out by Fisher & Phelps (2006) it is becoming more common for people to display the nature of action research in their writing up of the
research project in such a way that richer and deeper insights can be explored as the findings are revealed. This may mean that the findings and conclusions become blurred as the conclusions become in turn the focus of reflection and potential basis of new insights and conclusions. In this thesis, three themes were uncovered: the complexity of healthcare systems, the complexity of health IT projects, and the processual nature of change management, which is in itself complex. Each theme will be explored in terms of findings, discussions and conclusions before the next theme is discussed. Each theme therefore constitutes a chapter.

One of the conventions of thesis writing is for the author to become distanced by the third person voice in the passive sense, while AR is usually expressed in the active sense by the first and second person voice of the author (Wilson Scott, McCaslin, & Alexander, 2003). This thesis makes use of both ways of writing, depending on what is being reported in order to most effectively reflect the learning that has been achieved. The structure of the thesis reflects the total journey undertaken, despite the many AR cycles and iterations of learning that occurred.

### 1.2 Structure of the thesis

The thesis is structured in chapters as depicted in Table 1.1, moving from the introduction in Chapter 1, through the literature review and methodology in Chapters 2 and 3. Findings and discussions are presented together in Chapters 4, 5 and 6, and the thesis ends with a final chapter (Chapter 8) which consists of overall conclusions, recommendations and implications for the future.

<table>
<thead>
<tr>
<th>Chapter 1</th>
<th>Introduction</th>
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<tr>
<td></td>
<td>Introduces the research problem and orientates the reader to the thesis.</td>
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</table>

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<tr>
<th>Chapter 2</th>
<th>Literature review</th>
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<tr>
<td></td>
<td>Provides a literature review of the concepts involved in the research. Systems theory is explained so that the review of health systems such as that of the UK, Germany, USA and New Zealand can be understood in that context. Since healthcare is seen as a complex adaptive system, such a system’s properties are outlined. Healthcare organisational theory is</td>
</tr>
</tbody>
</table>
briefly provided for context for the research. The role of shared services organisations is described.

Health information strategy provides context for health ICT projects – summaries are provided for the UK, Germany, USA and New Zealand for contextual purposes.

Since projects are the focus of this research, and change management is a critical success factor for health ICT projects, an overview of projects and change theory is provided from the literature.

**Chapter 3  Methodology**
The research methodology is action research, within the context of constructivism. The data were analysed as part of the AR cycle. The principles of grounded theory were used within the AR context (such as constant comparison, theoretical sampling and analysis of thematic interviews).

**Chapter 4  Findings & discussion I**
The complexity of health ICT projects is explored in the findings and discussed.

**Chapter 5  Findings & discussion II**
The art of change management as a critical success factor in health ICT projects is explored in the findings and discussed.

**Chapter 6  Findings & discussions III**
The fabric of change linked to health ICT projects is explored in the findings and discussed.

**Chapter 7  Conclusions and recommendations**
The research is summarised, the findings drawn together, conclusions and recommendations are presented and the implications of the research are explored.

For the purposes of qualitatively examining how people adapt to change associated with ICT projects in healthcare systems, the research problem is described in terms of the assumptions used and themes we (the researcher and participants) wanted to examine. Following the description of constructivism and critical theory approaches by Orlikowski and Baroudi (2002) this research thesis starts with an outline of the problem in the form of a set of assumptions. These assumptions are part of how people experience, construct and encounter reality in terms of how they articulate it. The assumptions provided in this thesis are not *a priori* assumptions based on traditional positivist hypotheses requiring investigation to support or repudiate them; rather, they are a way of contextualising and defining the problem in a constructivist manner.
1.3 The research problem

Although ICT projects tend to fail we continue to implement more components of EHRs in New Zealand and other countries (Orr, 2004). This thesis takes a look at the role of change management as a critical success factor – the ways in which people adapt to new technology in the workplace such that a project can be considered a success. The research problem is described in terms of assumptions and themes. In this way, the researcher is presenting the research problem in the way in which people articulate it, rather than by identifying it as a theoretical problem.

1.3.1 The assumptions of the research

There are four assumptions that people talk about when discussing this research problem. Change abounds in the complex adaptive system of healthcare and change in healthcare is multi-faceted, health ICT projects tend to fail, and there is possibly a supportive environment for change in the healthcare system.

*Healthcare is complex, and change abounds*

Assuming that healthcare is a complex adaptive system, change occurs all the time (Wilson, Holt, & Greenhalgh, 2001). As healthcare workers we are part of this complex adaptive system. We prefer to work with what is familiar and knowable in an environment of limited complexity, with infrequent forays into complexity as we adopt new ways of working to enhance the care that we deliver (Anderson & McDaniel, 2000; Begun et al., 2003). We appear to follow a process when we adapt to change and this process occurs regardless of the situation, context or whether our experience is an individual or a collective one (Elrod & Tippett, 2002).

The complexity of healthcare is reflected in the information we use as part of our daily clinical and management roles. Quality healthcare decisions require accessible and adequate information - these decisions range from planning and delivering health services from a management perspective right through to individual clinical care (Orr, 2004). Innovative ways of implementing the EHR are expressed in health information strategies such as the Health Information Strategy for New Zealand (Health Information Steering
Committee (NZ), 2005). Project management appears to be the preferred approach to implementing information technology and its associated changes to processes and interpersonal relationships in order to support the development of EHRs (Freed, 2006).

Health ICT projects tend to fail

These projects have been occurring in health services all over the world for over twenty years, but there are few success stories. Between 50% and 80% of ICT projects appear to fail, regardless of the change management programmes that accompany them (Castle & Sir, 2001). It appears that large amounts of money have been spent on health ICT implementations, and yet the return on that investment has been doubtful, if not a waste in many cases (Heeks, Mundy, & Salazar, 1999; Strassman, 1997). Certain critical success factors are required in order to identify success, and sometimes it is the combination of these factors that makes one project more successful than another (Ruuska & Vartiainen, 2003; Wateridge, 1998). It is possible that despite the use of critical success factors, when new solutions, processes, or innovations of any kind are introduced, the users do not necessarily accommodate the new tool in their daily work activities: they simply continue to use the systems they know (Cozijnsen, Vrakking, & van Ijzerloo, 2000).

It appears that the technology itself can be implemented with little difficulty: that ICT infrastructure, software and other aspects of the technological implementation can be completed with expectations of success (Glaser, 2003; Heeks et al., 1999). However, when the human component is added to the situation, the project becomes complex, difficult to implement and full of consequences (Balachandra, 2000) that can make the technology on its own look ridiculously simple and easy to implement and maintain. One such consequence is changed business processes (Teng, Grover, & Fiedler, 1996). There are many examples of failed projects as a result of the inability of people to adapt to the changes brought about by process re-engineering (Cozijnsen et al., 2000). ICT projects bring about multi-faceted change in the healthcare system.
Change in healthcare has multiple facets

The properties of complex adaptive systems influence the complexity of how we change (Dooley, 1997), as discussed above. In addition, there is a low tolerance for failure and error in the healthcare system (Leape & Berwick, 2005), in that these errors and problems with ICT in the healthcare context can result in adverse events for patients, sometimes resulting in death or serious illness that could have been avoided. There is therefore an imperative for health ICT projects to succeed (Orr & Day, 2004). Add to this the need to contain healthcare costs, as expressed in the emergence of shared services organisations (Dibbern et al., 2004) and the development of the EHR to predispose us to delivering quality, informed healthcare services (Health Information Steering Committee (NZ), 2005).

The people involved in healthcare ICT projects span a broad range including innovators, implementers, individuals (such as clinicians, project team members, health service managers, administrative personnel, IS personnel, trainers), and investors (Orr & Day, 2004). The demand for evidence-based care means that the electronic health record and other forms of electronic health information must be available (Wells & Jackson, 2005) - no country can afford to stave off this need any longer. Even developing countries are making the most of the limited resources available to them to create at least the rudimentary electronic health record, as well as making available clinical research electronically, such as the free e-library for clinicians working in African countries (Braa, Monteiro, & Sahay, 2004).

There is a supportive environment for change. Or not?

If this is the case, then how are we helping these people to adapt? Some would argue that there is value in a mixture of managing change and not managing it, especially when we look at the unexpected changes that occur and can be explained by aspects of complexity theory (Smith, 2004). However, there is a common-sense approach that change should be managed (Leeman, 2002), and that leadership and learning are key to changing successfully (Kotnour, 2000; Kotter, 1996). Change management is a critical success factor for ICT projects: the rub lies in how we use it in terms of our understanding of the
change process, how we provide leadership, learning opportunities, communication and support in order to predispose such projects for success. Although we advocate the use of change management it is not clear if this enables the provision of a supportive environment for change.

In short, this research is concerned with the human element of implementing IT in a health context such that the implementation is successful, i.e., the new technology and processes are absorbed, adopted and used to the benefit of health service consumers and providers alike, exhibiting a successful transition to the changes inherent in such a project.

1.3.2 The research themes

The use of research themes, rather than hypotheses and questions, is a characteristic of action research (Waterman et al., 2001), which is the methodology of choice for this thesis. Using themes means that the research can be conducted on a broad level and narrow down to specific areas of concern to participants. In this way, the research is able to solve problems pertinent to the situation at hand, the participants’ concerns and the researcher’s need to develop and apply theory. Assuming that change abounds, healthcare is a complex adaptive system, health ICT projects tend to fail, and there is possibly a supportive environment for change, then the project success or failure are linked to the change process, IS infrastructure plays a role in business process re-engineering, and there is a need to examine the role of change models and theories as expressed in change management programmes for health ICT projects.

The change process and ICT project success or failure

Assuming that there are causes of failure that are common to most projects, general causes, as well as more specific causes, need to be identified and examined. One such cause is ineffective adaptation to the changes that are inherent in such projects. There is a process that people appear to follow as we adapt to change in and out of the workplace (Elrod & Tippett, 2002; Moss Kanter, 1985). Most of the literature has examined the full process, apparently assuming that most people complete the process (Cao, Clarke, & Lehaney, 2003; Stroebe, 2001). However, little has been done to explore instances where
we do not complete the process, or to examine what halts our progress. Schneider & Goldwasser (1998), for example, have identified a transition phase in which we realise the enormity of what we have committed to but they do not explore the concept with any degree of granularity that may be useful for ICT project management. The literature has several examples of how to manage change in complex adaptive systems, such as the use of evolutionary approaches to continuous change (Brown & Eisenhardt, 1997), management of radical change (Amis & Slack, 2004) and the punctuated equilibrium model (Dooley, 1997). However, there is no overt link to the process as described by Elrod & Tippett (2002) in their systematic review of change theories. There is a need to explore our understanding of the change process in the context of ICT projects.

**Using a change model in predisposing IS projects for success**

There are several change management models with common features, such as those that describe a process of adaptation (Elrod & Tippett, 2002) and a complex adaptive systems model of change (Dooley, 1997). Other models indicate that the more collective experience in organisations is multifarious (Moss Kanter, 1985), and models based on leadership (Kotter, 1996). These models raise a number of important questions. How do project managers select the most appropriate model and in what way is that model useful in assisting people to adapt? How does a change model provide insights into how we accommodate change? What are the roles of communication, leadership, learning and support in effective change? There is a period of transition in most models of change process (Elrod & Tippett, 2002) - what is the nature of the apparently low, poor productivity, and hard times during the change journey and what interventions can be applied to assist the transition to change?

**IS infrastructure alignment in establishment of shared services**

Shared services, a form of outsourcing, has been identified as a mechanism for saving health provision costs, making the total cost of ownership transparent and channelling savings back to clinical services. Establishing such an organisation results in radical changes in most instances, as the new emerging business unit adopts its own identity, functions and structure (Forst, 1997). As a consequence of sharing IS services between two DHBs (as in the research for this thesis), there is a need for the alignment of
processes so that previously separate teams can start functioning as one. In healthcare, especially linked to the provision and support of electronic health information, the establishment of a shared service IS division results in complex, radical changes. There is a need to assess the impact of the alignment of technology on multiple health business units.

Process re-engineering and large projects

Introducing new health information technology initiates changes in processes and interpersonal relationships (Hammer & Champy, 2001b), especially when linked to the emergence of a shared services organisation. It appears that the larger a project is, the more likely it is to fail (Shore, 2005). However, when two or more IS divisions are drawn together into a single entity in the establishment of a shared services organisation, business process re-engineering (BPR) is a consequence. Characteristic of BPR, are the rapid and fundamental changes that occur (Hammer & Champy, 2001b), the depth and breadth of which in turn affect how we adapt to these changes. This form of organisational change affects how we decide on the most appropriate change model that will predispose such a project for success.

1.4 Significance of the problem

The significance of the problem under study is that although several researchers have explored and described a change process common to many walks of life, ranging from grieving personal loss to multi-dimensional and complex organisational or national change, this process assumes successful completion of a course of events. It appears that no connection has been made between change as a process and change in a complex adaptive system, such as healthcare. As mentioned above, there are gaps in research regarding the role of change management in terms of our transition from the ‘before’ state to the ‘after’ state in organisational change.

If we are able to predict what causes people to halt in their change progress in the workplace (and more specifically in the health context), and plan an intervention to support continued progress, then we can apply this in future health ICT projects and
reduce the risk of costly failures. Change leadership will be more effective, project management will be more proactive and the move to a more comprehensive use of electronic information in the health setting will be easier, leaving the providers (both clinical and other) more capable of providing quality health services.

1.5 Development of a change model

The continued evolution of the EHR in New Zealand is dependent upon successful ICT projects for the implementation of future innovative and progressive components. The development of a change management model can facilitate our understanding of the change experience linked to these projects and support appropriate change management for successful projects. This research aims to identify what happens when we transition from the previous way of working to a future way of working, as part of the change process we follow within a complex adaptive system. A model will be generated to assist in our understanding of what happens when we are confronted with this transition period and how to facilitate our movement through it to successful change.

1.6 Conclusion

This chapter has provided an outline of the structure of the thesis, and a description of the research problem, its assumptions and the themes for investigation. Change is an important and fundamental aspect of the health workplace. How we use change management as a critical success factor for ICT projects linked to the development and support of the EHR in healthcare is dependent on our understanding of change as a process in complex adaptive systems. The next chapter will provide a literature review of the work that has already been done on this topic.
Chapter 2  Positioning the research in the literature: Health systems, information systems, projects and change management
2.1 Introduction

In this chapter the researcher provides a review of the literature associated with change linked to health ICT projects. For the purpose of this thesis, the term ‘health’ will be used to indicate the general concept of health as a system, encompassing personal and population health, as well as consumption (or use) and delivery of health. The thesis focuses on the delivery of health services, primarily from the perspective of the providers which include clinical, administrative and technical.

This chapter includes a description of health within the context of systems theory – more particularly as a complex adaptive system. The literature review will cover the health delivery system in the context of this theory as it plays an important role in understanding how we adapt to change in our health services. Three health systems are outlined as examples of how different health systems operate: the National Health Service (NHS) of the United Kingdom, the social insurance system of Germany, and the private health insurance model of the United States of America. There is a description of the New Zealand health system, based on the UK’s NHS, because the research was conducted in New Zealand. However, systems theory does not alone account for how organisations develop and behave, especially in changing times. This chapter also covers organisational theories that assist in understanding how we behave in the provider role of health care delivery.

This chapter reviews the emergence of shared services organisations that are a response to rising costs of healthcare. It provides an outline of the establishment, rationale and success or failure of this attempt to direct more funding to clinical care. Business process re-engineering, also discussed in this chapter, is associated with the establishment of new business units, such as shared services organisations. A review of the literature on project management follows. An outline is given of the vagaries of health ICT projects, such as risk of failure, and the need to make the most of critical success factors. This section describes the ways in which health ICT projects affect not only health professionals’ work environment and processes, but also that of the technological support professionals’
environment and processes. Change usually results from ICT projects. Change theory, and the roles of leadership, communication and learning in promoting successful change will be linked.

This literature review leads to a description of the methodology of this thesis in Chapter 3.

2.2 Systems theory as a way of understanding health

Systems theory provides a framework for examining, explaining, understanding and working with situations or aspects of situations in different contexts (Barton, Emery, Flood, Selsky, & Wolstenholme, 2004). This section defines systems theory, outlines its properties and provides the context for further discussion on health systems.

The general systems paradigm states that everything exists within self-regulating systems. According to von Bertalanffy (1972, p. 11),

“A system may be defined as a set of elements standing in interrelation among themselves and with the environment.”

This means that the whole is greater than the sum of the parts – the parts as much as the whole are crucial to the survival of systems, and yet the parts, in conjunction with one another, create something that is more than their sum alone. The whole provides context for the parts (Hanson, 1995). Parts of the system interact interdependently in varying degrees with one another and their environment (Tan et al., 2005). It is these relationships that form the context (the wholeness of a system), define its boundaries, and are the substance of a system (Barton et al., 2004; Hanson, 1995). Systems do not work in a linear, predictive manner: they are complex and unpredictable and the best we can do is try to understand them as they present themselves and respond according to the patterns they exhibit as time passes. Although systems behaviour is non-linear, unpredictable and complex, patterns emerge that we can examine, learn from and modify (Hanson, 1995).

Systems exhibit a number of properties: non-summation of the parts, context, relationships and emergence, lack of causality, equi-finality and multi-finality, growth and change, and feedback (Hanson, 1995; von Bertalanffy, 1976). Early systems theorists
viewed systems in a mechanistic manner, yet they are equally applicable in the ‘soft’ or people approach introduced by Checkland (Barton et al., 2004). Each property is outlined below.

- **Non-summation of the parts.** It is widely accepted that the sum of the parts of a system is greater than the whole (Hanson, 1995). An example of this in health is the combined effectiveness of the multidisciplinary clinical team on a Grand Ward Round. The combined input of the different parts enriches the ward round and allows for completeness of patient care that otherwise may not be there.

- **Context.** By their nature systems have context which is created by wholeness. What occurs within a system does so in the context of its whole system, or self-referential context (Barton et al., 2004). In this way, the Grand Ward Round creates its own context in the health system, and vice versa, but would be considered bulky and inefficient in a fast-moving retail business where multi-team collaboration is more appropriate in team meetings.

- **Relationships and emergence.** The parts of a system are interrelated and it is the relationships between these parts that causes something else to emerge (Barton et al., 2004; Hanson, 1995; von Bertalanffy, 1976). This emergence is a by-product of the non-summativeness that is characteristic of systems, is usually spontaneous and occurs in a non-linear manner. For example, the introduction of the electronic health record (EHR) has introduced new relationships between clinicians and the people who maintain and provide clinical records for the delivery of patient care. The success of the EHR is now breeding issues of its own in terms of clinicians’ expectations of what is possible when working with the electronic version of patient records.

- **Lack of causality.** Since systems operate in a non-linear and unpredictable manner it is not easy, nor is it necessary, to pinpoint causality. It is more sensible to search for patterns that cause unfavourable outcomes (Hanson, 1995). It is not productive to allocate blame – rather it is effective to find patterns and determine the relationships between the parts that resulted in an unfavourable outcome. In this way we are freed from allocated blame and can devote time and energy on finding solutions. For example, it is common to find a ‘blame and shame’ culture in which people point
fingers at others to avoid taking responsibility for medical misadventure (Cosby, 2003). However, when process is examined individuals are no longer blamed and systems are modified in attempts at improving quality of health service delivery.

- **Equi-finality and multi-finality.** In a system one can find a single response to many stimuli (equi-finality) and many responses to a single stimulus (multi-finality) (Hanson, 1995). These types of responses are not necessarily predictable nor easily managed, especially in more complex systems. In health, organisational communication is difficult at best of times, which means that many versions of a single message need to be sent to potential users of new software, for example, so that they are aware of the single message, “accessing clinical documents will change on a certain date”. However, because one cannot predict how people will respond to the message, there may be many who simply don’t switch on their computers that day to avoid having to use the new software and there are those who don’t come to work that day either (multi-finality).

- **Growth and change.** Systems are sensitive to their initial conditions and change over time in response to perturbations within their context (Checkland, 1998; Hanson, 1995; von Bertalanffy, 1976). Change can come from any type or size of stimulus, in usually disproportionate response to a stimulus, usually unpredictably and in a non-linear fashion. In some instances a small input in the system can cause unprecedented change, as in the butterfly effect (Hilborn, 2004). In addition, change often emerges without our awareness of it until we go looking for a solution to a problem or highlight something positive from an experience (Smith, 2004). No response to a stimulus is also considered a response.

- **Feedback.** Feedback is the opportunity to recycle outcomes as input in a system (Hanson, 1995). Systems are based on how things occur, not so much as what occurs – process rather than outcome is the core of a system (Barton et al., 2004). As we do things within a system we learn from our actions and the outcomes of our activities so that we are able to perform better next time (Flood, 1999). For example, in health we have learned from historical pandemics such as bubonic plague, as well as the recent SARS epidemic to plan for dealing with the pandemic threat of bird flu.
This systems paradigm appears to be common sense. However, systems theories are at risk of being used as a facile way of explaining our human predicament without insight, an abdication of the responsibility of science, a frame of reference that allows for the inexplicable but does not apply sufficient rigour for us to research effectively (Skyttner, 1998). Others argue that systems theories are too deterministic, having their basis on structure and function of systems such as Parsons’ theory of communicative action (Barton et al., 2004). There have been attempts at explaining how we adapt to the ebb and flow of systems as they grow, develop and wane such as the theory of punctuated equilibrium (Gersick, 1991). This theory assumes that change occurs in spurts that punctuate periods of inertia. The spurts of change are linked to spontaneous improvised innovation, but cannot be sustained without periods of inertia. This theory does not explain the health system adequately where change is the norm, partly because this system is subjected to multiple, complex and continuous external stimuli (Plesk & Greenhalgh, 2001).

Another criticism of systems theory points to the human need for order, for linear change that is easily assimilated but appears to be just out of our reach in the ‘real world’ in which we live (Skyttner, 1998). In response to this criticism, general systems theory has spawned theories to deal with the paradox of complexity and the human need for order (Flood, 1999). Open systems theory, dialectical systems theory, and complexity theory are some examples of the growth of new theories as we understand systems better. However, there is so much that we do not know about our world, as described by Flood as the unknown and unknowable (1999). There are parts of the systems around us that cannot be known just yet, just like the fourth window pane in Johari’s window (Dick & Dalmau, 2000). There are those who have extended systems theory to open systems theory to accommodate an open unbounded environment and its unpredictable influence upon systems (Barton et al., 2004).

These different versions of systems theory appear to emphasise that our social world is more than an organic creature and therefore cannot be likened to one. Our world is a self adapting living system of systems in which we are constantly receiving feedback about our actions and in which we need to continuously observe, act and adapt (Plesk &
Wilson, 2001). Complexity theory principles appear to resonate with health – the health system consists of multiple levels, of many types of providers and users with differing contributions to and impacts upon the system.

In summary, the discussion above has defined a system as a self referential entity that is made up of parts that sum to more than the whole, where relationships are the foundation of action which emerges as a consequence. The properties of systems have been described in the health context. However, when we talk about health systems, we mean something different from the above-mentioned definition. In everyday language we refer to health systems of different countries or ‘the health system’ as a structure for the delivery of health services. The discussion that follows will outline the delivery mechanisms for health services of the UK, Germany, the USA and New Zealand, in light of systems theory as defined and described above.

2.3 Variations on a theme: international health systems

This variation on the theme of systems theory provides a description of three different health systems as an expression of general systems theory. Each country’s health system will be described in terms of coverage, funding, costs, providers, markets, integration, supply and satisfaction (Brown, 2003). This discussion will be followed by a description of the New Zealand health system in which the research for this thesis is based.

2.3.1 The National Health Service (NHS) of the United Kingdom (UK)

The NHS was established in 1948 to provide comprehensive health services based on need and free at the point of care (Department of Health, 2003; Oliver, 2005). The structure of the NHS has undergone changes in all this time but has remained essentially the same in terms of its goal of providing care to those in need and free at the time of delivery. There have been several reforms, mostly in the interests of cost containment (Brown, 2003; Oliver, 2005). The most recent structure consists of 303 Primary Care Trusts (PCTs) made up of doctors, nurses, midwives and affiliated primary care providers. The PCTs receive capitated funding from the government to provide primary care and to purchase secondary care from the 20 Foundation Trusts which consist of
hospitals and specialised services. The PCTs are accountable to 28 Strategic Health Authorities who monitor services rendered. NICE (the National Institute for Clinical Excellence) was established in the 1990s and, in collaboration with the Healthcare Commission, regulates the performance and quality of services rendered by the NHS and the private sector (Oliver, 2005; Pearson & Rawlins, 2005). This organisation has changed over time and now focuses on medical devices and pharmaceutical quality checking. Other organisations have emerged in response to the need for quality and cost monitoring, such as the Quality and Outcomes Framework and the Commission for Health Improvement (Department of Health, 2006; Oliver, 2005). The private sector mostly provides secondary, optometry and dental services and at times does so in synchrony with the NHS. There is an increasing demand for patients to be able to make choices about which services they may use in and out of the NHS (and without being forced to pay at the point of care). However, co-payments have been introduced as costs rise and the capacity to fund from taxes diminishes (Brown, 2003). Private services are increasingly providing care for people on the NHS waiting list for elective care (Oliver, 2005).

Cost is an unavoidable aspect of any discussion of a health service or system. As healthcare costs have risen, health systems have made attempts at containing and where possible, reducing costs (Brown, 2003). The GDP spent on the NHS has increased annually from 5.6% in 1980 to 7.6% in 2004 and is expected to continue rising and achieve 9.4% in 2008 (Boscheck, 2005; Oliver, 2005). The NHS is funded by general taxes from which capitated budgets have been allocated to various fund holders, such as PCTs (Brown, 2003; Oliver, 2005). Funding has been made available to Foundation Trusts by means of Healthcare Resource Group funding, which is a standardised fee per grouped procedure based on Diagnosis-Related Group funding structure in the US (Brown, 2003; Oliver, 2005).

In the 1990s an attempt was made to use controlled competition between providers to contain costs by means of establishing an internal market (Oliver, 2005). The providers are contract holders and competed for services within the NHS. Although the focus is
now on collaboration between providers the internal market continues to exist in an adapted form as it still contributes to the control of costs. In an attempt at further reducing the cost of health services the NHS embarked on a shared services initiative in 1999 where support services such as finance were grouped for different health services and provided as a central function of the NHS (Treharne & Judkins, 2006).

The NHS, like health systems the world over, suffers from fragmentation and difficulties in continuity of care for patients. Despite the introduction of the patient as focus for health delivery, as evidenced in the policy encapsulated in The Patient’s Charter and Working for Patients in the 1980s, there is still a great deal to be done to achieve integration of care (Oliver, 2005). The NHS aims to unite community, primary and secondary care in order to manage costs and ensure quality and comprehensiveness of services rendered. This will be done by means of extending the role of GPs to include more ambulatory services such as day surgery, and giving more operational control over inpatient services to the Foundation Trusts. In addition, a contract has been awarded for a five year project to further integrate care transparently by means of the implementation of a global booking system (Boscheck, 2005). This is part of the Information for Health strategy for an electronic health record (Department of Health, 2004).

2.3.2 Statutory Health Insurance (SHI) in Germany

Like the NHS, the German health system is based on comprehensive, appropriate care based on need, which is available to all although only 90% of the German population are insured (Worz & Busse, 2005). The difference lies in the way in which the system is funded and the structure and priorities of the German health system, which was founded by Chancellor Otto von Bismark in 1883 (Brown, 2003). As described by Worz & Busse (2005) and Kamke (1998) the principles forming the basis of this healthcare system include:

- Solidarity, where contributions are based on income; access to health is based on need; and contributions are not based on risk adjustment (except for age, sex, disability fund, and sickness allowance);
• Provision of appropriate services for the health of the insured (maintenance, restoration
and promotion);
• Responsibility of the insured for their own health;
• Stability of contribution rates where the provision of services does not result in rising
costs;
• Inpatient and outpatient medical services are provided by federal states (Bundestad)
and Federal Association of Physicians and other physicians respectively.

Unlike in the UK where health funding is by means of general taxes, the German
population enrol in one of many different insurance funds in order to cover the costs of
healthcare (Brown, 2003; Worz & Busse, 2005). Where the UK spend 7.6% of GDP on
health, Germany spends 10.7% (Boscheck, 2005). Some funds are compulsory (such as
for farmers, sailors and miners), while the SHI became voluntary only in 1990s when
competition between different funds was encouraged to contain costs. An increase in
private funds resulted from this move. The internal market of the British NHS is not
possible in Germany’s insurance-based system. However, the competition between
insurers is a form of managed competition in an attempt to contain costs, which is
effective as evidenced in the -0.1% growth in health costs in the late 1990s (Kamke,
1998).

Services are paid for in three ways: fee-for-service, lump sum payments such as DRGs
and capitation budget systems (Kamke, 1998). Other efforts to reduce costs include
patient co-payments and reference price systems for pharmaceuticals. Visits to doctors
remain free at the point of service. Reforms have attempted to introduce managed care
initiatives similar to those in the USA but the legal structure of the German system does
not allow for much leeway (Jost, 1998). German health law determines the principles of
the system and how services should be funded. Services are delivered within the legal
framework but not by the government, as in the NHS of the UK. This means that there is
little scope for introducing the US models of HMOs (as described below) and other
managed care structures in order to contain costs and deliver comprehensive healthcare
(Brown, 2003; Jost, 1998). The insurance model is such that insurers cannot decline
cover for high users like those with chronic conditions. In this case some efforts have been made by insurers, within the legal constraints, to introduce managed care models of certain chronic conditions to contain costs so that insurance premiums are not prohibitive (Worz & Busse, 2005). In addition, insurers are legally prohibited from accessing clinical patient information from providers of care for underwriting purposes, which means that they form preferred provider allegiances with healthcare providers rather than engage in traditional funding contracts between insurer and provider (Kamke, 1998).

2.3.3 Private insurance in the United States of America (USA)

In contrast to the NHS funded by taxes in the UK, and the German SHI service funded by compulsory social insurance contributions, the USA’s health system is based on the principle of universal care but allows for freedom of choice in enrolling in the private health system (Brown, 2003; Oberlander, 2002). Where private insurance holds a small place in the UK and public health dominates, one finds the inverse occurring in the USA – private insurance dominates, pensioners and those with very low income qualify for Medicaid and Medicare and other government-owned insurance schemes (publicly funded insurance) and approximately 15% of the population are not insured at all (Brown, 2003; Oberlander, 2002). Unlike the German SHI, insurers in the USA use risk assessment for their members and the sick and elderly end up paying more than the young and healthy. Although the insurers aim at universal care, there is no government policy to ensure it (Boscheck, 2005; Oberlander, 2002). In addition, the uninsured (who are usually unemployed, or of very low income) access significantly fewer health services than those who are insured, even though they are able to make use of charitable services, Medicare, Medicaid and go to emergency centres. Those who do have access to healthcare have the latest innovations, the best quality of technology and service possible: it could be argued that people in the USA have more health service than they need (Boscheck, 2005; Oberlander, 2002).

Insurance is based on employment and members enrol in Health Maintenance Organisations (HMOs), which offer comprehensive, managed health services. HMOs emerged in the mid-20th century in response to the alarming rise in costs linked to the fee-
for-service insurance model. The insurers, or third party payers, play a role in the management and delivery of care, in conjunction with the associated employer. The HMOs are a form of integrated care where the payer and services are the same: nevertheless, services themselves are fragmented (Boscheck, 2005). An HMO normally provides a range of services for a specific population. If however, people move from one service provider to another, payment is consistent only if the provider is contracted with the patient’s insurer and continuity of care is not necessarily guaranteed. Costs are also an issue, in common with the UK and Germany, but the USA does not seem to have contained GDP spending in the same way that the former countries have done, as is evidenced by the higher GDP spending on health of 14% (Boscheck, 2005; Brown, 2003). Managed care initiatives for curbing costs include disease management, prescription benefit management, co-payments, and the use of various costing systems such as DRGs, per diem costing for procedures, Point of Service Plans, Preferred Provider Organisations and capitation funding structures (Brown, 2003; Oberlander, 2002).

In contrast to the internal market of the UK’s NHS, the USA has an external health market where competition is encouraged (Brown, 2003). Managed competition within the USA health market was one of the measures of containing costs in the 1990s (Oberlander, 2002). However, managed care is in a state of transition as its impact on cost containment is contestable and its lasting contribution to continued cost management is doubtful (Boscheck, 2005). Legislation is being promulgated to improve patient recourse for medical misadventure and negligence, and to allow for a stronger patient role in healthcare, so that patients can sue individuals as well as HMOs. As in the UK several versions of a Patient’s Bill of Rights (depending on which state one is in, and whether patient, provider or insurer has compiled it) have been compiled but the accompanying empowering legislation is yet to be refined to give power to the Bills (Boscheck, 2005). There is however, a rising demand for the role of the consumer in the delivery and funding of healthcare, as evidenced in the growing use of medical savings accounts that are tax free and available for incidental ambulatory healthcare (Scandlen, 2002).
Although patient satisfaction is not optimal, in common with the UK and Germany, it appears that legislative attempts at empowering patients are rendering mixed results. Those who are insured and have access to excellent care are usually wealthy and politically influential while those on the other end of the spectrum are poor and have little political insight or clout to influence health system reform (Brown, 2003; Oberlander, 2002). Service contracting structures are changing to allow for more cost-efficient evidence-based service provision, and the government is allocating more funding for prescriptions for members of Medicare. The Medicare structure has also been changed to allow for more choice on the part of the members, but with mixed results (Oberlander, 2002). The health system in the USA differs significantly from that of New Zealand.

### 2.3.4 The New Zealand health system

The New Zealand (NZ) health system, like that of the UK, is based on the concept of universal coverage and free healthcare at the point of service as expressed in the Social Security Act of 1938 (Ashton, 2005). This free care is extended to primary care in the UK, while in New Zealand a co-payment is required. The 21 New Zealand district health boards (DHBs), established in 2000, are accountable for the delivery of comprehensive health services in collaboration with the newly established Primary Health Organisations or PHOs (Ministry of Health, 2003). The health care delivery focus is on preventive health and funding from general taxes is based on population-based formulae (Ashton, 2005).

Where the DHBs have been traditionally accountable for the equivalent of the German hospital and specialist services, they are now required to collaborate with primary care to provide more integrated care by means of PHOs (Ministry of Health, 2003). These PHOs are similar to the PCTs of the UK health system, in that they comprise primary care doctors, nurses and allied health providers to deliver comprehensive primary care services. The PHOs enter contracts with the DHBs with the purpose of integrating health service delivery, in an effort to reduce fragmentation of services. GPs form the gatekeeper to hospital and specialist care, as in the UK and Germany, but do not purchase services (as in the UK) nor are they accountable for all non-hospital services (as in
Germany). The introduction of PHOs was an attempt at integrating health services with the focus being on preventative health in populations, rather than individual personal care (Ashton, 2005). In addition, an overarching health strategy was developed in 2000 to prioritise health care delivery and integrate services (Ministry of Health, 2000).

Unlike in the UK, the Ministry of Health is responsible for disability for those under the age of 65 and for public health. New Zealand also offers coverage for injury to all citizens and travellers, regardless of blame, by means of the Accident Compensation Insurance Corporation (ACC) Scheme (Ministry of Health, 2005a). For those who prefer to use private services, similar to the situation in the UK, these services are available and usually funded by private insurance. Private health insurance accounts for 14% of health expenditure in New Zealand (Ashton, 2005). Most health care is delivered via publicly funded services.

In terms of cost of health, New Zealand is in a similar situation to that of the three health systems outlined above: costs continue to rise and have been the reason for many reforms in the last few decades. New Zealand spends 8.7% GDP on health, which is comparable to other OECD countries (Ministry of Health, 2003). It compares well with the UK and Germany and comes in well below that of the USA. New Zealand introduced a market system that appears to be similar to the internal market system of the NHS of the UK in that health authorities in the 1990s were encouraged to compete for contracts for services and funding (Ashton, 2005). However, recent reform has emphasised collaboration between and within DHBs to reduce the fragmentation of service delivery and promote primary care and population based funding (Ashton, 2005; Ministry of Health, 2005a).

Satisfaction with the health services in New Zealand is comparable with that found in the UK, Germany and the USA. New Zealand struggles with hospital waiting lists for elective procedures but not to the same extent as in the UK. Private services have been used to alleviate the lists (Ashton, 2005). There is a strong emphasis on participation in health in the Maori Health Strategy, based on the principles of the Treaty of Waitangi (Ministry of Health, 2002). This emphasis is also found in the New Zealand Health
Strategy, in which consumers and communities are actively involved in the planning and delivery of health services (Ministry of Health, 2005b).

In summary, the health systems of four countries have been described above to provide examples of how a common type of system, i.e. a health system, differs according to the environment in which it exists and yet has common elements with other manifestations of the same system type. All the countries aim at universal coverage although the UK, New Zealand and Germany achieve this better than the USA. The USA does not mandate universal coverage in its legislation. Funding in the UK and New Zealand is tax based, while in Germany it takes the form of compulsory social health insurance via employers. In the USA private insurance is the model of healthcare funding, with some government support for select groups (poor, elderly, disabled and some children).

All these countries have issues with cost containment, and reform over the last two decades has been influenced mostly by rising health costs. The UK has an internal market for managing costs while the USA values the use of external market competition. The countries aim at integrated care but the UK is the only one that achieves it. The supply of services in the UK is via a structure of PCTs, Foundations and affiliated providers, while in Germany supply is divided into ambulatory care via SHI physicians and hospital and specialist care. In the USA most health services are rendered via HMOs funded by insurers. In New Zealand health services are supplied via DHBs and PHOs with limited integration of care.

Generally, patients are satisfied with their health services in all the countries but the level of discontent is such that reform attempts to address patient satisfaction. According to Scandlen (2002) approximately half the people in the UK (58%), USA (49%) and in New Zealand (57%) feel that their country’s health system needs fundamental reform. In the UK and New Zealand responsiveness to patient needs is being addressed as a priority in terms of reducing waiting lists, and in the USA patients are being empowered to participate more in their care by means of legislation that gives them recourse to righting medical wrongs.
Any healthcare system is complex, as evidenced by the previous descriptions of the systems for the UK, Germany, the USA and New Zealand. Although each country aims at much the same thing – health for all – they each go about it in different ways. Their context is slightly different, e.g. Germany and the UK are part of the European Union (EU) and their health delivery is influenced by EU policy and new countries entering the EU with differing health issues and contributions to the general health system of the EU (Murrin, 2005). The political approaches are different, e.g. USA consumers prefer the insurance system to the NHS system as they perceive more power to the consumer by means of owning their payment mechanisms (Oberlander, 2002). Health is a complex, unpredictable system that constantly adapts to stimuli as evidenced in the numerous reforms that have characterised the last three decades (Ashton, 2005; Boscheck, 2005). Although different models of delivery prevail in the different countries, there appears to be a move from one form (dominant public or private system) to a combination of private and public system.

2.4 Health systems as ‘systems’

The health systems described above form systems in their own right, as part of the global system of health as well as systems within systems in each country and relating to one another. This and each country’s own health profile and needs and legal obligations for healthcare delivery, forms the context in which each healthcare system exists. Each of the health systems described consist of components that interrelate with one another and the greater system of global health: the whole is greater in global terms than the sum of the parts of each country’s healthcare system. This is especially evident in the public health context. The relationships between the different components within a healthcare system, e.g. PCTs and secondary care services in the UK, DHBs and PHOs in New Zealand, stimulate new forms of healthcare to emerge, such as integrated care. Emergence is readily seen in health systems such as the emergence of a move towards private care in predominantly public services and vice versa. Since healthcare exists in a non-linear and unpredictable environment, and causality of disease is complex, these healthcare systems exist as complex systems.
Equi-finality and multi-finality are common in healthcare, e.g. the use of differential diagnoses to identify what could be a sick person’s problem in order to optimise the effectiveness of selected interventions. In this way many routes may provide one solution to a health problem or one route may provide many solutions. Funding is an example of providing feedback in any country’s health system, regardless of whether an insurance or public funding model is being used. Growth and change are part of the background in healthcare systems – as needs arise and resources become available, for example, services grow to meet needs. Change is a constant companion as evidenced in the apparently unstoppable flow of innovations. Healthcare systems are called such because they are indeed systems: complex adaptive systems.

2.4.1 Health as a complex adaptive system

Health can be viewed as a complex adaptive system (Dooley, 1997), in which many parts of the system interact interdependently in varying and unpredictable degrees with one another and their environment (Plesk & Greenhalgh, 2001; Plesk & Wilson, 2001; Tan et al., 2005). The continuum of complexity ranges from simple and unambiguous with high degrees of perceived certainty, to chaos which extends beyond complexity, uncertainty and ambiguity. Within this context capability is potentially at its best in the zone of complexity (Fraser & Greenhalgh, 2001, p. 800) where change is most stimulating and best received, usually in a non-linear manner as shown in Figure 2.1. We usually function well in the position where most of our world is reasonably certain and predictable, fairly unambiguous, familiar, mostly known and knowable, and where interdependencies and relationships are fairly simple (Plesk & Greenhalgh, 2001).
Once we move out of the apparently less complex environment, we find ourselves in the zone of complexity as described by Langdon (as cited by Plesk & Greenhalgh, 2001) where decisions are no longer simple and we are in a situation that is between simple and chaotic. Our natural tendency is to reduce ambiguity and uncertainty by attempting to create firm plans from which to work, or to strip some of the paradoxes around us by simply ignoring them. Others have found that it may be more productive to work with ambiguity and uncertainty by being reflective, learning from the consequences of our actions as we go, or creating a cycle of plan, act, review and modify as used in action research and in quality improvement practice. We tend to move in and out of the zone of complexity as we work through the day, acting out agreements between ourselves and others, working according to habits and pre-existing accepted patterns of activity, but often in healthcare we spend a high proportion of our time in the zone of complexity. For example, when a doctor calls the IS support service about a problem he is calling from a complex situation in which patient care is demanding his attention, his ICT skills are limited and his capacity to describe his computer problem is not as efficient as his medical skills. Although for the most part the ICT person who takes the call is able to
wade through the ambiguous descriptions given by the doctor, there is still a high degree of complexity where the two worlds of medicine and ICT meet, where jargon and terminology are dissimilar, and the demands of their respective worlds differ greatly.

Complex adaptive systems exhibit certain properties as described by authors in varying disciplines, such as social science, physics and healthcare (Begun et al., 2003; Gleick, 1987; Plesk & Greenhalgh, 2001), much in the same way general systems do. However, these are properties over and above those of general systems. They are outlined below.

- **Emergence.** Even in situations where we feel we are managing the complexity and the change that is occurring, some change emerges regardless of management or leadership (Smith, 2004). This emerging change is usually unpredictable and occurs in the zone of complexity.

- **Fuzzy boundaries.** These unpredictable and apparently uncontrollable systems are, however, bounded by fuzzy boundaries. People have concepts of what their roles are but simultaneously occupy multiple roles in multiple systems that fit together in a larger system (Plesk & Greenhalgh, 2001; Tan et al., 2005). This is particularly evident in health where the boundaries appear clear between management and clinical systems but are indeed fuzzy: where roles overlap and people fit together into teams on the basis of their contributions but also the shifting needs of their patients and the background change that comes with the constant onslaught of new technology, research and skills. In this way the agent, e.g. doctor, and system, e.g. hospital, adapt on the run, as it were.

- **Influence of internal rules.** The actions of those who operate in a complex adaptive system are influenced by internal rules, which most people don’t know or are not aware of (Plesk & Greenhalgh, 2001; Smith, 2004; Tan et al., 2005). An example of an overt rule is that a patient in need, e.g. going into cardiac arrest, overrules whatever a clinician is doing at the time of becoming aware of that need. These internal rules as well as other agreed, simple, shared rules contribute to the evolution of the system. In this way the system does not need well-meaning management in order to develop and
grow into an optimally functioning organisation, for example. Mutation can occur spontaneously in the interests of self-maintenance and stability.

• **Sensitivity to initial conditions.** Complex adaptive systems are responsive to even imperceptible perturbance, what is known as the ‘butterfly effect’ (Hilborn, 2004). A complex system is already turbulent, and any perturbation causes unpredictable, non-linear disruption. In a health system therefore, one should expect to see the unexpected when implementing new information technology. The butterfly effect also implies that small influences can have big consequences. In this way, small opportunities can arise in an IT implementation project and result in major scope creep, resulting in a failed project. Conversely, a large disruption could have minor consequences or something between the two extremes could occur.

• **Tension and paradox are natural.** Although we try to make our world simple and predictable the truth is that many situations naturally exhibit tension and paradox which are mostly constructive when they emerge (Plesk & Greenhalgh, 2001). Relationships are non-linear, entangled, and constantly changing, resulting in a sense of tension, conflict, and difficult situations which are normal in complex systems and not something to be removed or smoothed over (Begun et al., 2003).

• **The system and its agents are adaptive.** As the individuals and other components of systems interact and change, so the whole system changes and adapts to the emerging conditions, depending on the local situation at the time.

• **Patterns are a natural part of complex systems.** Although a system is unpredictable, only partially knowable and mostly ambiguous, patterns emerge that provide new insights for us (Gleick, 1987; Plesk & Greenhalgh, 2001). It is the parts in between the patterns that provide new opportunities for us and give clues about what is happening behind a pattern. Behaviour can be influenced according to how suggested changes are framed, i.e. in terms of an attractor. For example, changes to clinician behaviour can be brought about more effectively when couched in terms of clinician autonomy.

• **Complex systems are resilient.** Systems appear to move towards a state of equilibrium in order to survive but they rather tend to develop patterns that move in and out of a stable state (Gleick, 1987). This periodic stability ensures survival where on the contrary, equilibrium is usually a sign of the imminent demise of a system. It is
this periodic stability that is demonstrated by the regular cycles of policy change in the New Zealand health system (Ashton, 2005).

In summary, health is a complex adaptive system that exhibits properties such as sensitivity to initial conditions, internal rules, turbulence within the system, randomness that demonstrates patterns from which the unexpected and unpredictable emerge. Health organisations can be described by means of different theories, even though complexity theory appears to explain them well.

2.4.2 Healthcare organisational theory

The delivery of healthcare occurs in the context of complex healthcare organisations (Shortell & Kaluzny, 2000; Tan et al., 2005). Healthcare organisations are the primary tool for delivery of healthcare services, such as hospitals, primary health organisations, and district health boards. These organisations are an expression of the health system structure and policies that govern the delivery of healthcare (Ministry of Health, 2000). Information Services (IS) in a health organisation is an enabler of health care delivery, rather than a primary role player (Hammer & Champy, 2001a; Health Information Steering Committee (NZ), 2005). The IS department behaves like any other business unit, while clinical priorities and orientations determine the behaviour of the health-focused services. In a complex system such as health, IS should respond to the nuances of health organisations in such a way that new investments are used wisely, legacy systems are avoided (where an application is implemented and later abandoned due to obsolescence), and IS development reflects the constant need to adapt as things change (Truex, Baskerville, & Klein, 1999).

An organisation does not exist in a vacuum – it is part of a system of co-existence for health care providers (doctors, nurses, allied services), patients or consumers, support services (finance, administration, human resources, information services, supply services), vendors of various services, government, and educational services amongst other things (Shortell & Kaluzny, 2000). In addition, the services themselves are tiered according to intensity, degree and complexity of care: primary, secondary and tertiary
care. These levels are also overlaid by population (or public) health services provided by both national and local health service initiatives, such as the development of PHOs in New Zealand (Ashton, 2005).

In order to make sense out of the health organisation, we apply frameworks of organisational theories (Bolman & Deal, 2003), since organisations appear to adopt a combination of theories in their everyday existence. Several theories play out in health organisations. According to Bolman and Deal (2003) we normally find a combination of theories that fall into structural, symbolic, human resource, and political frames. From a different perspective, Bruscaglioni (as cited by Gregory, 1996) maintains that organisational theory fits into four categories of sociological-structural, socio-analytical, psychosocial and systems-functional. Thus, organisational theories attempt to use different explanations for similar phenomena, or different explanations for different phenomena that could occur simultaneously, in conflict with one other or in convergence with one another. Although Bolman and Deal (1999) appear to agree with this approach in principle they maintain that in order to be effective managers and leaders of organisations we need to use a combination of the four frames they describe. Hence, change leadership should take advantage of aspects of theories in all four of their frames to achieve successful change initiatives.

Organisational theories have ranged from mechanistic, such as the scientific management theory in the early and mid 20th century, to more sophisticated theories, such as total quality management in the latter part of the century. According to McLaughlin and Kaluzny (2000, p. 76) organisations appear to follow a pattern of development through a continuum from a craft focus, to mass production, to process enhancement, followed by mass customisation, and finally to co-configuration by means of networking. However, health organisations do not fall into one step of the continuum at a time – we are more likely to be working simultaneously in more than one part of the continuum. We could be mass customising clinical guidelines while working with one disease, and simultaneously using craft skills to learn new facts about a new condition until we master it. Organisations are increasingly using IT as part of their fundamental functioning which
means that more virtual teams are emerging and the dependence on the networked organisation is growing (Southon, Perkins, & Galler, 2005).

It appears however, that the dominant organisational theories currently in use are complexity theory (as described above), contingency theory, institutional theory, and transactional cost theory (Begun et al., 2003). Contingency theory assumes that an organisation is sensitive to its environment, adapts accordingly or manipulates its environment in order to prosper (Begun et al., 2003; Rowlinson, 2004). Contingency theory gives us the scope we need for developing strategic plans and manipulating our environment and our organisations in order to be more effective, but does not allow for the peculiar nature of unpredictable consequences that cannot be explained, nor merit a response (Rowlinson, 2004). Institutional theory questions the rationality and functionality of organisations and assumes that historical events inform future decisions (Begun et al., 2003; Bolman & Deal, 2003; Rowlinson, 2004). Institutionalism frames organisations in terms of the meaning that is attributed to them, for example, the recent shift of focus on to population health care because of the value of the meaning attached to reducing inequalities in health. Transactional cost theory considers the range of associated costs for health when describing what an organisation is doing, as illustrated in the development of managed care concepts and the surge of shared services organisations in the last ten years (Begun et al., 2003). There are many other organisational theories such as the learning organisation as described by Senge (1999), political theory, and others (Bolman & Deal, 2003) that inform our understanding of how health organisations work. However, complexity theory is most useful for the purpose of this thesis.

As the cost of healthcare rose in the late 20th century, attempts were made to make savings and return funding to the clinical budget wherever possible. New organisations emerged in response to the changing complex organisation with its changing initial conditions (Baskerville, 1999). From a transactional cost perspective and possibly as an emergent response to the interrelationships between and within aspects of the health organisation, shared services organisations were established to achieve this.
2.4.3 Shared services and health organisations

The benefits of Information Management and Technology (IM&T) are facilitated by resource sharing and economies of scale and the concept of shared service organizations is often invoked for financial and information technology operations (Schulman, Harmer, Dunleavy, & Lusk, 1999). A shared services organization is an organizational arrangement whereby a business unit is internally shared between multiple organizations as though outsourced, and is set up separately from these organisations (Dibbern et al., 2004; Kakebadse & Kakebadse, 2000). These not-for-profit organizations reduce the total cost of ownership (TCO) of support services by reducing duplication, leveraging common services, and sharing expertise, knowledge and transactional activities. Resultant savings are returned to the core function of the parent organization, i.e. clinical care in health services. Cost-effectiveness and quality improvement are the main benefits of a shared services organization. The National Shared Services Initiative was established in the UK in 1999 (Treharne & Judkins, 2006) to deliver cost efficiencies for non-clinical services but failed initially to realise its potential. It recently took the form of a self-funding joint venture with Xansa called the National Shared Business Service in an attempt to further develop the shared services potential (Simon, 2003). In other words, although shared services may be sensible in principle, it requires some tweaking to adjust to the organisations it serves and the changing circumstances of the health system.

An internal shared services business unit (or organisation) has specific characteristics (Forst, 1997), including:

- benefits in terms of services of expertise/knowledge and economies of scale;
- leveraging on common services without duplication or wastage;
- common services usually including information services, finance and human resources;
- a customer relationship between the shared services business unit/organisation and the organisation it supports in order to maximise the benefits of sharing services;
- charging customers the full cost of services rendered, making the total cost of ownership transparent, and
- cost efficiencies and quality improvements as the focus of shared services organisations’ main benefits.
The shared services model is not simply another form of organisational centralisation. The benefits of shared services include transparent costing, agile responsiveness to business needs, lean organisation, consistent standards and end to end processes, and the use of best practice principles. Processes are key to the success of shared services organisations. Processes bring the business closer to a client’s experience of high quality (Bowen, 2002; Mergy & Records, 2001). Shared services organisations typically share support services such as finance, IT and human resources (Schulman et al., 1999).

### 2.5 Strategic IS in health

Most countries acknowledge the need for electronic information systems to support, enable and enhance the delivery of healthcare. The IS strategies for Germany, the UK, USA, and New Zealand are outlined below in Table 2.1, comparing the various components of the different strategies. It is clear that even when the health systems of the countries differ they value health information strategies highly and find ways to integrate healthcare technologically by means of strategies and innovation.

As can be seen in Table 2.1, it is clear that a comprehensive strategic approach to a health information system is desired, although it appears to be more difficult to implement in a federal, insurance-based health system, such as Germany and the USA. Different approaches are needed for health information sharing when insurance and added fragmentation caused by federalism, enter the equation. It appears that because of the centralised, national approach to strategic information system development in the UK and New Zealand, these two countries are ahead of the others with their progress toward interoperability supporting the integration of health service delivery. Due to the nature of health services, the demands of implementing health ICT, and the specialised nature of such implementations, projects and programmes of projects have been the chosen way of ensuring that a health information strategy is implemented. The following section introduces projects in the organisational context.
Table 2.1. Comparison of health information strategies for UK, New Zealand, Germany and USA.

<table>
<thead>
<tr>
<th>Properties</th>
<th>UK (Burns, 1998)</th>
<th>NZ (Health Information Steering Committee (NZ), 2005)</th>
<th>Germany (Jahn, Gartig-Daugs, &amp; Nagel, 2005)</th>
<th>USA (Detmer, 2003)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal, documented strategy</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>In planning</td>
</tr>
<tr>
<td>Patient focus</td>
<td>✓ for some application e.g. advice line and clinic booking services</td>
<td>✗ primarily for health professionals to use</td>
<td>✓ by means of the EHR Insurance Card for implementation 2007</td>
<td>✓ with respect to insurance claims</td>
</tr>
<tr>
<td>Provider focus</td>
<td>✓ for most clinical services</td>
<td>✓ more so than for patient access/use</td>
<td>✓ triggered by secure access to patient records, takes into consideration ‘duty to break news gently’ by preventing patient access to clinical data other than test results.</td>
<td>✓ limited to HMOs, secondary care.</td>
</tr>
<tr>
<td>EHR as a process with levels</td>
<td>✓ lists 7 levels</td>
<td>✓ lists 4 levels</td>
<td>✓</td>
<td>✗ refers to UK levels</td>
</tr>
<tr>
<td>Benchmarked achievements to date</td>
<td>✓ keeps the public updated with achievements</td>
<td>✓ to facilitate gap analysis and strategic implementations</td>
<td>✗ not evident</td>
<td>✗ indicates what is needed. Latest health reform activities not final re strategic development</td>
</tr>
<tr>
<td>EHR extended to primary care</td>
<td>✓ by means of PCTs</td>
<td>✓ by means of PHOs. Already &gt;90% GPs using clinical information systems</td>
<td>Not indicated, appears to assume that EHR Insurance Card will create the link, especially for chronic condition management.</td>
<td>✗ most primary care services use information systems but not for clinical records</td>
</tr>
<tr>
<td>Plan to integrate care</td>
<td>✓ already linking primary and secondary care. Aim to provide basis for continuity of care for patient moving through all services</td>
<td>✓ PHO development includes integration starting with chronic condition management</td>
<td>✓ primarily by means of the EHR Insurance Card</td>
<td>✓ within the scope of HMOs. No indication yet how to integrate between disparate services.</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Comprehensive implementation plan/s</td>
<td>✓ full programmes for implementation, fully costed, approach is to implement comprehensive health information system</td>
<td>✓ iterative implementation as funds become available (Orr, 2004), more comprehensive in future.</td>
<td>✗ EHR Insurance Card considered key to implementation, no comprehensive plan reflecting UK approach</td>
<td>✗ comprehensive implementation called for but not yet indicated</td>
</tr>
<tr>
<td>Addresses interoperability issues</td>
<td>✓ as part of comprehensive strategy</td>
<td>✓ as part of integration strategy</td>
<td>✓ by means of EHR Insurance Card</td>
<td>✓ in some situations but not nationally</td>
</tr>
<tr>
<td>Classification systems for reimbursement</td>
<td>✓ using combination of classification systems</td>
<td>✓ using combination of classification systems</td>
<td>✓ using combination of classification systems, stressing DRGs for managed care purposes</td>
<td>✓ using combination of classification systems</td>
</tr>
<tr>
<td>Centralised information infrastructure</td>
<td>✓ as part of NHS</td>
<td>✓ as part of NZ NHS</td>
<td>✗ limited to insurance funds</td>
<td>✗ limited to HMOs and insurance funds</td>
</tr>
<tr>
<td>Unique patient identifier</td>
<td>✓ in implementation process</td>
<td>✓ implemented in 1994, opt out policy where identifier issued unless patient refuses.</td>
<td>✓ will be implemented as part of EHR Insurance Card</td>
<td>✗ limited to HMOs and insurance funds</td>
</tr>
<tr>
<td>Addresses privacy and security issues</td>
<td>✓ by means of privacy legislation. Issues with access to patient information without consent</td>
<td>✓ by means of privacy legislation, minimises issues with access to patient information without consent.</td>
<td>✓ by means of privacy legislation. Patient activates EHR by means of Card, provider has secure access to clinical data.</td>
<td>✓ by means of HIPAA</td>
</tr>
</tbody>
</table>
2.6 Projects

According to the PMBOK guide (Project Management Institute, 2000, p. 18) a project is defined as a “temporary endeavour undertaken to create a unique product or service”. In other words, projects consist of a set of activities that form part of an organisation, have a distinct beginning and ending with the express purpose of implementing products and/or services that are appropriate to that organisation’s strategy (Cleland, 2004; Hallows, 2005; Keeling, 2000). One would expect to find projects in thriving organisations, running alongside operational business activities as a normal part of the organisational structure and activities (Maylor, 2001). Projects appear to follow a process by which the new product or service is delivered, which in turn determines how a project is managed. Several models have been developed to assist project managers in ensuring project success, such as incremental development and Rapid Application Development (Cleland, 2004). The Project Management Institute (PMI) and PRINCE have gone so far as to trademark their processes and models (Project Management Institute, 2000).

Project phases include concept development, feasibility assessment, planning, design, product development or construction, testing, implementation, project termination and handover (Keeling, 2000; Project Management Institute, 2000). The definition and use of the phases depends on which model is being used. The PMI approach uses a set of processes and project management skills linked to the phases, calling them the project management body of knowledge or PMBOK (Project Management Institute, 2000). These processes include initiating, planning, controlling, executing, and closing. Project management skills include communication; assessment; time, cost and scope management; human resources management; leadership; and team development and management (Project Management Institute, 2000; Thamhain, 2004; Turner & Muller, 2005). PRINCE methodology, however, uses a different framework, emphasising deliverables (not processes), allowing for acceptable degrees of deviation from plans (tolerance) and assumes flexibility related to project nature, size and complexity (Bentley, 1992). PRINCE methodology is not based on processes or the concept of bodies of
knowledge as used in the PMBOK methodology. Its key components are organisation, plans, products, activities and controls.

Since projects introduce new products and/or services, they bring about change and require an environment in which learning can occur so that new skills, information and processes can be adopted (Cleland, 2004). The purpose of projects is to implement key strategic goals (Grundy & Brown, 2002). This means that projects consequently introduce innovations and keep an organisation on the cutting edge of competition (Project Management Institute, 2000). However, in public organisations such as health services, the emphasis is not the same on competition as the organisations are not driven by profits (Gulledge & Sommer, 2002). Consequently, the goal of projects in this context is to improve the delivery and quality of healthcare and to continue to nurture and develop health knowledge that forms the basis of clinical care (Gulledge & Sommer, 2002).

Although we put in place measures to promote success for projects (such as strategically aligning projects, focussing them on an innovation, defining timelines, budget and resources), success is elusive. If a project is defined in terms of time, budget and scope, then we would expect successful projects to be delivered on time, within budget and scope – within reason (Briner, Hastings, & Geddes, 1995; Hallows, 2005). However, it appears that when measured for success according to these simple parameters, ICT projects tend to fail (Shore, 2005).

### 2.6.1 ICT projects and failure

ICT projects tend to fail, with some putting the failure rate as high as 80% (Shore, 2005). Failure can be broken down into projects that have been abandoned, those that were partially successful upon completion, and those that were outright failures: the three outcomes contributing to roughly a third of all projects (Keeling, 2000). According to Cozijnsen et al (2000) the breakdown between failure and success is about outright failure (20-30%), no change in the organisation (50%), and success (20-30%). Heeks et al (1999) categorise health IT failure differently and describe it as total, where a project is abandoned; partial, where key goals are not realised or outcomes are undesirable; replication failure, where the success of a pilot project cannot be replicated in the full
implementation; and sustainability failure, where an implementation does not survive on
the long-term. In some instances projects are considered to be a failure by some but not
by others. This is usually due to differing criteria being applied in measuring success
(Wateridge, 1998). The criteria for success are reflected in the list of reasons for failure of
projects.

Failure could be due to the following reasons, but this is not an exhaustive list of what
makes projects fail (Cleland, 2004; Collins & Bicknell, 1998; Hallows, 2005; Keeling,
2000; Project Management Institute, 2000).

- **Scope**
  - The concept forming the basis of the project is not sound. Failure to develop
detailed, clear, specific project specifications;
  - Inadequate planning, resulting in unexpected and/or avoidable outcomes
  including growth of the scope of the project;
  - Compromised quality of project achievements;
  - Unexpected outcomes;
  - Poor feasibility assessment resulting in poorly researched business cases,
inadequate planning and ineffective project management from that point on;
  - Optimism of executives resulting in unrealistic decisions to initiate and
  promote innovations;
  - Mismatch between expectation of what the project will deliver and what it
  actually delivers;
  - Changes to the project’s scope that are inadequately managed.

- **Cost**
  - Costs escalate as the project progresses;
  - Inadequate budget allocation;
  - Poorly managed budget.

- **Time**
  - More time is needed than the project merited during the planning phase.

- **Project management**
  - Failure to identify criteria for success from the outset;
- Inappropriate or inadequate resources, including poor resource selection and team management. Failure to build an effective project team.
- Poor project management, including inadequate issues and risk management;
- Sabotage from those resisting the project, especially from strong leaders in the stakeholder group. Poor relationship management.
- Ineffective change management, resulting in effective resistance to change;
- Lack of clarity around roles and responsibilities of those in and out of the project team who are affected by the project;
- Ineffective use of learning within the project team and for those who need to adapt to long term changes;
- Incomplete termination of the project with inadequate and/or hasty handover;
- Inability to develop strong project team to ensure quality project performance;
- Failure to communicate the project goals across an organisation and to co-ordinate their implementation outside of the project’s management.

In addition, in non-ICT there is the difficulty associated with aligning the ICT function with the organisation (Chan, 2002; Strassman, 1997). It appears that executives do not easily see ICT as a strategic component of their organisation. This means that an organisation’s leaders tend to default to exclude, rather than align, ICT from its strategic and operational activities. ICT projects are usually specialised in context of the rest of an organisation and so there is a heavy reliance on consultants in projects. In addition, the consultants are usually experts who have little sense of alignment with the organisation hosting their project (Collins & Bicknell, 1998). Processes usually change (and often radically) when ICT projects are implemented (Fingar, 2002). Consequently, roles change and companies restructure to accommodate the changes (Bolman & Deal, 1999). Radical change in business process re-engineering as advocated by Hammer and Champy (2001b) frequently contributes to project failure when the long term benefits of re-engineering are not realised (Attaran, 2003). Critical success factors have been identified which should be built into any ICT project at the outset in order to set it up for success.
Critical success factors are those aspects of a project that promote its success within the context of the organisation in which it occurs (Pinto, 2004). Components that should be included in the measurement of success for projects include the following.

- Cost, time and specifications parameters (as suggested above), in addition to
  - customer satisfaction;
  - computer usability;
  - realisation of the benefits of the project;
  - stakeholder satisfaction;
  - meets organisational needs;
  - meets objectives set out in the business plan;
  - achieves its business purpose;
  - fulfils quality requirements;
  - the product or innovation, e.g. software, delivers according to expectations (Shore, 2005; Wateridge, 1998).

The above list is by no means comprehensive. Different criteria apply in different situations, organisations, and projects (Wateridge, 1998). However, there does appear to be some agreement on the main critical success factors that should be put in place at the beginning of a project. These include the following.

- **Alignment with business strategy.** Although it appears that such alignment is elusive in many organisations, this alignment is a critical success factor for ICT projects (Chan, 2002; Strassman, 1997). Projects should be part of the business of an organisation, an expression of the delivery of innovative products related to core business goals (Pinto, 2004). Health ICT projects should be strategically aligned on a national level as well, to ensure that the final outcome of the project supports national health strategy (Orr, 2004). The primary goal of business process re-engineering is to align ICT with business strategy (Champy, 2002).

- **The happy user** (Wateridge, 1998, p. 3), or customer satisfaction. The project should meet user requirements, and in the case of health ICT projects, it should ultimately be patient focussed (Orr & Day, 2004), however difficult this may be in the
complex health environment. Stakeholders, business leaders, patients, and users of the actual product e.g. doctors, are included in the concept of the happy user. If the product that has been implemented meets the customer’s needs the project will be considered a success. Being a happy user does not guarantee that the user takes ownership of the project’s outcome – incentives should be associated with the project so that new users and customers are inclined to use the product and associated processes (Pinto, 2004; Strassman, 1997). It is pointless implementing a ground breaking software application if the customers, e.g. clinicians, do not use it. In many instances it is not the product that defines a project’s failure but the people associated with the product – the users need to be using the technology. An additional aspect for health ICT is that the product and processes should incorporate the need for secure and private management of health-related information (Ramirez & Nazaretian, 2005).

- **Effective project management** (Turner & Muller, 2005). PMBOK and PRINCE methodologies (Bentley, 1992; Project Management Institute, 2000) comprehensively outline a suite of skills, priorities and activities that should be mastered for excellent, effective project management. This includes finding the right project manager, one who exhibits characteristics of a strong management profile with relevant experience in the type of organisation in which the proposed project will be implemented; leadership, communication and change management skills; team building capacity; business acumen; capacity to deal with uncertainty, ambiguity and paradoxes; and someone who is a pace setter and project process controller (Grundy & Brown, 2002; Keeling, 2000).

- **Leadership within the project as well as in the organisation** (Turner & Muller, 2005). Assuming that ICT and associated projects are strategically aligned in an organisation, leadership (including governance) should be aligned as well. It appears that leadership is not a key element of the project manager’s role (Turner & Muller, 2005), but leadership remains critical to the success of a project. When things go wrong, top management should be seen to support the project, to provide leadership and resources to assist in dealing with issues associated with projects (Pinto, 2004).

- **Effective learning is essential for project success** (Pinto, 2004). Projects usually implement something new and innovative, which in turn requires learning. Project
team members need to learn the new product and associated processes and also teach and support customers during the course of the project. Learning for project team members occurs on the two levels outlined by Argyris (1976) – single loop learning occurs where the person learns how to use the new product and processes, while project team members do double loop learning when they reflect on project progress, issues and risks and adjust the project activities accordingly in order to promote success.

Factors that indicate project failure provide clues for evaluating project success. However, if the organisation in which projects are occurring does not ensure the provision of critical success factors before projects start, there is a higher risk of failure. Such success factors encompass, but are not limited to, the traditional project success elements of completion within allocated scope, budget and time. Critical success factors can be grouped in terms of alignment with business strategy, the happy customer, effective project management, leadership in and out of the project, and effective learning.

2.6.3 Health ICT projects

The discussion above has provided an outline of why ICT projects fail in general and what critical success factors could be implemented to predispose a project for successful implementation. It appears that health ICT projects are discussed differently in the literature. The above-mentioned failure rate and reasons for failure appear in the health literature, but some characteristics of healthcare appear to influence success or failure differently. There are four components in the delivery of healthcare – clinical care, administration (which includes management), research and education (Orr & Day, 2004). This means that many ICT projects, even when they are not specifically clinical in nature, seem to overtly require clinical input in order to contribute to the probability of success. Clinicians traditionally left much of the administrative work for other personnel but the advent of real time data entry into electronic information systems has resulted in an increase in the administrative load of clinicians. When we talk about ICT projects in health we normally refer to components of the electronic health record, which is a lifelong, longitudinal record of all health and related data to be captured and stored and reused regardless of episode or care of service boundary (Burns, 1998; Health
Information Steering Committee (NZ), 2005). It is in this context that health ICT projects are implemented, in order to contribute to health knowledge management systems (Orr, 2004).

When health ICT projects fail people’s lives are at risk, e.g. the failed ambulance service project in the UK in the 1990s (Jeffcott & Johnson, 2002). In addition, health ICT project success is linked to the way in which clinicians are enabled to provide care, such as the emphasis placed on good clinical decision support systems (Kawamoto, Houlihan, Balas, & Lobach, 2005). Medical error is a serious issue in healthcare (Leape & Berwick, 2005) and unacceptable levels of error occur during the provision of clinical services. In some instances ICT projects contribute to these errors in their very attempts at resolving them, such as errors introduced during computerised order entry processes (Cosby, 2003).

Many ICT projects are in businesses orientated to commercial profit and return on investment while most health ICT projects in NHS-based health systems such as those of New Zealand and the UK are in the public sector where the focus lies in making the most out of the resources available (Jeffcott & Johnson, 2002). This means that public sector health ICT projects seek to add value in a different way from most ICT projects in business. Even establishing an appropriate strategy has proved to be more difficult than expected as evidenced in the failure in the Wessex Region in the UK in the 1990s (Hackney & McBride, 2002) despite strong alignment to the nation’s health strategy. It appears to be difficult to feed lessons learned from previous projects back into new policies and strategies (Jeffcott & Johnson, 2002). There is a need for risk assessment to incorporate technical, people, clinical and organisational aspects in order to reduce chances of ICT project failure in the health context.

Business process re-engineering is usually implemented in the form of projects and therefore also requires attention to critical success factors (Teng et al., 1996). The next section will outline what business process engineering (BPR) is, the role of processes in organisations, and the link between BPR and change.
2.7 Business process engineering

There are several definitions for BPR because of the many ways in which it unfolds in organisations (Grover & Malhotra, 1997). The definition applicable for this thesis encompasses four components:

- **Significant change.** One traditionally expects to see radical change implemented over a short period of time (Hammer & Champy, 2001a). This change is a response to strategic redesign, whereby an organisation can be redefined in order to survive in a rapidly changing, ambiguous, complex environment. Some organisations plan for radical change but implement it incrementally (Teng et al., 1996): implementing the change incrementally does not invalidate the re-engineering intention.

- **The business process.** This is the primary focus of BPR (Hammer & Champy, 2001a) which transforms us from a functional approach to work working into using cross-sectional processes that traversing functions in an organisation. The process is the unit of analysis for BPR (Grover & Malhotra, 1997). According to Rosemann (2003), a process is “the self-contained, temporal and logical order (parallel and/or serial) of those activities that are executed for the transformation of a business object with the goal of accomplishing a given task.”

- **ICT as an essential change enabler.** Historically BPR has been hampered due to the inability to manage processes electronically because of the scope of processes and their characteristic way of crossing departmental and organisational boundaries (Chambers, Desai, & Turocy, 2003; Grover & Malhotra, 1997). Processes change all the time. Adaptability and flexibility are necessary for processes to remain in line with their organisation’s core business strategy (Smith & Fingar, 2002b).

- **Dramatic improvement in performance and competitiveness.** This is the primary goal of BPR (Hammer & Champy, 2001a). However, the need to re-engineer a company should not be limited to the company’s shareholders, but should aim at improving performance across company boundaries (Champy, 2002). Value is added and customers and other stakeholders benefit from the outcomes (Teng et al., 1996).

Business process management (BPM) is more than BPR. Processes are documented and improved, and re-engineering is done where required to meet business needs (Gulledge &
Sommer, 2002). There is a growing ability to do this using information technology and it is important for organisations to assess their IT capacity and use it accordingly – moving from application-development tools to process development tools (Smith & Fingar, 2003). BPM removes functionalism in the workplace and focuses on processes, orientating the business to the customer (Majchrzak & Qianwei, 1996). The focus on processes and the customer radically changes the way people work (Fingar, 2002; Shin & Jemella, 2002). Not only will processes be re-engineered, but they will also be adaptable and easily added to as the business progresses (Fingar, 2002). BPM involves:

- Modelling processes and documenting them;
- Assigning appropriate process ownership;
- Managing processes for optimum performance;
- Ongoing improvement of processes to improve performance (Fingar, 2002; Gulledge & Sommer, 2002; Smith & Fingar, 2002a).

When shared services organisations are established they need to establish their own strategic direction and goals (Dibbern et al., 2004). It is usually at this point that BPR plays a role, especially where processes cross organisational boundaries and functions, and influences the changes that occur due to the development of new roles and processes for all concerned. A successful BPR project consists of a technical design (ICT and processes) and a social design (processes and people) (Grover & Malhotra, 1997). Failure to attend to the social design ensures failure of the BPR project – it is the people who need to understand the change and adapt to it in order for the new ICT-enabled processes to be effective. A change management programme is as much an enabler of BPR as ICT is (Teng et al., 1996). Not only does an organisation undertaking this type of change move from functional to process orientation, but it also changes its culture, the way people think and work (Champy, 2002; Majchrzak & Qianwei, 1996). The next section describes change theory, and the roles of leadership, communication and learning in change management.
2.8 Change in the workplace

BPR results in changes to culture which involve changing and overlapping previously separate responsibilities, rewarding unit performance rather than individual performance, changing the physical layout of the workspace, redesigning procedures and restructuring the organisation (Teng et al., 1996). This makes for a more collaborative workforce that supports a business process orientation. Working in silos is counter-productive to process-complete organisations and makes it difficult to deliver customer-focused, integrated, informed services (Gulledge & Sommer, 2002). We appear to follow a process when adapting to change, even in a non-linear, complex organisation that, although it is not predictable, our response to change appears to exhibit a pattern consistent with a process.

2.8.1 Change as a process

Elrod & Tippett (2002) have examined change theory that has evolved since World War II, demonstrating that most change theories follow a process as illustrated in Figure 2.2 in which we move from one step to the next in a sequential manner, through what they call the ‘death valley of change’. Most change theory describes our adaptation process as one that broadly follows Lewin’s three steps of unfreeze, move and refreeze (Elrod & Tippett, 2002; Lewin, 1951). The ‘move’ stage describes the transition between one state of being and another. According to Schneider & Goldwasser (1998) this transition marks our realisation of what is happening around us and a conscious response to the need to adapt to our changing world. No other literature appears to describe this transition in quite the same way. Once we have adjusted to the change, we consolidate our new state and refreeze into the new roles, responsibilities, processes and other activities. It appears that this process is applicable to both individuals and groups of people experiencing change. Elrod & Tippett (2002) have identified a pattern in change theories, which support this apparently linear process of change:

- Kubler-Ross’s (1970) five phases of transition associated with death;
- Fink’s (1967) crisis reaction process;
- Parkes’ (1979) seven steps of grieving;
- Menninger’s (1975) change curve;
• Adam’s (1976) self-esteem changes during transitions;
• Perlman and Takacs (1990) theory of ten stages of change;

In contrast, Moss Kanter’s ‘Big Three Model’ of change (Moss Kanter, Stein, & Jick, 1992; Tracey, 1994) describes organisational change as multi-level, non-linear and complex. Change is an organisational dynamic that needs to be considered at all levels of organisational functioning. There are four types of organisational change: process, function (or structure), culture, and power (or politics) (Cao et al., 2003). In addition, the journey to the changed state of an organisation is as important as the destination (Moss Kanter, 2000). On an organisational level, change is manifest in many guises – radical, fast and revolutionary; incremental, slowly and selectively; fundamentally or apparently superficially; or all of the above simultaneously (Amis & Slack, 2004). Orlikowski & Robey (1991) use Giddens’ theory of structuration to explore organisational change brought about by IS implementations. This theory focuses on the social component of organisational change and explains this change in terms of ‘modalities of structuration’ (p. 150), which are described as interpretive schemes, norms and resources. Although this theory accounts for aspects such as the values, power, human relationships and how
people go about doing their work during changing times, it does not explore the transition phase of change and the effect of how people handle this transition regarding their own changing worklife. Change could occur in the form of punctuated equilibrium where a system becomes unstable, changes and settles into a new state of equilibrium (Smith, 2004) but this is not characteristic of complex systems where change is persistent.

Others have examined resistance to change such as Mariotti who explored ways in which people resist change (Elrod & Tippett, 2002), and Mabin et al (2001) who examined the paradox of using resistance to change for facilitating change. Markus (1983) explored the role of resistance to change in IS implementation failure by describing how three theories of change (group dynamics influencing change, factors inherent in the system being implemented, and the interface between the system and the people). There are several tools for assessing resistance to change, such as the force field analysis in which forces working for and against the proposed change are compared and analysed in terms of predicting success (Hersey & Blanchard, 1993). Other ways of assessing resistance to change is by means of the fishbone method and conflict analysis (Teng et al., 1996). Reasons for resisting change include low tolerance for change, lack of readiness for change, perceptions of unacceptable loss, inability to see the usefulness of the change, desire to retain what is perceived to be valuable, and perceived loss of power resulting from role changes and organisational restructure (Kotter, 1996; Lu & Yeh, 1998; Moss Kanter, 1985). Leadership, communication and learning are essential for assisting us in adapting to change (Moss Kanter, 2000; Teng et al., 1996).

### 2.8.2 Change management

Although there are several approaches to change management, there appears to be agreement that change should be managed (Cao et al., 2003; Markus, 1983; Moss Kanter, 2000), even in the context of organisations as complex adaptive systems that are unpredictable and exhibit high levels of ambiguity and uncertainty. This approach is evident in project management methodology and is essential for the success of ICT projects (Bentley, 1992; Castle & Sir, 2001; Project Management Institute, 2000). Since organisational change is multifarious, occurring on multiple levels, to multiple degrees
and in multiple contexts (Moss Kanter, 2000), linear change management efforts are likely to fail (Amis & Slack, 2004; Cao et al., 2003): change management that addresses multiple components of a project on multiple levels is more likely to succeed and at times positive change may even emerge without deliberate management (Smith, 2004). Some argue that deliberate change should be introduced according to organisational impact – small changes may pave the way for bigger changes and simultaneously deal with the inertia that frequently hounds change initiatives causing them to fail (Amis & Slack, 2004). Others argue that a deliberate change management plan with a systemic focus is most effective (Cao et al., 2003), while yet others maintain that since change is continuous, change management can at best attempt to identify opportunities and steer organisations in the right direction as they arise in a complex environment (Dooley, 1997). Herein lies a role for leadership.

2.8.3 Leadership

Leadership is defined as the capacity to influence others to achieve a shared goal (Kouzes & Posner, 1990; Levy, 2004; Turner & Muller, 2005). This definition assumes that leaders have a vision that they communicate to others; that these others are their followers; that the situation in which they are leading is usually complex; and that the leaders have certain attributes, styles, competencies and attitudes that predispose them to be leaders in a situation, rather than followers. The predominant leadership theories of the last century include theories of trait, behaviour, contingency, charisma, emotional intelligence and competence (Turner & Muller, 2005). The competence approach appears to embrace all the other theories, and lays emphasis on the different competences, attributes, attitudes and intellect of leaders. Managerial competence is blended into the leadership profile as part of the leadership competence of that person.

The project manager’s competence is usually the first to be considered in terms of project success (Thamhain, 2004). Most research points to the project manager’s management competencies as a key success factor, rather than their leadership capabilities (Turner & Muller, 2005). Others state that a combination of project management and leadership competencies are key (Ruuska & Vartiainen, 2003; Thamhain, 2004). It is the project
manager’s responsibility to develop the project team’s effectiveness; take the project through its process; tracking and controlling the project. In addition the project manager is responsible for providing an environment in which teams can function well, where disparate groups affected by the project can converge when necessary, and promote commitment and involvement in an ultimately successful outcome (Thamhain, 2004). However, there are others who influence project success and the forms of leadership traditionally include governance by means of steering groups, leadership by sponsorship and the use of champions in the workplace to facilitate project success (Munro, 2004). Other leaders who influence projects are the stakeholders such as managers of the various groups who are affected by the project’s process and outcomes, and their associated leaders, such as a situation where the IT department of a district health board (DHB) implements clinical software into a hospital and the associated managers and leaders play a leadership role in the project process and outcome.

Change management and associated leadership involve assisting people around us in adapting to the changes that we confront as a result of a new ICT project (Caldwell, 2003). According to Kotter (1996) there are eight steps of change leadership:

1. Develop a sense of urgency;
2. Establish a guiding coalition;
3. Develop vision and strategy;
4. Communicate the vision;
5. Empower a broad base of people to take action;
6. Generate short term wins;
7. Consolidate gains and produce more change;
8. Institutionalise new approaches in the culture.

On the other hand, Moss Kanter (1985) argues that leadership in a complex organisation relies on concepts (ability to imagine innovation), professional competence and connections (capacity to collaborate). In this way we are able to provide multi-layered leadership that is appropriate for the complex system in which it is required. Kotter’s eight steps appear linear in approach and do not adequately address the complexity of healthcare systems. It may be too difficult to establish guiding coalitions to address
multifarious change, or to overtly keep up to date with vision and strategy in situations where self-referent groups of workers are emerging in an environment where they are mostly autonomous (a characteristic of healthcare services as complex adaptive systems). Kotter’s eight steps may be more appropriate in situations where Moss Kanter’s multi-level approach lacks in boundaries or capacity to provide direction. Either way, communication plays a role in change management.

2.8.4 Communication

Leadership involves communication in terms of the change vision and engaging people in the change project as well and obtaining ownership for the new way of working in an organisation (Narine & Persaud, 2003). Clarity of vision is essential for successful change, especially in terms of engaging people in the new culture, values and processes (Axley, 2000; Narine & Persaud, 2003). If we are to influence others into changing how they work, we need to make use of a broad range of communication mechanisms involving synchronous and asynchronous communication as well as different media, such as sense-making focus groups, written communication, and one-on-one discussions (Barry & Fulmer, 2004; Narine & Persaud, 2003). Workshops are also useful for change in that they can be used in the early stage of an initiative as well as for communication and sense-making discussion during the project (Greenly & Carnall, 2001). This means that a comprehensive communication plan should be associated with a change project, and that the managers of the personnel affected should own this plan and use it. Communication, however, is also essential for learning, which accompanies projects as a matter of course (Sense & Antoni, 2003).

2.8.5 The role of learning in adapting to change

Learning is what adults deliberately do when they want to change, while children learn as they grow. In organisations learning and change are inextricably linked, occurring at any intersection between the familiar (and apparently simple) and the unfamiliar (and apparently unknown) (Fraser & Greenhalgh, 2001; Sense & Antoni, 2003). In terms of complexity theory, we appear to be stimulated when in the Complexity Zone (as in Figure 2.1) where things are not as comfortable as when we are in a situation of low complexity: it is in this zone that we are at our learning best (Fraser & Greenhalgh, 2001; Tan et al.,
Chaos, on the other hand, does not predispose us to learn which means that there are some parts of our world that are unknowable and hence not available for learning (Flood, 1999). It is the chaos that we need to avoid when implementing organisational change (Leeman, 2002).

Our learning in everyday situations tends to take the form of single-loop learning (Argyris, 1976). Making use of action research methodology in a change project helps us to use double-loop learning as described by Argyris (1976) in which we make opportunities to reflect on our performance and learn from our experiences, such as in post implementation reviews and lessons learned discussions associated with project milestones (Pinto, 2004). Action research provides us with the opportunities to reflect as part of the AR cycle described in Chapter 3, in that we are able to connect theory with practice, i.e. we turn espoused theory (what we say we know about our work) into theory in practice (how we use theory to achieve our work objectives). According to Argyris & Schon (1976) we are not aware of all the theories we use in our everyday activities (theory in use). These theories come to the surface by means of learning and reflection – in this way we are able to tap into them and convert them into espoused theory. Action research methodology is a useful way of achieving this and is discussed in more detail in the methodology chapter, which follows.

2.9 Conclusion

In conclusion, healthcare is a complex system that consists of multiple and varied components that are interrelated and interact with one another in unpredictable and non-linear ways. Even thought healthcare systems play out in different ways, such as the publicly funded systems of the UK and New Zealand, and conversely the private insurance models of Germany and the USA, they are nonetheless systems. They exist within the context of their host country and global health considerations within fuzzy boundaries, and their whole is greater than the sum of their parts. As better forms of health provision emerge, the system changes, but without clear indications of what causes the need for these reforms. These systems continue to grow as new breakthroughs in
healthcare emerge continuously and as feedback loops through the system. In this type of system, change is a given.

BPR brings about alignment between and organisation’s strategy and ICT, which in turn brings about change. However, ICT projects tend to fail. There are many reasons for this failure, and we apply critical success factors in our efforts to achieve success. Our experience with ICT projects in healthcare is similar to that of other ICT projects but the clinical component of healthcare brings a different focus to ICT project failure and success, the strongest aspect being that people’s lives are at risk if a project fails.

Change management is an important factor for success. Several theories prevail and leaders use them according to the situation, their style and the nature of the organisation in which the change is occurring. Most change theories assume that we adapt to change according to a predictable process, described as a death valley by Elrod & Tippett (2002). However, it could be argued that we do not necessarily follow a linear process when adapting to change (Moss Kanter, 1985). How we experience the transition identified by Schneider & Goldwasser (1998) could give us important clues about how to manage the way people adapt to change in a complex system like that of healthcare. How we manage change linked to health ICT projects could make all the difference in predisposing the other critical success factors to working well in a complex adaptive system such as health.
3.1 Introduction

This chapter contains an explanation and description of the methodology adopted for this research and why the approach is appropriate for the research problem described in Chapter 1. The research problem will be reiterated in summary to provide a backdrop for the decision to use action research to explore change linked to health ICT projects. In order to link this research and its methodology decisions to previous IS qualitative research, an outline will be provided to show how others have explored this theme and to contextualise research methodology choices in IS research. Action research and its strengths and weaknesses will be described in detail to establish an understanding of rigour. Then the data analysis approach and method will be described, including any precautions that were taken to ensure robust data gathering/generation and analysis. This chapter finishes with an outline of what we did in order to conduct the research, covering the ICT project that formed the basis of this research, as well as the full research design for data generation/gathering and analysis. In this chapter the reader is prepared for the chapters that follow, which describe the findings and conclusions.

3.2 The problem: adapting to change linked to health ICT projects

As described in Chapter 1, the research problem, in summary, is about how people adapt to change arising from ICT projects in the health context. When people talk about health IT projects, they talk in terms of the following assumptions:

- Healthcare is a complex adaptive system and change abounds;
- Health ICT projects bring about change but the projects are usually depicted as failures;
- Although we go through an apparently linear process in our adaptation to change, we are more likely to adapt in a non-linear and complex manner;
- It is not clear if the environment in which we experience change supports our efforts to adapt to change brought about by health ICT projects.
In response to this talk, the research examined a set of themes as follows, in an attempt at understanding people’s capacity to change and deal with the transition period in the change process as outlined in the literature in Chapter 2.

- What is the link between the change process (as described in personal and organisational change theory) and health ICT projects?
- How can existing change models be used and/or adapted to promote success in health ICT projects?
- What is the role of IS infrastructure alignment in the establishment of a shared services organisation and how does this type of IS project influence collective and individual adaptation to change?
- What is the link between large ICT projects, process changes and healthcare and how do they impact on people’s ability to adapt to the consequent changes?

This research aims to provide an understanding of how people adapt to change in complex healthcare organisations in order to improve the success rate of health ICT projects of which there is no end in sight. Now that the research problem has been described, the next sections explore the research design and philosophy. What follows is an outline of prevailing research approaches and methods in IS to provide context for the decision to use action research for the problem described above.

### 3.3 Prevailing research approaches and methods in IS

Palvia and colleagues (2003) maintain that management of information systems (MIS) is a relatively new discipline, having emerged in the last 40 years, and as such there is no particular research discipline that can be said to represent it. This is different from the stamp of the longstanding history of positivism in medical research (Malterud, 2001). There does appear to be certain patterns in how MIS research is conducted and the common themes under examination as discovered in systematic literature reviews of this kind of research (Palvia et al., 2003). According to Culnan’s categorisation of MIS research topics (as outlined by Orlikowski & Baroudi, 1991), the types of MIS research include
- Individual, management and organisational approaches to IS,
- Research foundations, and
- IS curriculum.

Roughly 30 topics fit these categories, such as MIS theory, artificial intelligence and global information technology as the top three topics, with BPR and organisational impact of MIS, innovation, IS planning, implementation and usage somewhere in the middle of the list described by Palvia et al (2003). Surveys, conceptual frameworks and case studies are the most popular study design with literature analysis, mathematical modelling and interviews in the middle of the list (Orlikowski & Baroudi, 1991; Palvia et al., 2003) and action research as a form of qualitative\(^1\) research at the end of the list of choices for research design. Action research features in 0.6 - 0.8% of MIS research and does not appear (in the literature) to be growing in popularity in terms of IS research (Alavi & Carlson, 1992; Orlikowski & Baroudi, 1991; Palvia et al., 2003). According to Myers & Avison (2002) there is indeed a growing trend and this trend shows more people using action research, grounded theory and other qualitative methods in more recent times.

To help understand the choices made in MIS research, research is broken down into empirical or positivist, and non-empirical or interpretive and critical research (Alavi & Carlson, 1992; Orlikowski & Baroudi, 1991; Palvia et al., 2003). Positivism is an objective form of research in which the researcher remains distanced from phenomena under examination (Denzin & Lincoln, 2000). Interpretivism and critical research are seen as being subjective, where the researcher’s participation in the research is acknowledged, and their experience is part and parcel of understanding the phenomenon being examined. It appears that non-empirical research is favoured when researching management and organisational topics while empirical research methods are preferred in the more technical topics (Alavi & Carlson, 1992). The salient difference between the two non-empirical forms of research is the outcome – for critical research it is social

\(^1\) Although the literature outlining MIS research categories and themes classes action research as a form of qualitative research, recent practice patterns present action research as a framework that enables both qualitative and quantitative forms of research (Brydon-Miller et al., 2003; Klein & Myers, 1999).
change while interpretive research aims at understanding the meaning people attach to social action.

### 3.4 Prevailing research approaches and methods in health

When MIS and healthcare intersect there is no way of predicting which approach will be used. Clinical medical research defaults to positivism in the form of randomised clinical trials because the circumstances of searching for evidence to support clinical decisions require rapid evidence retrieval for the purpose of appropriate clinical care (Hamilton, 2005). The hierarchy of evidence as depicted in Table 3.1 is used in most clinical research, where one can see that positivism in the form of randomised clinical trials is considered the most valid and reliable form of clinical research, the ‘gold standard’ of medical research.

<table>
<thead>
<tr>
<th>Increasing degree of validity and reliability</th>
<th>Systematic review and meta-analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomised control trial</td>
<td></td>
</tr>
<tr>
<td>Cohort study</td>
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<tr>
<td>Case control study</td>
<td></td>
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<tr>
<td>Cross-sectional survey</td>
<td></td>
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<tr>
<td>Case report</td>
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</table>

However, Hamilton (2005) exhorts researchers to match the research design to the question to be answered, rather than default to a signature or traditional research approach. Malterud (2001) supports this approach, pointing out that not all questions can be answered appropriately by means of a randomised control trial. Because of this, health research no longer adheres strictly to the traditional hierarchy of evidence: it is more appropriate to use qualitative research methods for asking questions about how and why (Petticrew & Roberts, 2003), such as questions in this thesis about organisational change linked to health ICT projects. Petticrew et al (2003) take this instruction a step further by
indicating that researchers should use a topology of methods to guide our decisions regarding research design. Add to this the natural affinity some researchers have to certain methods such as action research’s prevalence in healthcare research conducted by nurses - it appears to resonate well with the way in which they normally work (Waterman et al., 2001). Action research is becoming more widely used in healthcare because of the growing variety of opportunities to use it, especially with more patient empowerment and consumer participation in the delivery of healthcare. This use of action research can be extended to organisational change research for similar reasons – the research itself can be used to bring about change and the healthcare personnel are empowered to make the most of that change.

3.5 Research design for change management in health ICT projects

The research design (what we, the researcher and participants did) and rationale (why we, the researcher and participants did it) for the thesis are presented below. The research conducted in this project was framed by constructivism, using the critical research approach. Action research methodology was used to generate and gather data and was influenced by grounded theory, especially in the data analysis.

3.5.1 Research philosophy

The role of the researcher is important in terms of decisions that are made and how the researcher experiences the project and analyses the data. According to Caelli et al (2003, p. 9), theoretical positioning in qualitative research

“refers to the researcher’s motives, presuppositions and personal history that leads him or her toward, and subsequently shapes, a particular inquiry.”

This means that the researcher acknowledges the subjective nature of the study, taking into account values, norms, beliefs, and motives in an attempt to remain as true as possible to the situation being researched. This positioning may include a preference for a specific theory and methodology that provide the framework for a research project. On the other hand, shortfalls in the project can be dealt with by factoring in these preferences, values, beliefs and motives. Quantitative researchers operate from a professed neutral standpoint, in which they are considered experts and own knowledge
not possessed by their subjects (Denzin & Lincoln, 2000; Parker, 2004). Alternatively, qualitative researchers operate from a subjective, participant standpoint from which their research is completed in collaboration with their subjects, bearing in mind the impact of their own beliefs, values, motivations, history as well as those of their subjects (or more appropriately named, partners in research) (Caelli et al., 2003; Denzin & Lincoln, 2000; Heron & Reason, 1997; Parker, 2004; Willig, 2001).

I decided to use qualitative research because I believe that I am unable to essentially be separate from the research, and that my beliefs, values and prior knowledge influence the research to be conducted. The talk used by people around me to describe their experiences of ICT projects was also my talk. The complexity of the situation struck me such that I felt I was not in a position to separate myself from the research project and effectively study the phenomenon of change brought about by health ICT projects. Rather, I felt that by being part of the research I was in a better position to tap into contextualised, rich data that was real from several perspectives simultaneously. In this way I felt I was more able to fully appreciate the context, language and history of the experience of the project at hand.

There are different ways of knowing, such as realism and constructivism (Golinski, 2005). Much of the literature refers to constructionism, which is different from constructivism in that it focuses on social structure and meaning, rather than how people use language to articulate their experiences in historic and contextualised terms. For the purpose of this research thesis constructivism is the preferred philosophical approach.

Realism assumes that the world exists independently of those who observe it and positivist research is most appropriate for tapping into knowledge. Piaget, possibly the father of constructivism (as indicated by Hooker (1994) in a discussion about the concepts of constructivism as described by Piaget), wrote about the self-regulatory and adaptive nature of the world and how we construct our understanding of it. Piaget also provides overtones to our understanding of complexity by means of self-regulatory, adaptive, organic social systems. Colliver (2002) describes constructivism as a way of knowing in terms of how we articulate our knowledge and contextualise it in terms of
past, present and anticipated experiences and that history influences the ways in which we obtain and understand knowledge. Berger and Luckman (1966) maintain that knowledge is a social construct, created from our mutual interaction with one another, and adapted as we develop a collective history. Our knowledge is therefore socially constructed and can change according to how we deal with contradictions, controversies and conflicts. Kuhn (1996) states that scientific paradigms are used as exemplars for problem resolution, but when controversies arise over their efficacy and new solutions are found such that they exclude use of the previously accepted paradigm, a scientific revolution is said to have occurred and new knowledge has been discovered. This could be construed as a constructivist approach in that contradictions and controversies are expressed in social and historical terms and that new knowledge is exposed within a context (Golinski, 2005; Kordes, 2005).

Constructivism views language as being the essential tool for uncovering knowledge as it is language that we use to frame our constructs of reality (Golinski, 2005). In this way we construct our experiences differently from one another, allowing the influence of history and our language to help us understand our lives, such as our adaptation to change (Appleton & King, 2002). Puzzles, contradictions and controversies are common, therefore, to the critical research approach selected for the research question and also to constructivism. The researcher participates in research and is part and parcel of any outcomes (Kordes, 2005).

The reasons for choosing constructivism for this thesis include the following:

- If positivism in healthcare is expressed in the form of randomised controlled trials, one would expect to be able to predict why health ICT projects fail, set up two projects (an experimental one complete with critical success factors and a control project) and compare the outcomes. One would be able to identify unequivocally that the experimental project succeeded for specific reasons linked to interventions such as certain critical success factors. The literature reveals that critical success factors alone cannot account for success or failure and indeed that success and failure are not well defined as evidenced by the raft of available theories and explanations. For these
reasons the positivist approach was considered inadequate for the purpose of
discovering a change management theory in support of successful ICT project
implementations.

- When people experience change we talk about it. Appleton et al (2002), in their
  adaptation of constructivism to the healthcare context, indicate that how we articulate
  our experiences and the influence of history on those experiences is central to
developing theory and knowledge. Constructivism was chosen for this thesis because
of the opportunity to tap into the social construction of reality as described by Berger
and Luckman (1966) in order to discover what we don’t yet know.

- People in healthcare respond to current situations within the context of their history,
  and explain their responses to experiences as part of the continuum of history. For
  example, because previous projects have been difficult there is the expectation that
  the next one will also be difficult. Since social history, as described by Appleton et al
  (2002), is one of the key properties of constructivism, and history plays a role in how
  people adapt to change then constructivism appears to be a useful approach to use in
  this thesis.

The critical research approach, within the scope of constructivism, was used for this
thesis regarding change linked to health ICT projects and the rationale for this choice is
provided in Table 3.2 below on the basis of the literature review in Chapter 2. As can be
seen in Table 3.2, critical research and ICT projects share synergies and objectives as
summarised below.

- In both instances a problem is identified and addressed, resulting in change in
  processes, relationships and technology (specifically in ICT projects)
- People are essential for successful critical research and for ICT project
  implementations. An ICT project is successful if the changes in processes and
  relationships are successful.
- People articulate their experiences and contextualise them on the basis of previous
  experiences, which is important for change management (in terms of
  communication), and critical research in terms of how they critique their experiences.
The processual nature of critical research, change management and project management provides opportunities for examining synergies and contradictions which are important for triangulation in research. Since health ICT projects are complex and their context is a complex adaptive system, critical research can take advantage of this complexity and support the generation and gathering of rich data and rigorous theory development.

**Table 3.2 Rationale for selection of critical approach**

<table>
<thead>
<tr>
<th>Critical approach</th>
<th>Application to health ICT research projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Critical evaluation and transformation of social action is the focus of research.</td>
<td>• Business transformation is the focus of health IS projects and BPR</td>
</tr>
<tr>
<td>• People can bring about change to achieve their potential but they are normally constrained.</td>
<td>• The ‘happy user’ is an important critical success factor in IS project management</td>
</tr>
<tr>
<td>• Aim = to reveal and use contradictions and conflicts in social action.</td>
<td>• Contradictions between the status quo and future state are evident in health IS projects and can be used to mobilise change</td>
</tr>
</tbody>
</table>

**Assumptions**

- Basis of the research activities is critical analysis and action that brings about change
- Social reality is historically constituted. History counts.
- Systems approach – social reality is contextual and the whole is greater than the sum of the parts
- Phenomena develop processually
- Social change is a constant
- The language used by the participants plays an important role
- Change is the result of the implementation of IS projects – that is the purpose of such a project.
- Health IS projects have a history of failure, which influences future project decision making in terms of identifying critical success factors and project management emphasis. Complex adaptive systems are sensitive to initial conditions – history counts.
- Health is a complex adaptive system which means that change is contextual and emergence is expected
- We change according to a process. And projects follow a process for IS implementation.
- Complex adaptive systems are resilient because of their constantly adaptive state.
- Effective communication plays an important role in IS projects. IS personnel and health personnel
• Research must be reflexive, transformative and influence participant and researcher.

• The researcher raises awareness of what could be and mobilises social actors to change the status quo.

• Good for exposing inequalities and bringing about empowerment of social actors.

use different languages (technical and medical) which appears to play an important role in such projects.

• The purpose of BPR is to transform, and the usual consequence of IS projects is to transform, therefore influencing all who are associated with an IS health project

• IS project change managers and other leaders involved in a health IS project raise awareness of projected change and mobilise social actors to change the status quo.

• The people who will be using the new IS capability should be empowered to do so – the change imperative for these projects mostly impacts on the user.

• An indirect consequence of health IS projects is the exposure of health inequalities to clinicians and the demonstrated need for improved management of health knowledge.

Therefore the reasons for selecting the critical approach to this thesis are as follows:

• With constructivism as the epistemology for this thesis, critical research makes sense in terms of how people articulate the experience of change, contextualise it historically (to change from the way we were to the way we want to be), challenge the status quo (to make the way we want to be better than the way we were), and to empower participants in the ICT project to improve their situation as a result of the project.

• The goal of critical research is to identify what does not work well and improve on it. The goal of ICT projects is better quality and cost-benefit in healthcare. Therefore critical research aims, just like ICT projects aim, at improving healthcare and so the research for this thesis was used to concurrently explore new knowledge as well as intervene in change management.

• Problems can be solved by means of critical research. The problem of ICT project failure can be explored and possibly solved by means of this kind of research.
• Change usually accompanies ICT projects but people often falter, as described by Elrod and Tippet (2002) in their ‘death valley of change’. Critical research aims to emancipate people from historical ways of changing and support attempts at empowering them for successful change. This thesis was used as part of the change management programme for Project Fusion to help people change.

3.5.2 Action research as a methodology and as a way of life

In this section action research is defined and described and my reasons for choosing to use it are outlined.

Action research (AR) has waxed and waned in popularity over the last century, depending on what researchers wanted from it, and the situation in which it was used. The concept ‘action-research’ was first used by Lewin who combined research, practice and change, when he referred to change resulting from research based on social action (Waterman et al., 2001). In this way AR emerged as a tool for social change: research and practice are conducted simultaneously and the research subject is a participant in the research and in the application of new knowledge (Brydon-Miller et al., 2003). There is usually an emphasis on the development of knowledge in the practical situation where a researcher and the researched (both acting as participants, partners and collaborators of change, research and new practice) participate holistically in the achievement of shared goals (Waterman et al., 2001) as can be seen in Figure 3.1.

AR as a research methodology, has two key elements: a cyclic process, and partnership with the research subjects, respondents or participants (Waterman et al., 2001). With such a strong people focus, the most appropriate definition of action research has been presented by Rapoport (1970, p. 499), as aiming to

“...contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework”.

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This definition presents the idea that action research is not only a methodology, or simply a research process – it is a way of life, of working, that plays out in a mutually desired manner for all participants (researcher and researched) in a social research project.

Figure 3.1 The relationships of people, goals and AR cycle in action research

People choose to use AR for many reasons (Brydon-Miller et al., 2003; Kock, McQueen, & Scott, 1999). Reason and his associates have identified a number of core quality dimensions of action research (McArdle & Reason, 2006; Reason, 2006; Reason & Bradbury, 2001). These dimensions are summarised and extended on in the mnemonic DEVELOP described below, a mnemonic developed by Orr (Day et al., 2006). These core dimensions may well also encapsulate the main reasons that attract individuals and communities to action research. Using Orr’s mnemonic, my reasons for selecting AR for this research and for the change management approach in Project Fusion are outlined in Table 3.3. For academic purposes I, the researcher, attached an additional layer of cycles to inform the academic research part of the project following the Suzman model as described by Baskerville and Wood-Harper (2002). In this way I conducted the practical action research in order to inform practice within the host organisation and was given a further opportunity to use action research principles for academic purposes.
### Table 3.3 Rationale for selecting AR

<table>
<thead>
<tr>
<th>Reasons for choosing AR for social research</th>
<th>Reasons for using AR for change management in Project Fusion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Democratic form of research (everyone is involved and has a say)</strong></td>
<td>Everyone in the IS department was going to experience change: participative involvement was considered essential for project success.</td>
</tr>
<tr>
<td><strong>Extended epistemology</strong></td>
<td>Since so many people were involved in the project and the research, a single epistemology was not considered appropriate.</td>
</tr>
<tr>
<td><strong>Value orientation (the values of the participants are evident in the lived research)</strong></td>
<td>The organisation claimed to be value orientated: the participants’ values were considered part of the research.</td>
</tr>
<tr>
<td><strong>Action researchers take advantage of the Emergent nature of our complex research environment</strong></td>
<td>Health is a complex adaptive system and emergence is frequent, informing research.</td>
</tr>
<tr>
<td><strong>AR is Lumpist (rather than splittist) in nature aiming at holistic research where links, connections and patterns are sought</strong></td>
<td>Health is a complex adaptive system and patterns, connections and links play an important role in project success.</td>
</tr>
<tr>
<td><strong>Organic nature of complex social research</strong></td>
<td>The organic nature of health systems lends itself for holistic, organic research.</td>
</tr>
<tr>
<td><strong>AR is Pragmatic</strong></td>
<td>The pragmatism of AR lends itself to learning as we go, research that informs future practice and concurrent application of new concepts, ideas, and improved practice.</td>
</tr>
</tbody>
</table>

Having made the decision to use action research (the practical loop as well as the academic loop as described above), I also used the model described above to contextualise the research by means of the “client-system infrastructure” (Baskerville & Wood-Harper, 2002, p. 133), which is a mutual agreement between the researcher and the host organisation regarding the scope for the research and its dissemination, roles of the organisation, participants and researcher, and the use of the resulting outcomes. Within this framework I negotiated with the Information Services Manager, and the Chief Operating Officer of healthAlliance to use Project Fusion as the primary source of my research, recruiting participants from the project team as well as the greater Information Services department, and that the research component of the project would not interfere
with the planned outcomes of Project Fusion. In addition, as change manager, I was encouraged to use action research principles to support the change management aspect of the project. (Details regarding ethics and ethics approval are outlined below in section 3.7 on page 76.)

The AR cycle usually includes four steps: (1) problem identification, or ‘diagnosis’, (2) planning, or action planning, (3) action, also known as action taking or implementation, and (4) evaluation, also known as reporting, assessment, and specifying learning (Brydon-Miller et al., 2003; Waterman et al., 2001). The egalitarian approach of AR requires participants to be actively involved in the research project so that learning and action are democratised, where research becomes inclusive and non-political. As a project moves through the AR cycle, things change due to complexity, ambiguity and uncertainty, and the people involved should be flexible and responsive to changes brought about by the research and the associated actions (Kock, 2003; Orr & Sankaran, 2005, July, 2005; Waterman et al., 2001). It is the participants together with the researcher who assess, plan, act, reflect, evaluate, and then write reports. In this way the employee is inducted into the practice of action research as a way of working.

The key to AR is the practice of reflection. As stated by Dick (2001), the two components of action research are action and critical reflection or deliberation. This reflection is deliberate and continuous in order for action research to be of any value. The insights gained from this kind of reflection contribute to the richness of the research, providing a broad, multi-dimensional perspective. Throughout the AR process, deliberate reflection is a companion to the research and informs practice (Bell, 1998; Waterman et al., 2001). Reflection manifests itself in many ways which range from group discussions to interpersonal one-on-one discussions to personal introspection.

In this way the AR cycle does not only loop around one project: it is a set of cycles that loops around the project and every component of the project, and is manifest in every episode of reflection throughout the course of a project. This approach is reminiscent of Checkland’s soft systems methodology, which advocates a practice cycle and a research
cycle that can be arbitrarily allocated according to the boundaries defined by the participants (Checkland, 1998, 2000; Flood, 2000). Reflections generate data for concurrent and later analysis to inform practice and also to contribute to theory generation.

### 3.6 The research project

The research project that formed the basis for the research will be described in this section, with a description of how the action research described above was used.

In 2001 two District Health Boards (DHBs) in Auckland agreed that their support services should be shared to render these transactional activities more cost effective and to channel the money saved back to the clinical bedside (healthAlliance, 2001). Although DHB shared services organisations are not a national initiative as in the UK, several DHBs have entered such agreements with one another since 2001. A description of the shared services initiative (below) provides context for the research that was conducted. The reason for this context is that, in a constructivist perspective, people’s experiences are usually contextualised.

#### 3.6.1 The healthAlliance shared services IM&T infrastructure project

The healthAlliance Shared Services (HASS) initiative covers several key activities including supply chain management, finance, human resources and information services (healthAlliance, 2001). The focus of this research, the IT infrastructure project (Project Fusion), was added in 2002 encompassing technical support, help desk, networking, hardware and software as well as project management, training and web development. The two DHBs involved in HASS had different IT infrastructures with their own issues, strengths and futures. A business case was therefore proposed to reduce the total cost of ownership by developing a single, upgraded IT infrastructure with standardised applications and operational procedures. The infrastructure initiative, which was designated Project Fusion, identified twenty-seven discrete projects of which seven were prioritised as summarised in Figure 3.2.
Separate business cases were compiled for each project and were presented as a collective business case to senior management at both DHBs. The proposal was initially declined as the potential benefits were not evident to the customer (the DHB management teams). The proposal was revised to reflect the DHBs’ needs as customers and presented again to the same senior management groups. This time it was accepted and plans commenced for implementing a single upgraded network.
### People
- 85 IS staff
- 25 project team
- One person rebuilt all the computers
- 11 people on Helpdesk handled user support

### Timeline
- 15 months from business case approval to final project handover
- 6 weeks per DHB for desktop deployment

### Email exchange involved
- one of largest in New Zealand
- 3 DHBs
- > 7 million emails migrated to new exchange
- > 14,000 entries in global address book.

### Desktop deployment involved
- 2 DHBs: 4 hospitals, 53 remote sites (urban and rural)
- > 7,250 users migrated to new, single domain
- > 4,300 computers rebuilt and standardised

### Servers
- consolidated 25 Domain Controllers to 11
- Installed and/or upgraded 27 servers

The scope of Project Fusion was large and complex. It affected every user, clinical and administrative, working in both DHBs and the shared services organisation, as can be seen in Figure 3.3 below. Each of the seven projects of Project Fusion was treated as an AR cycle, thereby repeating the cycle formally with the onset of each new set of activities and contributing to research rigor (Kock et al., 1999)
3.6.2 Research purpose and scope

The purpose of the research was to:

- participate in and study the change management processes involved in Project Fusion by means of action research, and
- examine people’s responses to change so as to develop understanding and theory that could be used in future change management.

The scope of the research concentrated on the change experience of the IS staff. They were expected to bear the major change impact of the project. The DHB clinical and administrative staff would be affected only when their desktops changed to Windows XP and MS Office 2003 was used for the first time.

The researcher/change manager drew up a change management plan, which was approved by the IS management team and the project manager. Key elements of the plan included communication, understanding of change regarding roles and responsibilities, leadership and management, training and learning, support (management, leadership and technical). Details of the research actions are provided in section 3.8 in which the data generation and analyses are described.

3.7 Ethical considerations

Ethical research requires permission from the host organisation and individual participants and subjects. I treated all data with integrity, protecting contributions of the participants and/or subjects by means of anonymity and confidentiality. Data were eliminated from the research at participants’ request.

Permission from host organisation

I was approached by the organisation as part of my job description to implement a change management plan for Project Fusion and accepted the offer. I applied for and was granted ethics approval from the Auckland Human Subjects Ethics Committee. Permission (from the host organisation) for the research was granted formally in a letter from the IS Manager, with verbal endorsement from the COO (Chief Operating Officer) of
Confidentiality was covered in three ways. In addition to the confidentiality requirement associated with the ethics application, I had signed a standard confidentiality agreement at the time of taking up employment with the host organisation some years before the research began. In addition, as a healthcare professional (nurse) my work and research are bounded within the legal confidentiality framework of the health sector.

**Anonymity of individual contributors**

Anonymity was maintained on an individual level and no individuals were made identifiable in reports, publications or this thesis. Some reflections were conducted in confidence and the researcher honoured all requests to maintain confidentiality.

**Participant withdrawal from the research**

It was made clear in the Participant Information Sheet that participants would be able to withdraw from the research component of the project if they so chose, but that not all traces of their participation would be able to be removed if what they wanted withdrawn could not specifically be allocated to their contribution. In other words, a group discussion such as a ‘lessons learned session’ at the achievement of a project milestone would be treated as a whole and parts thereof would not be discrete enough to remove without influencing the whole. However, if people applied conditions to their conversations with me, e.g. “You can include this in your research but don’t tell my boss about this discussion”, I honoured their request. One participant of the convergent interviews withdrew consent to use the specific interview. This was done on the basis of what they learnt from reading the interview transcript. Despite the offer from the participant to repeat the interview, the researcher and interviewee together decided that further conversations (with consent) regarding the consequences of the interview would be more informative for the study. The convergent interview was therefore discarded from the research, even though it informed the participant in a useful way and influenced that person’s future behaviour and thinking. There were no other formal requests for withdrawal from the study. However, there were occasions when participants inferred that some conversations were for research purposes and should be otherwise treated in confidence. These confidences were honoured.
Ethics approval

Ethics approval was gained from the Auckland Human Subject Ethics Committee in August 2003 for the research. Permission from the host organisation was gained on two levels:

- General permission from healthAlliance to conduct the research using action research. This involved general consent from the IS personnel unless otherwise specified. A letter from the IS department manager confirmed this consent.
- Individual consent was gained from those who participated in the convergent interviews. Interviewees signed consent at the time of the interviews.

The ethical issue of using action research methodology to effect change

Since AR is a form of critical research and change management aims at assisting people to adapt to new ways of working, Project Fusion appeared to offer the opportunity for emancipation and empowerment. People working in the IS department of the new shared services organisation were encouraged to make the most of the new situation and opportunities that may arise. However, change management by means of AR practices could cause conflict where people were empowered but the environment did not support their take on empowerment (Reason, 2006). In addition, the researcher was constantly aware of the risk of self exposure when participants reflected deeply, thus becoming vulnerable (Bell, 1998; Pillow, 2003). The researcher, at all times, made attempts to ensure that participants remained as safe as possible while practicing AR principles as part of their daily work.
3.8 Generating and gathering the data

Data were generated, gathered and analysed using a suite of tools and analysis methods. The use of AR resulted in a cyclic process of plan, act, review (including reflection, data analysis and literature review) and modify the plan of what has not been enacted yet, act, and repeat the cycle. The AR cycles were made up of the whole of Project Fusion (as an encompassing and contextual cycle), each of the seven infrastructure projects of Project Fusion, each of the 27 change workshops that were held near the beginning of Project Fusion. The communications plan was treated as an AR cycle. I used personal reflections and observations associated with various activities such as project and subproject milestones, and weekly meetings with the project manager as mini-AR cycles to inform next steps in the change management and communications management activities. There were too many cycles to depict in Figure 3.4 and so they are not drawn as part of the figure – rather, they form its background.

![Figure 3.4 The data sources in relation to the project milestones](image-url)
The principles of grounded theory were applied throughout the process, especially when the reflection resulting from the AR cycle tossed up new insights worthy of further exploration. The data generation was done in four ways as depicted in Figure 3.4.

1. **Change workshops.** A series of change workshops was conducted with all the IS staff. Workshops in this instance worked well as a form of communication, a method for influencing change and a tool for generating and gathering data (Greenly & Carnall, 2001). After each workshop I made notes of the discussions, outcomes and questions. I also kept an action research diary (Holly, 2000; Williams, 2002) and recorded observations, thoughts, plans, evaluations of workshops and meetings, and journal diary notes. There were 27 workshops in total, and each workshop was treated as an AR cycle in which lessons learned from the preceding workshop were noted and informed the next one, to incorporate improvements. Outcomes from the workshops were applied in other AR cycles such as the communication plan, especially where problems were detected in the workshops that could hold up the dissemination of information to the project team.

2. **Observations and reflections** on all aspects of the project that were pertinent to the research and to change management were recorded. This included emails to self (Sankaran, 2006) and to others as well as entries in my AR diary. Participant observation was the form of choice because the role of the researcher in the project as participant in a situation in which research is conducted, and power is shared (Angrisino & de Perez, 2000; Kidd & Kral, 2005). In this situation the researcher was also employed as change manager in Project Fusion and another parallel clinical information systems project.

In addition to being exposed to a more comprehensive situation for observation, the researcher (as participant observer) was already part of the social environment of the research project (as an employee), had already developed relationships with the people, and was then able to establish a mutual participant observer relationship with those around her (Angrisino & de Perez, 2000; Kemp, 2001; Trauth, 2001). A two-
way flow of ideas, observations and commentary developed between the participants and researcher, which enriched the content of the research. During the project the researcher was aware of her personal influence on the research and the impact of her ability to develop the best mutually contributory relationships with the subjects (Kemp, 2001; Trauth, 2001). Reflection is key to action research (Waterman et al., 2001) and was used as described above in the discussion on the components of AR.

I kept my AR diary by means of emails to myself and others. Most times I wrote down what I had observed and experienced but at times I used the diary to summarise what I had written. Other times I used the diary to try to understand what I had observed and experienced. This attempt at working out the meaning of my observations and experiences became a form of comparative analysis, as used in grounded theory. Towards the end of Project Fusion I printed all my notes, emails to and from myself and others, and other notes I had compiled. I bound the diary in its hard copy format and then reviewed the content for another layer of insight into what the data were telling me. I wrote more. In writing, I found that I was discovering new layers of data, knowledge and insights, new questions and avenues of exploration.

Each opportunity to write was considered a ‘method of inquiry’, a method of discovery, with the researcher as the primary research instrument (Janesick, 1999; Richardson, 2003). Not only is writing a way of recording observations, transcribing interviews and communicating with others, it is a way of knowing, of exploring data, of discovering new knowledge. The writer records observations, thoughts, lived experiences, in preparation for reflection and analysis over time, and then, based on further reflection, writes again (Fontana & Frey, 2000; Miles & Huberman, 1994; Richardson, 2003).

Writing became not only a form of recording data, but also a form of discovery as described by (Richardson, 2003). Writing stimulated meditative thinking and an initial analysis of the data being generated, which in turn resulted in a search of the literature for more evidence of other research on the topics raised. This is consistent
with the grounded theory practice of comparative analysis (Charmaz, 2006).

I also used the hard copy compiled AR diary to review themes that had arisen from conversations, observations, emails to and from me, and my notes to inform the interviews that were conducted at the end of Project Fusion as described below.

3. All **communications materials** linked to Project Fusion (e.g. newsletters, minutes of meetings, memos, emails to staff) were treated as potential data for the research project as they reflected the needs of staff and answered questions, dealing with concerns as and when they arose. As part of my role as change manager I was required to write all the communications related to Project Fusion. I made notes on the implementation of the communications plan and compared the data I collected (notes, emails to self, emails to and from me, conversations, lessons learned notes, and other memos about the implementation of the communication plan) against the plan at the end of the project. The findings and conclusions regarding this and the change plan are described and discussed in Chapter 4, Findings and conclusions I: The complexity of ICT projects.

4. **Convergent interviews.** A review of the data was done a year after the project began and themes were identified for further investigation. Semi-structured convergent interviews were conducted with project team members and managers of the information services department. Convergent interviews are primarily used in qualitative research in the triangulation process for establishing rigor (Rao & Perry, 2003). These are follow-up interviews with research participants to further explore themes that emerge as a result of a battery of methods for data acquisition, such as observations, reflections, focus groups, discussions and other forms of interviews. Following a structured process whereby the researcher gradually focuses on specifics, the interviews start out unstructured or unframed (Day et al., 2006) and become more structured as the research becomes more focused. Usually a series of interviews is conducted with the same people until the focused data are comprehensively described. In some cases this type of interview is used to further explore themes and
concepts that emerge from other data acquisition methods or are part of a series of interviews (Dick, 1998; Rao & Perry, 2003).

During the course of Project Fusion conversations and interviews occurred spontaneously as we progressed through the project’s planned activities. As new insights into change management emerged I discussed them with some project team members, the project manager and the Clinical Director of Information Services so that I, and we, could better understand what we were observing and experiencing. By the end of the project, and as a result of the focusing effect of the comparative analysis I was doing, I was able to identify a set of recurring themes, ideas and concepts that I wanted to explore in more depth. Thus, the initial unformed convergent interview described in the above-mentioned literature, had been conducted informally at opportune moments during the project. At the end of the project I conducted 12 interviews with project team members and managers of the newly formed, single, IS department in order to converge understanding of the emerging focus on what was later described as the capability crisis.

The summarized list of themes was presented to each interviewee with a request to talk freely about them. Each interview lasted between 30 and 90 minutes. I transcribed them and asked the interviewees to check and revise, which they did, providing very few, small changes to the transcript. It was at this point that one of the interviewees withdrew their interview from the research (as described on page 76). I also made notes on each interview, as part of my own reflection on the content and process and these notes were included in the data analysis. Each interview was treated as an AR cycle in which I planned the interview, acted on it with the interviewee, reflected on it afterwards, making notes, in order to improve the next one. As a result of using this AR cycle of act and reflect I changed from taking notes of the interview content during the interview to an audio recording of each interview so that I could gain eye contact and richer data without having to multi-task (write and ask questions).
The themes that were identified for these interviews became the basis for theoretical sampling, which is characteristic of grounded theory. In this way I was able to identify a focus for my research, using the comparative analysis that accompanied the bigger AR cycles of the subprojects of Project Fusion, the accompanying ongoing literature searches and reviews, and the convergent interviews. Once the interviews were completed I started the final data analysis exercise.

### 3.9 Analysing the data

Data analysis occurred on multiple levels throughout the course of Project Fusion and afterwards.

- During the course of the project I reviewed emerging data as part of the AR cycle, with a view to returning learning to the people involved in the project (McArdle & Reason, 2006). These reviews were done by me alone in some instances and with other individuals and groups as the situation required, such as ‘lessons learned’ discussion after completion of one of the projects, e.g. implementation of the email exchange alignment and upgrade. The reviews were returned to my research database in the form of new data which in turn were analysed as was considered appropriate (Kock et al., 1999). In this way multiple AR cycles emerged within the major AR cycle which encompassed the whole of Project Fusion and the smaller AR cycles represented by the subprojects of Project Fusion.

- I met weekly with Project Fusion’s project manager to discuss the change management component of my role and for weekly updates on the project’s progress. These meetings were also used as opportunities for analysis and learning from the previous week’s activities – they formed an AR cycle within the major AR cycle of Project Fusion. These discussions were documented and further analysed according to grounded theory principles as described above on page 80.

- I took advantage of any opportunity to write as form of discovery (as described on page 80 – 81). Emails to self (Sankaran, 2006) became a form of gathering data in which the researcher concurrently analysed and discovered new data. Some emails to self were exercises in analysis while others simply recorded events and thoughts. In this way the researcher as an individual was locked into AR cycles within AR cycles
within the major cycle of Project Fusion. These emails were finally analysed according to grounded theory principles as described below.

- Towards the end of Project Fusion I reviewed the data already collected and identified recurring topics (Miles & Huberman, 1994; Thomas, 2006). These formed the basis of convergent interviews in order to explore these concepts in more depth.

- After the end of Project Fusion I reviewed the interviews and the balance of the data and identified general themes according to a general inductive approach (Thomas, 2006), as described on pages 81 - 83. Each document was read and reread, loosely coded in a spreadsheet and categorised into themes (Miles & Huberman, 1994). The purpose of this form of analysis was to establish themes for further analysis.

- At the beginning of the project I negotiated a project management mentor relationship with a highly regarded project manager with a reputation in health ICT project success. Regular meetings during and after the project consisted of concurrent and later post-project analysis – contributing to the AR cycle of reflection and action and also to the preliminary and final analysis. This mentor added value by keeping the analysis grounded in the ‘real world’.

- Further data analysis used the principles of grounded theory to allow for in-depth analysis and generation of theory (Charmaz, 2000). This is outlined below.

### 3.9.1 Grounded theory principles for data analysis

The practice of grounded theory principles merged well with the AR cycle: as data emerged during the AR cycle we were able to review and reflect upon them, perform preliminary analysis (often just looking for themes or recurring concepts) to inform the next phase of the project, which was the comparative analysis aspect of the research. This was useful in informing further literature reviews to enhance the effects of the next AR cycle that corresponded with the project (Kock, 2003). The iterative approach of AR provided multiple opportunities for constant comparisons and occasions for reviewing the literature anew because of new insights gleaned from reflection on data as they emerged during the course of the project. Grounded theory was also selected because of its capacity to keep the data generation and analysis true to the research at hand by not allowing contingency (shifting the focus of the research unnecessarily), uncontrollability
(the emergence of consequences that cannot be controlled in a complex adaptive system) and subjectivity of the researcher (Kock, 2003) to interfere with the research.

Since there are two versions of grounded theory (Melia, 1996; Strauss & Corbin, 1998), both versions will be briefly outlined. Grounded theory analysis involves coding, constant comparison, theoretical sensitivity and emergence of theory (Charmaz, 2006). There are different ways of achieving this, depending on whose grounded theory approach is being used (Urquhart, 2001; Charmaz, 2000). The assumption is that grounded theory uses data analysis strategies rather than data collection methods (Charmaz, 2000). In this way data are collected until theory emerges, rather than collecting data until there is enough to analyse or data saturation is achieved. Data analysis should be transparent – theory is grounded in the data and the path it took to emerge should be evident in the analysis process used. The principles as depicted in Figure 3.5 will be outlined below.

![Figure 3.5 The principles of grounded theory](image)

Grounded theory coding starts as soon as the first data are collected and continues until theory emerges and is clearly understood and this fits well with the AR cycle. Coding is central to theory development (Goede & De Villiers, 2003). In the grounded theory context, “coding is the analytic process through which data are fractured, conceptualised,
and integrated to form theory” (Strauss & Corbin, 1998, p.3). Open coding, axial and selective coding follow a hierarchy of pattern development, sophistication and abstraction in the analysis process. For the purpose of this research Strauss and Corbin’s (1998) approach was used where assumptions and themes were explored within the context of Project Fusion. The data were analysed using open, axial and theoretical coding (Charmaz, 2006), after which theory emerged.

Choosing the most appropriate tool for data analysis

A number of tools exist for analysing grounded theory data, including NVivo and MS Excel. I started the analysis of the interviews in MS Word by using the MS Word facility for summarising in an executive summary and highlighting repeat phrases. Once I had glanced through the highlights and reviewed the automated summaries I was able to see what I wanted to start working with.

After making sure that all the data was accurately recorded in MS Word, I decided to use MS Excel to organise it in terms of open, axial and selective coding to identify themes. I chose to not use NVivo for the following reasons as outlined by (Auld, Boushey, Cluskey, Mishner, & Wang, 2007).

- Only one person was involved in the coding and so the need for NVivo and intercoder reliability was limited;
- Fewer than 20 interview transcripts required systematic coding. Also, there were 6 business case documents and a variety of documents in the AR diary that meant that a systematic coding system such as NVivo was surplus to requirements for several small data sets that needed analysis.
- The convergent interviews were partially structured and rendered a variety of results and the small number of interviews meant that NVivo was surplus to requirements.
- This was a relatively small research project and the opportunity for future research with this group of people was not available after completion of Project Fusion. There was no need to retain the database for ongoing future research.
On the other hand, MS Excel fitted the data analysis need well. Spreadsheets were created using the convergent interviews as a starting point because of their similarity in themes. As can be seen in Figure 3.6 below, the horizontal lines in the spreadsheet sufficed for open coding, the columns for axial coding where lines were grouped according to similarities. Selective coding was available by means of identifying patterns was easier to do as I shifted the common and similar lines closer to one another.

As new themes emerged during the open, axial and selective coding, I opened new spreadsheets until there were eight themes. I reduced the themes to six as I refined the axial and selective coding content within the sheets.

![Figure 3.6 Example of grounded theory coding in MS Excel](image-url)
Open coding

Open (or line-by-line) coding is used in the first step of data analysis (Charmaz, 2000). Open coding, the first step in coding, involves identifying characteristics, dimensions and properties of concepts by going through the text line by line and allocating names to them (Charmaz, 2006; Goede & de Villiers, 2003; Urquhart, 2001). This form of coding keeps the analyst on the micro-data level to prevent the effect of assumptions, preconceptions, frameworks, and halo effect of any recent experience, reading or thinking, from affecting the meaning of the data as they present themselves. These codes generate comparison.

Axial and selective coding

Strauss & Corbin (1998) differentiate between open, axial and selective coding. Glaser focuses on line-by-line coding without differentiating between the different levels of developing abstraction. Coding becomes more abstract as the analyst progresses through from open to selective coding. The dimensions and categories of these codes are linked by means of axial coding. This involves reassembling the coded data, and refining the coding that has already occurred. Patterns are discovered, in which the data are linked by their similarities and differences. Relationships between categories are identified and the open coded data are now grouped (Charmaz, 2006; Goede & de Villiers, 2003; Urquhart, 2001). One should expect to be left with a few core categories with which to work in selective coding.

For the purpose of the research at hand, this coding was conducted after the completion of Project Fusion, using Excel spreadsheets and was limited to the analysis of the business cases, workshops and convergent interviews.

Identification of themes

Themes are identified, from which one or more main themes finally emerge. The intersection of these themes forms the basis of the emerging theory. Selective coding identifies the core category, which is central, appears frequently in the data, is consistent and is a powerful means of explaining the phenomenon being researched (Charmaz, 2000; Strauss & Corbin, 1998; Urquhart, 2001). For the research at hand, themes were
identified using general inductive theory as described by Thomas (2006) for initial analysis, followed by core theme identification by means of grounded theory process of coding in the interests of more rigorous analysis and to confirm these themes.

*Constant comparison*

Constant comparison occurs parallel to the analysis process and is an integral part of it. Grounded theory comparison involves comparing people with people, people with their own data, data with categories, categories with categories, incidents with themselves and other incidents (Charmaz, 2000; Urquhart, 2001). This comparison takes the analyst back and forth, recoding and recategorising as the need arises and as the data fall into place in the emerging theory (Baskerville & Pries-Heje, 1999). This comparison was part and parcel of the AR cycles in the research conducted on Project Fusion.

*Memos*

The researcher writes memos throughout the research process. This is done for two reasons. Writing as a form of discovery (Richardson, 2003) assists the researcher in thinking through new thoughts about the data, identifying and working through puzzles and insights in support of the analysis process. In grounded theory in particular, memos are an audit trail through the analysis process, showing the path taken during the emergence of theory, indicating the way in which theory is grounded in the data (Charmaz, 2006; Urquhart, 2001). The memos link the analysis to the empirical reality. The writing is crucial to the development of theory. Visual representation of the thinking that occurs during this period is a part of the memo writing – diagrams assist in clarifying thinking and explaining concepts to others (Miles & Huberman, 1994; Strauss & Corbin, 1998; Urquhart, 2001). Emails to self (Sankaran, 2006) are another form of these memos and were used extensively by the researcher throughout the research project.

*Theoretical sampling*

Theoretical sampling involves identifying gaps in the data, codes and categories and how they could influence the emerging theory (Charmaz, 2006; Goede & de Villiers, 2003). It is at this point that the researcher is able to focus the data gathering on one or more themes on the basis of previous analysis (Glaser, 1992). The researcher also looks for
contradictions, paradoxes, and puzzles, in order to further explore theoretical doubt. Data are collected to fill gaps and explore the doubts thus refining analytical thinking and identify conceptual boundaries. Learning, as part of the AR cycle, predisposed the researcher to conduct theoretical sampling in order to enrich the next cycle.

By means of coding, constant comparison, memo writing, and theoretical sampling, the grounded theory researcher is able to allow theory to emerge from the data. Grounded theory analysis is an integral part of the whole research process. Strauss & Corbin (1998) make use of frameworks and hypotheses early in the research process, which Glaser criticises as forcing the data (Melia, 1996). The core of grounded theory is the theory that emerges from the data. Strauss & Corbin (1998) make grounded theory accessible to those who are not in a position to be mentored in their first use of the methods. Their guidelines are useful prompts for applying the data analysis method where Glaser’s 1967 book is at times difficult to follow on an applied and detailed level (Charmaz, 2000; Melia, 1996; Urquhart, 2001).

Data analysis regarding change management linked to Project Fusion

These principles were useful for making sense of the data concurrently and after the generating and gathering of data is over. Data were generated and analysed throughout the project, as depicted in Figure 3.7. The first analysis was conducted in order to produce the change management plan. The use of action research principles resulted in multiple cycles of data generation, analysis and layers of reflection and meta-reflection which in turn generated more data for analysis (the cyclic nature as depicted by the circles of arrows in Figure 3.7). Constant comparison and reflective AR formed a pattern of cycles of data generation and analysis. Once the convergent interviews were analysed in Excel using the grounded theory coding process, further data were generated in the resulting reflection, publications, conference presentations, and thesis writing using writing as a form of discovery (Richardson, 2003). The combination of AR and grounded theory simultaneously generated new data, while analysis revealed new insights (Baskerville & Pries-Heje, 1999).
3.10 Limitations of the research methodology

According to Kock (2003) there are three threats to action research: uncontrollability, contingency and subjectivity. Because health is a complex adaptive system, unexpected events emerge as part of the system itself and when action research intervenes. Since it is potentially counterproductive to try to control for these, the researcher was aware of the risk of a ‘butterfly effect’ (Gleick, 1987) and ensured that any such event was documented in order to learn from it. Controlling action research projects has been
known to be difficult – especially if they do not align well with the business associated with the organisation in which the research is conducted (Avison, Baskerville, & Myers, 2001). To protect against this problem, the research was integral to Project Fusion (which was a defining organisational project) and authorisation for the research was mandated in the appointment of the researcher as change manager, with action research endorsed by senior management as the mode for change management.

In terms of contingency, there was the risk that Project Fusion’s mandated scope (as described above as the seven projects of Project Fusion) could be a major limiting factor. As an infrastructure project it had different characteristics and dynamics from those of a software implementation project and possibly the research outcomes may not be generalisable or transferable to the latter type of project or other types of project. Other contingency limitations included the healthcare and shared services context, and the willingness of staff to participate and contribute. In terms of healthcare in New Zealand, some aspects of the project were peculiar to the national health sector and may not be generalisable, e.g., New Zealand Ministry of Health information requirements which may impact on reporting processes, and the HIS-NZ strategic context (Health Information Steering Committee (NZ), 2005). Since action research solves problems, there was the risk that the researcher could become embroiled in solving the problems exposed by the research as well as by the alignment project, and lose sight of the purpose of the project and/or the research (Baskerville, 1999).

Clinical research is characterised by the hierarchy of evidence in which the quantitative randomised control trial is considered to be the gold standard of medical research (Petticrew & Roberts, 2003). There is no role for subjectivity in such research. To this end subjectivity is discussed here because of the role it played in the research at hand. Subjectivity was recognised from the outset as a possible limiting factor, yet subjectivity itself was used in terms of participation in the situation in order to observe so that the research could be enriched by ‘insider’ perspective and more detailed data could be accessed and used to inform the research. Due to the participative nature of action research methodology, most of the research findings will be descriptive and qualitative.
with concomitant limitations, such as lack of comparative findings linked to control measures (Baskerville, 1999; Kock, McQueen & Scott, 2002). The participative/observing researcher influences the findings. It will be difficult to separate the consequences of such influence from objective observations. There was an occasional risk of action research turning into a form of consulting (Baskerville, 1999): since the researcher was also an employee it was at times difficult to separate the researcher role from that of employee, especially since action research informed the change management role. Thus, the grounded theory principles were used in the data analysis. Comparative analysis and theoretical sampling were also used as a guide to keep the researcher true to the data without skewing towards the researcher’s subjective perceptions of what could be important.

The research was further limited by the researcher’s lack of experience in action research methodology, which could influence the quality and nature of findings or the right time to terminate the research and its associated project (Waterman et al., 2001). It appears that action research projects in healthcare frequently incomplete. To counter this, the research was associated with a strategically committed project within healthAlliance, for which the risks of non-completion were too high. The researcher learnt to use action research in a project in the host organisation that started some months prior to Project Fusion. Another researcher, Orr (2004) who was also the Clinical Director for IS in the organisation, was also using action research to examine change linked to implementation of health knowledge management systems. As researchers they were involved in both projects. Day was change manager for both projects while Orr was clinical director for information services and therefore provided strategic influence for both projects. They each had a principal researcher role in one of the two projects and supported the other in the remaining project. Concurrent to their efforts to establish their own community of practice as ‘research buddies’ they introduced AR as way of working to the leaders of the two projects who endorsed its adoption by the rest of the project team.
3.11 Rigorous action research

This research was conducted from the constructivist perspective which in turn influenced the potential for bias. The repeated use of the AR cycles and the principles of grounded theory helped predispose the research to integrity (Kock et al., 1999). In addition, the community of practice (DeMarco & Lister, 1999) between the researcher and Clinical Director allowed for comparisons, discussions, search for contradictions and disconfirmation of findings.

Although this research is contextual due to the nature of AR methodology, some of the learning could be applied to similar projects or in similar health service environments – the transferability of the findings could even extend to any situation in healthcare services, (not limited to IS or to shared services) where major change projects are underway, and groups of people are adapting to significant change in a complex adaptive health system (Caelli et al., 2003).

3.12 Conclusion

Although prevailing research methods in both IS and healthcare do not commonly use action research as the preferred method for researching how people adapt to change linked to health ICT projects, a critical research approach within the constructivist framework is appropriate. Change is the goal for the research and the associated project. Action research lends itself to this type of research where the recurring cycles of plan, act, observe and modify action, can be used to concurrently evaluate an IS project and inform research. Two cycles of research are used – the practical application of new learning to inform business practice and the academic theoretical learning that contributes to the body of knowledge.

The seven projects of Project Fusion formed the basis of the research. This was a large infrastructure project as part of the establishment of a new health shared services organisation. Ethics approval was obtained and ethical issues were borne in mind during the research in order to ensure that participants remained safe while practicing the skills
of action research. Data were generated by means of several tools such as reflection journals, project communications, discussions, convergent interviews, to name a few. The data were analysed initially using the general inductive approach and in more detail using principles of grounded theory. As themes emerged they were explored in more depth in interactions with the research participant.

Action research as a way of managing change in large health IS projects has rendered interesting and useful findings, which will be discussed in the ensuing chapters.
Chapter 4   Findings and conclusions I:  
The complexity of ICT projects in healthcare
4.1 Introduction

In Chapter 1 the research problem was outlined by means of assumptions and themes. Assuming that change abounds, healthcare is a complex adaptive system, health ICT projects tend to fail, and there is possibly a supportive environment for change, then the project success or failure are linked to the change process, IS infrastructure plays a role in business process re-engineering, and there is a need to examine the role of change models and theories as expressed in change management programmes for health ICT projects.

Chapter 4 provides a description of the findings that support the assumption that healthcare is a complex adaptive system and that IS infrastructure changes play a role in business process re-engineering. Chapter 5 covers the change process and how we adapt to change in complex adaptive systems, especially change linked to health ICT projects. During the research on planned change, we tended to focus on the transition phase of the change process: it is this transition that is the subject of Chapter 6, which will cover findings that emerged as a result of our research on the change process. This shift in focus on the research problem is characteristic of action research and especially grounded theory (which follow the data as they unfold) (Charmaz, 2006; Melia, 1996) and the contextualisation of healthcare as a complex adaptive system (which allows phenomena to emerge and be studied to inform future action) (Hanson, 1995). Since action research was the methodology of choice, the balance of the thesis will be written in the first person, plural or singular as is appropriate in the tradition of writing up action research results (Fischer & Phelps, 2006; Wilson Scott et al., 2003).

Since data were gathered and generated in multiple forms, and some of the findings were examined with specific data generation methods, an outline is provided at the beginning of this chapter of the ways in which the general change management data were gathered/generated. The chapter goes on to provide the context for the research which was an emerging health shared services organisation and the project itself that was used for the research. Based on the research problem’s assumptions about complexity, the tendency for ICT project failure and the role of BPR in these projects, the chapter will
provide a discussion of the findings and will end with related conclusions and recommendations.

4.2 Data sources for examining planned change linked to health ICT projects

There were several sources for the gathering and generation of data as depicted in Figure 4.1. To inform the plan component of the AR process for this research, we reviewed the healthAlliance business plan for 2002/3, IS planning documents, business case documents for Project Fusion, and IS process documentation.

![Figure 4.1 The ways in which data were gathered and generated](image-url)
I also talked with managers, especially the IS Manager and the project manager for Project Fusion. The result of this review was a change management plan for Project Fusion, which was developed in collaboration with and signed off by the IS management team and the project manager for Project Fusion. The change management plan was the intervention regarding the AR research component.

During the course of Project Fusion and the implementation of the change management plan (the action, observation, reflection and modification steps of the AR process), we gathered and generated data from multiple sources which included the following, as depicted in Figure 4.1:

- AR diary in which I recorded, in a structured format developed by Williams & Harris (2001), reflections on workshops and other planned group activities such as team meetings and lessons learned meetings;
- Emails between project participants on aspects of the project;
- I-mails (Sankaran, 2006) in which I wrote to myself to record events, thoughts and observations, think through concepts, and reflect on observations;
- AR journal (Janesick, 1999) in which I recorded free flow thinking, reflections, observations, notes on discussions, ad hoc comments for future reflection purposes. This included a full account of the research experience at the end of the research period.
- Transcriptions of unframed interviews (Day et al., 2006) to explore the thinking and perceptions of leaders and other participants in the research and Project Fusion;
- Communication documents such as the project’s newsletter, intranet website, email updates to stakeholders, and other documentation created for the purpose of communication about aspects of the project;
- ‘Writing as discovery’ (Richardson, 2003) when I wrote free flow in order to process, integrate and assimilate deep thinking. This included forms of poetry and prose as I explored the deeper concepts to be used in the practical situation in which the research was based. Writing up the thesis document was also part of the writing as discovery process as new understanding developed during the writing (Wilson Scott et al., 2003).
The data rendered by these sources will be discussed below in terms of change in the complex adaptive system of healthcare, our adaptive response to the emergence of a shared services organisation, and our adaptive response to the implications of Project Fusion on our daily work. The context for these adaptations was provided by the emergence of a shared services organisation, healthAlliance as described below.

4.3 Findings

4.3.1 An emerging shared services organisation takes on IS

I conducted the research in a recently established shared services organisation, healthAlliance, belonging to two Auckland DHBs, namely Waitemata and Counties Manukau. During the year 2000 the Boards of the two DHBs had entered an agreement to establish a shared services organisation in order to make transparent the total cost of ownership (TCO) of support services such as finance, human resources (HR), supply chain, procurement, business solutions and information services (IS) and to return savings to the core business of clinical care. IS was the last to join the newly formed healthAlliance in November 2003.

According to the healthAlliance Business Plan for 2002/3 the goals of the new organisation were to:

- Establish the new organisation as a separate business unit, neutral to the two DHBs, but owned by the two DHBs;
- Increase efficiencies by reducing duplications, making TCO transparent, developing centres of excellence, and effecting savings by using economies of scale and providing demand-driven services;
- Establish a customer/supplier relationship typical of any independent business and its customers;
- Reduce costs, standardise processes and improve quality of the services rendered.
The healthAlliance vision was presented as that of an independent organization which aligned itself with government health policy and the visions and values of the two DHBs that own it. The vision was stated in the business plan as follows:

“healthAlliance will become a world class Shared Services organisation for NZ Public Health operating to Best Practice service and cost levels.”

Subject to this vision, the organisation also stated that end-to-end processes were important to its success and identified the primary processes for HR and finance in the business plan. The primary processes for IS were yet to be identified and implemented.

While Finance, HR and Supply Chain had their own changes to manage as they settled into the new organisational structure with their new processes, IS personnel (who were yet to experience the changes in their own departments) were aware of the changes happening around them, with some impact on their own activities since they were the department providing the ICT enablement for healthAlliance, Waitemata DHB and Counties Manukau DHB. The IS department interacted with the other healthAlliance departments and therefore were subjected to changes that influenced these interdepartmental interactions and relationships.

Changes in the demand and use of ICT services by the new healthAlliance and the two DHBs impacted on those delivering the service, i.e. the two IS departments yet to be merged. Parallel to their merger into a single IS department, the IS personnel were experiencing change as it impacted on them from the DHBs and other departments within healthAlliance. It became clear that change was no longer predictable, nor was it simple and that certainty was no longer something the personnel could expect to find in their workplace. They were no longer able to even rely on job security, especially in light of the three restructures of the IS department in the space of 18 months. Some people left the organisation while others looked for opportunities for promotion or to expand their role in the department and others simply carried on working with the expectation that little was going to change, even though they sensed that in the end their jobs were not going to be the same after the merger and Project Fusion. They were working within a complex adaptive system that was subject to change in many guises, occurred on multiple
levels and impacted on their daily work in many dimensions. There appeared to be a sense that change was becoming the norm. An additional uncertainty factor was that other DHBs had considered participating in this new shared services organisation but were not yet ready to commit to it, thus remaining on the periphery without commitment one way or the other.

4.3.2 The organisational context of the research

Since healthcare is considered to be a complex adaptive system (Begun et al., 2003), we assumed a backdrop of constant change in the environment in both DHBs for the purpose of Project Fusion. The delivery of healthcare is constantly being influenced by new discoveries, innovations and evidence which means that we have complex ways of interacting with our environment as it changes, morphs and shifts into new forms and responds to changing stimuli (Snowden, 2003). The Chief Information Officer (CIO) expressed this as

“...doing too much at once. ...clinical people are too busy and try to get through too much at once on too many levels. Too many IS projects are happening at once. But that is part of working in health. Healthcare is all about doing too much at once.”

Each DHB had its vision and healthAlliance developed its own distinct vision, as depicted in Figure 4.2 which demonstrates the complexity in which the IS personnel were working and adapting. Each DHB had its values, which were important to them, and healthAlliance established its own values at the outset when establishing the new organisation. Although both DHBs provided mostly secondary and tertiary healthcare for their region, and they were both healthcare service providers, they had different sets of values and differently expressed visions. The visions of both DHBs focussed on the delivery of quality healthcare services, with differences in how this was expressed. Counties Manukau DHB expressed their vision in terms of clinical care in their community while Waitemata DHB expressed their vision in terms of making a difference to health on a regional level. The Counties Manukau DHB values described desirable professional behaviour while those of Waitemata DHB were more descriptive of personal
attributes than of professional behaviour. healthAlliance’s initial values could be said to fit more appropriately with a business profile rather than a clinical one.

Halfway through the infrastructure project the healthAlliance executive team reviewed their organisation’s values and strategic vision, which added to the complexity of dealing with multiple organisations’ value sets and adapting to the changing values of the new shared services organisation. Primary processes differed between the DHBs because of the differences in services provided and sophistication of the nature and delivery of tertiary care by each DHB, such as full women’s health services delivered by Counties Manukau DHB and regional mental health services delivered by Waitemata DHB.

Figure 4.2 The multiple visions and value-sets influencing change adaptation

The development of the electronic health record brought about changes in the New Zealand health system (Orr, 2004). Counties Manukau was considered a pioneer in many instances and had already implemented a clinical information system to support the clinical interface with the EHR. Waitemata DHB implemented the most recent version of this system (Orr & Day, 2004) concurrent to Project Fusion. For the DHB this was
business as usual, while the IS department continued to support the implementation in the face of their own internal changes. A leader in IS put it during a discussion on change management in this way:

“The reality is that there is no time to stop and consolidate. We change all the time….we can’t take time out to consolidate…if we do stop introducing new things we will get behind.”

In addition, senior stakeholders were grappling with the development of a new Regional Information Systems Strategic Plan. This plan was published towards the end of Project Fusion, incorporating and acknowledging the foundation laid down by the progress made in supporting an EHR with a single infrastructure for these organisations.

In summary a new shared services organisation had already established all its departments with the exception of the IS department. Radical change was occurring in terms of vision, organisational identity, processes, geographical location, customers, and products. The need for a single ICT infrastructure became paramount in order for the organisation to demonstrate its vision and goals.

4.3.3 The need for an infrastructure alignment project

The joining of the two DHBs’ ICT infrastructures was one of the first objectives of the new, single IS department, and seemed to represent the biggest change impact on the IS personnel to date. New policies were introduced on the basis of the single infrastructure. According to the healthAlliance Business Plan for 2003/4 these included:

- A single core strategy for the two DHBs and healthAlliance;
- New initiatives would be shared, and differences would be agreed upon by both DHBs prior to implementation;
- Any catch-up application implementation would use the first DHB’s version as a template with negotiated deviations from the norm being kept to a minimum;
- New ICT projects should fit in the agreed ICT systems architecture established by the two DHBs and healthAlliance.

Thus the change imperative for Project Fusion was the need for a single ICT infrastructure in order for other changes to occur for shared services success. Parallel to
the implementation of Project Fusion was a catch-up implementation of a clinical information system at Waitemata DHB – this project upgraded to a new version of the software suite and at the same time impacted on clinical processes and information management in addition to the impact of Project Fusion. A separate project team of consultants and seconded staff from the DHB comprised the primary team which interacted with IS personnel for technical support as required. For the most part, this project team worked independently of IS unless the Fusion changes influenced it in technical terms.

4.3.4 The IS infrastructure alignment project: Project Fusion

Since this was a project that marked the formal addition of the IS department to healthAlliance, it was considered significant in terms of scope, cost, time, and effort as described below in the business case summary.

The change imperative: a case for business

The business cases put forward a strong argument for change, in line with Moss Kanter’s advice to leaders (2000), regarding the establishment of a single ICT infrastructure for the two DHBs and healthAlliance. Initially a suite of 27 business cases was proposed to the executive management of healthAlliance and the two owner DHBs, who rejected them because of the size of the proposed suite of projects and because they did not appear to be closely linked to business needs. The subsequent proposal review resulted in a suite of six business cases that were presented in a way that was more closely aligned to the business needs of the three organisations. The business cases were as follows.

- **Planning and preparation of desktop standardisation** involving the standardisation of all computers hardware at workstations, the computer operating environment and basic applications, including automation of server management and application deployment.

- **Server upgrade** involving the review of all servers (the WAN and LAN), consolidation of servers, replacement of obsolete servers, purchase of required new servers and upgrade of server software.
• **Email alignment** involving the upgrade of Email Exchange to Exchange 2003 and the establishment of a single Exchange for the three Auckland DHBs, with a single global address book and calendar facility for all three DHBS of the Auckland region.

• **Deployment of standardised and upgraded desktop software** involving the upgrade of all desktop and laptop computers to Windows XP. Some computers were obsolete and were replaced, while all computers that remained in use were rebuilt to conform to the new standard. Food chaining of computers was introduced to extend the lifespan of all computers so that as a computer ages it is ‘recycled’ for use in less demanding environments while making way for more advanced computers. Older computers were commissioned for thin client purposes for administration functions, such as booking and scheduling clinic appointments in a terminal server system. Clinical environments, where high grade computers are required for radiography viewing and other high power usage, received newer computers.

• **Single user logon** for all users, independent of location of a user, in the three organisations and independent of the application they use. This replaced the bulky labour intensive service for multiple logons for clinical personnel working in more than one DHB and/or using more than one application in the clinical setting.

• **Management tools** involving the automation of application deployment and server management.

The business cases were written in the format of rationale, description of current situation and proposed solution, indication of the project product, description of project objectives and deliverables, and a detailed description of the expected benefits (quantitative, productivity, future and qualitative). Arguments are summarised for the business cases altogether as follows:

• **Rationale:** Most of the rationale consisted of standardisation, e.g. standard desktops, processes, service, technical environment, and business activities. Cost saving was a strong argument for the suite of projects in terms of reducing operational and support costs, facilitating cost effectiveness and supporting efficient pricing of computers and service. Better management of the technology by means of automated maintenance of servers, proactive approach to providing helpdesk service, and reducing the risk of
downtime in the clinical environment. Single identity of the department was cited in terms of eliminating duplication.

- **Current situation:** Many differences were highlighted, which included operating systems, desktop environments, application packaging technologies, technological management tools for the servers and desktops in the two DHBs, and processes. There were unlinked email systems. There were two helpdesk services. New technologies were needed where old licences could no longer be renewed or where old technology no longer met the needs of the three organisations.

- **Proposed solution:** The solutions were encapsulated in the business case titles, and were expected to result in cost savings, reduction in duplication, upgrade of technology, and standardisation of technology and processes.

- **Project product:** These included common and standardised desktops with a standard operating environment; review and upgrade of servers (including setting up the servers for future upgrades); single email exchange system for all three Auckland DHBs and healthAlliance; deployment of the standardised desktops throughout the two owner DHBs and healthAlliance with associated desktop management processes; establishment of a single domain logon facility; design, configuration and deployment of automated systems management tools.

- **Deliverables:** These consisted of standardisation of technology and processes; training of personnel to use the new technology and processes; merging of technology infrastructure; deployment of new technology; project implementation activities; change management activities, and cost savings.

- **Project objectives:** These included critical success factors such as completing the project within budget, time and scope. Other objectives included changed work activities, e.g. “provide transparent access to IT facilities across the two DHBs” and “remote control capability for the desktop environment”; standardised processes and toolsets, and implementation of new technology, e.g. new email exchange technology.

- **Project benefits:** These were provided in some detail and it was expected that most of the benefits could not be met in the short term. The benefits focussed on cost savings, improved service and improved management of people and technology as
well as benefits to users, e.g. faster, more efficient service based on remote helpdesk functions.

When expressed to the IS personnel in terms of a full project plan, the six business cases became seven projects as depicted in Figure 4.3 in which the projects were arranged according to their dependencies on one another and the logical progression from one project to another, based on the previous project’s success. This suite of projects was called Project Fusion and had considerable scope and impact.

![Figure 4.3 The six business cases and the seven projects of Project Fusion](image-url)
4.3.5 Project scope and impact

This project impacted on the IS personnel, other staff in healthAlliance who interacted with IS, as well as clinical and administrative staff in both DHBs. Put simply, Project Fusion affected the work lives of everyone in the two owner DHBs and healthAlliance. However, the major impact was experienced by IS personnel in that their tools, technology, processes, location and relationships with their colleagues all changed. Some of the impact is depicted in Figure 4.4 where the complexity of the project is depicted.

<table>
<thead>
<tr>
<th>People</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 85 IS staff</td>
</tr>
<tr>
<td>• 25 project team</td>
</tr>
<tr>
<td>• One person rebuilt all the computers</td>
</tr>
<tr>
<td>• 11 people on Helpdesk provided user support</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Email exchange involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>• one of largest in New Zealand</td>
</tr>
<tr>
<td>• 3 DHBs</td>
</tr>
<tr>
<td>• &gt; 7 million emails migrated to new exchange</td>
</tr>
<tr>
<td>• &gt; 14,000 entries in global address book.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Desktop deployment involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 2 DHBs: 4 hospitals, 53 remote sites (urban and rural)</td>
</tr>
<tr>
<td>• &gt; 7,250 users migrated to new, single domain</td>
</tr>
<tr>
<td>• &gt; 4,300 computers rebuilt and standardised</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Servers</th>
</tr>
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<tbody>
<tr>
<td>• consolidated 25 Domain Controllers to 11</td>
</tr>
<tr>
<td>• Installed and/or upgraded 27 servers</td>
</tr>
</tbody>
</table>

Figure 4.4: Facts and Figures on the size and complexity of Project Fusion

The total cost of the project was $1.4 million with expected savings amounting to approximately $800,000 a year. These savings were linked to

- standardisation of hardware, e.g. consolidation of domain controllers from 25 to 11;
• implementation of standard server build and standard desktop build;
• automation of certain processes and standardisation of other processes;
• introduction of ability to solve user issues remotely, saving on costly site visits;
• upgrade of hardware and software to support new applications and functions, e.g. the packaging of over 900 software applications in preparation for automated deployment and management and the upgrade to Exchange 2003 to support all three DHBs in Auckland.

In the end, Project Fusion impacted mostly on the IS personnel, but towards the end of the implementation period it was felt throughout healthAlliance, Waitemata DHB and Counties Manukau DHB. Anyone who used a computer was aware of the project in one way or another until their computer was swapped for a rebuilt one and they were obliged to use the new interface that came with it. Users were also faced with having to adapt to the new HelpDesk approach of dealing with their problems remotely and having to share HelpDesk with other organisations, which meant that they could not assume that the person on other end of their query knew the details of how work is done in their DHB.

A flexible project team

Most of the project team for Fusion was drawn from the general IS staff of 85 people across the two DHB locations. For most of the duration of the project the team was made up of approximately 25 people, of whom there was a core group that worked on the project from beginning to end. Others came and went according to the skills that were required, e.g. the IS team who were operationally responsible for the Exchange were brought into the Fusion team for the third milestone.

The project manager was a contractor from the large ICT organisation that had been awarded the implementation contract. Other contractors included consultants from HP and Microsoft, HelpDesk temporary personnel, two administration temps and the contractor who rebuilt all the computers during the desktop deployment for the last two components of Project Fusion. Others who contributed to the team included five information managers and twenty representatives based in the DHBs, and two project
leaders for the desktop deployment projects. The project team was quite large, and although it was based mostly in the IS department at Waitemata DHB the team came from and worked in multiple locations and interacted with many people. This meant that some relationships in the team were difficult to develop and maintain in terms of forming a project community of practice and for the purposes of learning (Sense & Antoni, 2003). It also meant that people who worked in the team were expected to continue with their operational, business-as-usual responsibilities in addition to their project responsibilities when they were drawn into the project for certain milestones. Only a handful of team members were limited to working solely for the project while most team members added the project’s workload to their existing operational workload.

*Using critical success factors to predispose project success*

Since this was a significant project critical success factors were implemented in order to ensure success.

- **Strategic alignment and meeting business needs**
  The project was aligned with business strategy (Hackney & McBride, 2002; Pinto, 2004), expressly so, since it was a direct consequence of the emerging shared services organisation. It was also aligned with the health information strategy encapsulated at the time in the WAVE Report (Ministry of Health, 2001a), which was followed in 2005 by the Health Information Strategy, New Zealand (Health Information Steering Committee (NZ), 2005) having started its development during the course of Project Fusion.

- **Project completion within scope, time and budget**
  The project was implemented within the mandated time, budget and scope, (Shore, 2005; Wateridge, 1998) with the exception of one delay of a week for the Exchange milestone. The project was completed within the 15 months planned for completion, it used the $1.4 million budget as planned and the scope as set out in the business plans was not extended, regardless of requests to do so. There were many requests to slow down the project as people felt that it was moving too fast. Despite these requests the project manager and the IS management team were steadfast about adhering to the planned timetable. This stance about the time and scope boundaries at times appeared unreasonable and required strong
leadership to ensure that it was upheld. As one HelpDesk person put it in a convergent interview:

“Such a monstrosity of a project! It couldn’t have been made easier. Well, if we wanted to employ 10 more people and make the start date six months later and do some different planning. But then you can only do so much planning....”

Most team members felt that the project could have received the benefit of more planning and a longer implementation period but conversations about it usually ended up with similar sentiments to those in the above statement.

- **The happy user**

The project team and IS management team aimed at the happy user being a long-term goal (Wateridge, 1998), realising that adjusting to remote support, ICT standardisation, and the new interface on their desktop computers could not be achieved overnight. However, there was a sense that the user, i.e. the person in the DHB who is using computers, rather than the IS personnel, was being short-changed during the project process. This was expressed by one person as follows:

“Counties users have never used terminal server before and we told them all the advantages of it and it keeps falling over. I don’t think we’ve had a week without something going wrong. So I think it’s pretty hard for them to buy the idea when they haven’t been able to really see the advantages of it.”

The counterpoint to these difficulties experienced by users in the two DHBs was the constantly reiterated message that they would soon be able to use any computer in any location in the two DHBs to do their work, and with only one logon regardless of geographic location or type of computer or software application that they were using.

- **Effective project management**

The contractor project manager was an advanced PMI member with extensive experience in complex and large ICT projects, with a reputation for more successes than most project managers. Leadership in and out of the project, in and out of the IS department was considered key to project success and was given particular attention (Argyris, 1976; Briner et al., 1995), which will be outlined and discussed under the change management plan in Chapter 5. The project team members became a form of community of practice (Garrety, Roberston, & Badham, 2004), learning new skills and knowledge related to the
use, support and delivery of the new technology and single instance of the ICT infrastructure. The project team was developed for high performance, and in some instances people who were not performing optimally were removed from the team and redirected to operational activities. Project activities, processes, objectives and milestones were clearly communicated and well managed. In addition, people with potential were coached for new roles and/or promotion where appropriate. However, not everyone involved in the project was of the opinion that the project management was done well. With one exception, the IS management team members appeared to consider the project manager highly skilled and effective. The people reporting to the project manager generally felt that his leadership, management and project activities were effective.

“I didn’t know all the answers and I didn’t have to know all the answers. It wasn’t for me to have to deal with all the issues. He was the one dealing with all the issues, and running the thing and dealing with all the strain. It made a big difference to me.”

Others, on the other hand, felt that the project manager had made some bad calls with resources and did not always support those he should be supporting as described by this person that the project manager

“... was also quite two-faced. And indiscreet with throwaway comments about people and their personalities. I began to distrust him – what he was saying to my face wasn’t what he was saying to other people about me. I felt he was quite untrustworthy.”

It appeared that people resonated with certain leaders from whom they took their cue regarding the project. As a result at times it was difficult for the project manager to complete some project tasks because of the ways in which people used their leaders’ contribution to the project. For example, one of the IS managers did not appear to be engaged in the project and as a result those following his lead were not able to contribute at times as they should have. This dissonance appeared to contribute to the complexity of working on the project and at the same time increase rather than reduce associated stress.

- **Project leadership**

The project manager considered deliberate, planned change management was a critical success factor (Pinto, 2004) and placed considerable emphasis on the use of such a
programme. I was invited to be the change manager for the project – the change management programme was the AR intervention for the research. We assessed the change impact linked to the project and subsequently developed the change plan which took into consideration the complexity and scope of change resulting from this project. This will be outlined in detail in Chapter 5 which discusses the aspects of change linked to Project Fusion.

- **Learning in order to change**

  From the outset learning (including training) was considered one of the most important aspects of the project, since processes and technology were changing radically as a result of the project. Training was emphasised in the change management programme with particular attention given to internal training of IS personnel, and training for DHB users on the new Windows applications would also be given. Although learning was considered a high priority by all concerned it was difficult to follow through. We were repeatedly told that the people working in the IS department were task oriented in their jobs. The training budget was used mostly for learning specifically orientated to their daily activities, often related to new applications or technology being introduced in the department. For other, more general educational purposes, the training budget appeared to be underutilised.

For the project’s purposes there were three streams of formal learning:

- **Training for the team members who would be using new technology.** This was conducted by Microsoft trainers on the train-the-trainer basis so that those trained could pass on their new learning.

- **Training on new processes, mostly within the HelpDesk.** A designated trainer was employed to conduct this training. His role included identifying and documenting new processes and training relevant personnel in the new processes and related technology.

- **Training users outside of the department to use the new functions available in Microsoft applications, such as Outlook.** This training was provided on a limited basis by the IS training team while extended Microsoft user applications training was
provided by Microsoft on a contracted basis and paid for by the user’s department (not from project budget).

During the project planning, and based on the evidence that training was considered a priority, it appeared that learning would not be an issue. Not long after the project commenced we discovered some major difficulties with learning and the training programme. The HelpDesk trainer was not part of the initial plan and was hurriedly employed as a HelpDesk team member to fast track the learning that was needed. There seemed to always be a lag between the learning needed and its application. Also, although personnel were used to learning on the job to adapt to new technology as it was introduced, they appeared to struggle with the volume, intensity and scope of the learning required for this project. As one of the exchange team members put it in a convergent interview:

“We did go for training. It was in-house. And it was cut down. What is normally done in five days was cut down to two days. We were turning pages and he was saying that we could read through this and this and this on our own. It was rush rush rush. The trainer was from another company that does the Microsoft courses. We had the manuals from the five day courses and we had to do a lot in our own time. To me it was a bit rushed. It was all a bit much.”

During the change workshops there was a strong demand for the project team members to participate in future meetings at project milestones to explore lessons that had been learned during the course of the project. A lessons learned session was negotiated for the end of each of the subprojects but although attendance was good from junior staff, managers failed to attend which meant that the lessons learned could not be effectively implemented. Despite our efforts to develop a structured workshop that would promote reflection and draw out discussion, it was very difficult to raise thinking above the task orientation of their everyday activities. The action research question of “if you knew before what you know now, how would you have done this work differently?” was both difficult to build into their daily activity thinking and did not appear to be of significant
value to them in their daily, task-oriented work. These inclusive lessons learned sessions were abandoned after the first one and subsequent sessions were by invitation only.

During a time of low resources and high demand training appeared to take a secondary role to the achievement of getting the demanding work done. Although there was commitment from the outset to send people for training, it became increasingly difficult to release them for formal training sessions. One manager, who had been promoted into this role just before the beginning of the project, found it particularly difficult to clear the way forward for his team to attend training. Communication about training between the team manager and the project manager became more complex and difficult to separate from the pressing demands of the daily activities. As time passed opportunities to send the team for training passed and eventually the project manager issued an instruction that the team would attend training on a specific date, after their milestone in the project had been achieved. This placed undue stress on all concerned, especially for the team members who had to go live with new technology before their training was completed.

Parallel to this situation was a developing conflict over the need for training for users in the DHBs. The IS department had its own training team for teaching users in the DHBs on how to use new clinical or administrative applications pertinent to their core business. It was standard for ICT project implementations to include this team in the application training that normally accompanies such projects. However, there was a distinction between these applications and Microsoft Windows application training: the department trainers did not provide this training since it was provided by Microsoft directly, at a cost to the department where the user normally worked. The paradox was that everyone in the three organisations would need some upgrade in their knowledge about the Microsoft applications that were being upgraded but the IS training team were not mandated to provide this training and there was no funding allocated for Microsoft to provide the training. A tension grew between the project manager, change manager and the training team leader as we tried to explore ways to solve this problem, as expressed by the training team leader in her convergent interview:
“That whole ‘they’re not listening’ and going away from meetings with ‘they’re not listening’ and my trainers are expected to do all that stuff and it’s not what they do. The message didn’t seem to be getting across.”

Attempting to deal with these issues during the course of the project rendered adequate but insufficient outcomes. In the end, the change manager took on some of the training role regarding the new Microsoft versions of Outlook and other features as a form of communication, while the training team upgraded their Outlook training programme, and the HelpDesk trainer trained the HelpDesk personnel in FAQ (frequently asked questions) training for his team to be able to help people who called in for help.

4.4 Discussion

The findings described above are now discussed in relation to the themes of complexity, ICT project failure, critical success factors and the role of BPR in ICT projects.

4.4.1 Healthcare in Auckland and New Zealand as a complex adaptive system

It is clear from the findings described above that the healthcare system of the greater Auckland region, and within the New Zealand NHS, is a complex adaptive system. There are many interrelationships between the different components of the healthcare system and between the healthcare system and its environment. The interrelationships between the four components of the delivery of healthcare (clinical, administrative, educational and research) (Orr & Day, 2004) add to this complexity. The relationships between the people delivering the care and the communities of practice that exist add further to the complexity. In the situation in which the research was conducted, attempts were made to reduce the complexity by establishing a shared services organisation to provide support services, such as finance, information services and human resources services. In this way, the relationships and processes could be simplified regarding interaction between the core business of clinical care and support business of finance, human resources and information services. This was one of the primary goals of establishing the shared services organisation as indicated in their business plan. Having said that, however, it became clear during the research period that a different form of complexity was introduced by the project – a single support services organisation may have reduced
internal organisational complexity but each person dealing with customers in the two DHBs and internal customers had to be aware of the differences in the processes and relationships of their customers.

The research was primarily conducted from the perspective of the shared services organisation, touching on the business of the two owner DHBs. This setting exhibited the properties of complex adaptive systems as follows:

- **Sensitivity to initial conditions.** Changes introduced in the establishment of the shared services organisation were influenced by the initial conditions of the two DHBs’ separate support service provision structures. The existing structures and their consequences in terms of cost, duplication, and lack of sufficient potential to excel, contributed to the decision to establish the new organisation. In addition, the butterfly effect of a small perturbation causing unpredictable and disproportionate consequences was evident in the far-reaching effects of standardising hardware and certain processes. Other small changes that did not appear to be significant at decision time also made big impacts on clinical practice, such as the decision to standardise the idle time for all computers. The starting point for this example was that clinicians rarely logged on to their own computers in the clinic. The standardised lock after a period of computer idling caused an understandable outcry from clinicians who were effectively locked out of computers in clinics and the emergency department where the nurse on duty routinely logged on and started up all computers for the day. If the computer became locked during a consultation, the clinician had to call the responsible nurse to unlock it. Consequently, all clinicians who did not have logons, and/or who did not know how to logon were given a logon and taught how to unlock their computers, in addition to nurses being banned from starting up and logging on to all computers in their work area. Some generic computers were allocated for departments where it was unavoidable to insist on every user logging on and off the computer whenever they needed it, such as the emergency department where users needed to collectively use a computer without being able to physically handle it, for example during resuscitation of a patient.
• **Fuzzy boundaries.** Although the arrangement of two DHBs owning one shared services organisation seems fairly straightforward, it is not. In many ways health information service delivery is different from that of any other industry (Bolman & Deal, 2003). Boundaries are not clear-cut, nor are they easy to see, especially for the uninitiated. Clinical care influences every other component of the delivery of healthcare. The project manager for Project Fusion frequently remarked that doing projects in healthcare was different from any other project he had ever done, as did the department manager who said that her experience in health ICT was different from that in any other ICT industry. Although the delivery of support services was the shared services organisation’s primary responsibility, there were many people in the two DHBs who also delivered support services. At times this appeared to be duplication and at other times it did not; and then some people claimed it to be duplication while others said it was not. The infrastructure project itself had some clear boundaries in some aspects: it was clear how many subprojects there were, who was responsible for what milestone, and aspects such as time, budget and scope were very clear in terms of boundaries. However, many boundaries within the project were not clear, such as who the stakeholders were for which part of the project, how and by whom training on the new technology and processes was going to be conducted. In addition, assumptions were made about boundaries as exhibited between the initial two IS teams from the two DHBs where people from the one DHB did not get involved in activities they considered to belong to people of the other DHB’s IS team. There was a sense of ‘us and them’ between them long after the official merging of all IS personnel into one department, albeit in two or more geographic locations. One of the project’s outcomes was to allow for remote access to computers within the DHBs. This virtual environment for solving IT problems for customers further contributed to the sense of fuzzy boundaries.

• **Emergence.** Some phenomena were not planned for Project Fusion and yet they emerged as new relationships developed, new processes were tested and new technology took the place of old. The project itself was a form of emergence. It had been tried three years previously to standardise processes and technology in one DHB, but without success and the project had been abandoned. The idea of
healthAlliance being an opportunity for a fuller project emerged when the meaning of the new organisation was understood by one of the IS managers.

- **Influence of internal rules.** Although the new IS department was made up of two previously separate groups of people, the internal rules that govern healthcare influenced the ways in which the people worked. The project itself aimed at reducing the rising costs peculiar to healthcare. Clinicians are involved in all levels of healthcare delivery, resulting in a Clinical Director for IS for both DHBs being involved in the governance of the project as well as other clinicians playing a role in what would normally be considered a technical project. The new shared services organisation took on its own identity and yet continued to be influenced by the internal rules of patient priority and safety of healthcare service delivery.

- **Tension and paradox are natural.** This was particularly evident in the tension of the three sets of values and three visions of the organisations involved, as depicted in Figure 4.2. In addition, although the shared services executive team revisited the values and vision halfway through Project Fusion, the tension continued and the organisation carried on with business-as-usual activities without skipping a beat. Paradoxically, people complained that many of the values were not evident for some people interacting with healthAlliance on other projects during the infrastructure project and yet they continued to work as though the values were being lived out.

- **Patterns are a natural part of complex adaptive systems.** Although one expects to see change occurring as technology and medical knowledge change and grow, there are patterns of ICT projects that emerged over the years. There was a rise and fall of complex projects with upgrades as a counterpoint, large projects followed by difficult ones, small and simple projects followed by large complex ones. As one project is completed for one group of people another starts for other personnel in the DHB. There is usually little time for consolidation other than to prepare for the next project and attempt to understand the implications of the last one.

- **Complex systems are resilient.** Despite the high failure rate of health ICT projects we continue to implement innovations, and the electronic health record’s scope, depth and breadth continue to grow. In the Auckland region this resilience is marked by hospitals and other health services in the DHBs concerned being in the forefront of
the development of the EHR in New Zealand. The infrastructure project aimed at making the supporting infrastructure more robust with standard technology and processes so that more complexity can be accommodated and more of the system’s need can be met. This is evidenced in the healthAlliance policy that new clinical applications would be standard for the two DHBs yet adapted to fit the needs of each DHB. Although ICT projects were considered by most to be a painful experience accompanied by hard work and relentless change, people did not appear to balk at the idea of Project Fusion, nor was there a sense of outright resignation (with the exception of the few people who were exhausted from being involved in a number of projects simultaneously just prior to Project Fusion). The people were resilient, as was the healthcare system in which the project was implemented.

- **The system and its agents are adaptive.** Although this was not overtly stated in the business plans for the project, healthAlliance had a policy that one DHB would implement an application with the plan to catch up in the other DHB at a later date. Although one application would be the standard to a particular need, each DHB had some leeway to interpret the implementation of that application with the option of one day in the future being able to use the same application regardless of location of patient or treating clinicians. It appeared, also, that the IS management team took it for granted that their staff were resilient and would not have much difficulty in adapting to the changes brought about by Project Fusion. However, there was also an assumption that the system would adapt to the development of healthAlliance and that even if the infrastructure project did not go ahead or was not successful to everyone’s satisfaction, the system would still need to have a standardised infrastructure to make the most of IS in healthcare.

In conclusion, the healthcare system of the greater Auckland region, and of New Zealand, is a complex adaptive system in that it exhibits the characteristics of sensitivity to initial conditions, fuzzy boundaries, emergence, influence of internal rules, paradox and tension, patterns, resilience and robustness, and agents that are adaptive. This could also be said of Project Fusion itself in that it emerged as a possibility when the interrelationships between the two DHBs and healthAlliance changed as the new shared services
organisation emerged and has the other characteristics of complex adaptive systems as discussed above.

4.4.2 IS projects in complex adaptive systems such as healthcare

The introduction of an innovation in healthcare temporarily heightens complexity with accompanying increases in uncertainty and ambiguity. The implementation of such innovations usually removes us from our apparently less complex ways of working, where we have mastered our processes, knowledge, technology and relationships (Snowden, 2003).

![Diagram of Zone of Complexity](image)

**Figure 4.5 The journey of a project in a complex adaptive system**

The implementation of an innovation, such as in an ICT project, takes us on a journey through the zone of complexity and to the other side, sometimes as far as the cusp of chaos or even into chaos, as depicted by the curve in Figure 4.5. While we are there we are unable to predict with certainty the possible outcomes of our innovations, and uncertainty and ambiguity are more likely to cloud our capability than not. Such projects challenge what we know and have mastered, and in most instances take us to the place where many things are unknown where, as Flood et al (2004) argue, many things are unknowable, and possibly should remain so. In addition, complexity is exacerbated by
the emergence of unpredicted and unpredictable consequences of our actions within such a complex system as healthcare (Begun et al., 2003). In some instances a small perturbation could result in a large change in the system (Gleick, 1987), for example, limiting the idle time of a computer to 7 minutes before closing to secure access can disrupt a whole outpatients’ clinic.

ICT projects are an example of this shift to proximity with chaos: an innovation being implemented by a project is usually assessed from within our comfort zone with some shift into the zone of complexity to stimulate the development of innovations. However, the beginning of its implementation into an organisation takes us to the zone of greatest complexity where the project initially fundamentally challenges our capability to adapt. The old ways of working are juxtaposed against the innovation such that we can initially only conceptualise the changes, then attempt them, then return to our previous state of comfort as we master the new processes, technology and relationships. ICT projects take us out of our comfort zone in the known, knowable and perceived simplicity of our current work practices and relationships. Since the purpose of ICT projects is to implement new information technology, we are wrenched out of our known world and stretched to the other side of the zone of complexity, and put at risk of drifting into chaos.

4.4.3 Critical factors for successful change

The critical success factor that received the most attention in Project Fusion was strategic alignment with healthAlliance’s core strategy and those of the two DHBs, as well as the WAVE Report (Ministry of Health, 2001a). Other critical success factors that received attention included completing the project within scope, time and budget; a change management programme; the happy user, and project management expertise.

Strategic IS for shared services

While Project Fusion was in progress the Regional Information Services Strategic Plan was being developed for the whole of the Auckland region. This was a new development resulting in part from the establishment of healthAlliance. The research fitted into the principles of the strategy which in turn aligned with the WAVE Report (Ministry of Health, 2001a). This strategic alignment with the regional and national strategy for health
information was a key critical success factor for the project (Chan, 2002; Strassman, 1997) – a factor that many organisations fail to include in ICT projects. Despite all the other success factors that had been built into the project itself, this alignment was a turnstile for many communications and a stake in the ground for those defending the project against detractors. Not only was the project strategically aligned with the national and regional information strategies, but it was fundamentally aligned with the core strategies of healthAlliance. Thus, even though at times it was hard to see the final achievement of the project’s goals, this alignment, this symbol of healthAlliance’s commitment to its principles of single point of service and cost effectiveness, was a recurring theme in communications, discussions, meetings, and conversations regarding the project. However, this critical success factor, strong as it was, was not enough on its own to predispose the project for success.

*Project completion within scope, time and budget*

This is a straightforward way of measuring project success (Wateridge, 1998) in that the scope is defined in the business cases and project implementation plan, the budget is signed off by the DHBs and managed, and the time allocated is indicated in the project implementation plan and all communications. However, these parameters can at times be too rigid in a complex adaptive system and may cause conflict, stress and bullying as the project progresses. As Project Fusion approached each milestone the stress associated with adhering to these parameters was heightened, even though people knew that it was important to have the parameters. This stress influenced to some degree how people adapted to the changes in process, technology and relationships. At times there was a sense of resistance to change as people became exhausted from the pressures and demands of the project, but there was no relief in sight until the final milestone’s activities had been started. There was a sense of fatalism as people commented with hindsight that they could not see how the project could have been done differently. Some people thrived on the pressure while others succumbed to it and absenteeism increased as the project pressure to adhere to scope, time and budget increased with progress through the project process.
Project management as a critical success factor

Team development, budget and resources management, decision making, planning and implementing a training programme were all part of project management as a critical success factor. Since the project manager was a registered PMI project manager, he followed the PMI project management processes (Project Management Institute, 2000) to ensure success. Although leadership on the part of the project manager is not considered a critical success factor (Turner & Muller, 2005) this particular project manager’s leadership skills were essential. The project manager was given free reign with leadership for the project’s success, while at times leadership lacked somewhat from the IS management team and other leaders who were involved in the project. It appears that, although management rather than leadership is a priority for a project manager, the need for a focal point for leadership in this project was greater than the use of leadership elsewhere. This project manager’s use of leadership appears to have highlighted the need for leadership representation while other leaders surrounding the project continued to play their leadership roles as well.

The problem of prioritising learning

Although learning is a priority for project success (Pinto, 2004), it appears that this is more difficult to implement than one would think. Commitment in principle is inadequate and assumptions about capacity for training seem to cloud decisions about training that arise during the project. Other factors that compromise the capacity to send personnel for training include inexperience as a manager or leader, naïve management, high demand for resources to complete operational tasks, complexity of doing operational work in addition to project work. These factors were juxtaposed against the need for intense, high level learning that was more educational in nature (resulting in broad changes in behaviour and culture) than training (resulting in capacity building for operational activities) (MacKinnon-Slaney, 1994). The complexity of the learning resulting from the project is increased by the need for double-loop learning as described by Argyris (1976) and needed in the action research cycle such as the lessons learned sessions. The capacity to learn individually and collectively was compromised by such complexity. It became
clear that the tension between the demand for resources to get the work done, and the
demand for learning to get it done effectively was at times destructive.

4.4.4 Radical change and business process re-engineering
BPR involves significant and rapid change, business processes, ICT as an enabler of
change and process improvement, and dramatic improvement in performance and
competitiveness (Grover & Malhotra, 1997; Hammer & Champy, 2001a; Teng et al.,
1996). Project Fusion represents all of these components. Significant change involved the
merging of two IS departments that belonged to two DHBs, into a new IS department
belonging to a shared services organisation with its own values, vision and culture. In
addition the technology introduced radical changes, as outlined in the business cases for
the project. Business process changes ranged from radical, e.g. automation of application
deployment, to incremental, e.g. adjustment of some HelpDesk processes revised and
documented the year before Project Fusion. The objectives of the establishment of
healthAlliance and the implementation of Project Fusion aimed at dramatic improvement
in performance as outlined in the healthAlliance business plan for 2003/4. In principle
BPR was part of the project, as well as being an ongoing programme in the IS
department, but it was not an overt aspect of Project Fusion itself. As a complex adaptive
system itself, the IS department appeared to adjust to the BPR component without an
overt programme.

4.5 Conclusion
The healthcare system of the greater Auckland region, and in New Zealand, is a complex
adaptive system. It exhibits properties of such a system. The involvement of clinicians in
all aspects of health ICT projects adds to the fuzzy boundaries of the different
components of healthcare delivery. The internal rules of healthcare are well known, and
tension and paradox exist within each department of each DHB and between different
services. The EHR is being implemented in ways that show up patterns, such as the
administrative software following clinical software capability in all the DHBs in New
Zealand, which is more pronounced and ahead of such implementations in the rest of
New Zealand. There is sensitivity to initial conditions such that change management is
potentially challenged by the unpredictable consequences of small or apparently inconsequential perturbation in the system. Since healthcare is constantly adjusting to new knowledge and research it is no surprise to find that people in the healthcare system capably adjust to changes brought about by ICT projects, but do they change in response to radical changes?

This is the starting point of any health ICT project in that the implementation of any innovation will be influenced by how the healthcare system operates and how it and the people working in it adapt to changes brought about by those innovations. Projects are also complex adaptive systems exhibiting the complex interactions between themselves and the organisation in which they are being implemented as well as the interactions internal to the project. The nature of these projects influences how we adapt to change brought about by them and for now, we assume that ICT projects are accompanied by painful and unpleasant change experiences that should be managed to reduce their unpleasantness.

In order to predispose projects for success we used critical success factors. These alone are not enough to ensure success in a complex adaptive system. The system itself appears to interfere with the implementation of such factors as the capacity for learning and our decision making capability to ensure that learning opportunities are made available appropriately and taken up as they arise. Project management skills and leadership are essential for project success. However, there is much opportunity for latitude in project leadership and management – the fuzzy boundaries of a complex adaptive system make it difficult to establish the full scope of a project manager and to identify the overlaps when it comes to leadership.

It appears that ICT projects are themselves complex adaptive systems. This research was conducted on a complex infrastructure project with technology changes and consequent process, relationship, culture and role changes, and resulted in business process re-engineering. The use of critical success factors does not guarantee success: these factors themselves are part of the complexity. Success is less dependent on the fact that these
factors are used than on the combination of factors used, how they are employed and the influence of the system’s sensitivity to initial conditions. Regardless of a project’s success or failure in a complex adaptive system, it has an impact and that impact is influenced by the system’s capacity for emergence, turbulence, paradox, tension and its ability to allow patterns of innovation to form, taking the organisation to new levels of functioning in the face of failure or incomplete success.

Change therefore gains a new meaning. Chapter 5 takes a look at the process we tend to follow when experiencing change and our experience of projects in complex adaptive systems when health ICT projects are used to implement innovations.
Chapter 5  Findings and conclusions II:
The art of change management
5.1 Introduction

Health ICT projects are complex themselves in a complex healthcare environment. Since they usually introduce innovations related to technology that supports the electronic health record, they result in changed processes, relationships and in more extreme situations, culture. This change is usually not logical, simple or predictable. The change linked to health ICT projects is felt on multiple levels, by individuals, groups of people, departments and on an organisational level. As outlined in Chapter 1, this research examines a set of assumptions and themes. Assuming that change abounds, healthcare is a complex adaptive system, health ICT projects tend to fail, and there is possibly a supportive environment for change, then project success or failure are linked to the change process, IS infrastructure plays a role in business process re-engineering, and there is a need to examine the role of change models and theories as expressed in change management programmes for health ICT projects.

As discussed in Chapter 4, health ICT projects are implemented in complex healthcare systems, and change occurs in a complex manner. The emergence of healthAlliance resulted in complex change which played out simultaneously on multiple levels, following predictions in some situations, yet exhibiting a high degree of unpredictably, with changes occurring in a non-linear and often irrational and illogical manner. Assuming that healthcare is a complex adaptive system, we viewed the change implications in the broader context of the whole healthcare system of New Zealand, as well as within the systems of the two Auckland owner DHBs and healthAlliance as an organisation. Chapter 5 examines the art of change management associated with health ICT projects, in the context of Project Fusion. A discussion of these findings will follow, examining whether a supportive environment exists for change in ICT projects, and how change models perform in change management programmes in complex adaptive systems like healthcare. Conclusions will be presented as to how we experience such change in a complex healthcare system.
5.2 Findings

5.2.1 Change management as a critical success factor

Although change management is essential for promoting successful change and success in ICT projects, there are no guarantees that it will indeed ensure success (Castle & Sir, 2001). This is particularly true in a complex adaptive system that is sensitive to initial conditions and in which unpredictable changes emerge. We found that the people involved in Project Fusion agreed in principle that change management was important, however, they did not initially place any emphasis on its role during the project planning phase. It was upon the project manager’s insistence on a specific change management component, that a change manager was enrolled in the project a month after project commencement. Despite the presentation of compelling arguments supporting the role of change management, some project participants could not relate to it as a component of Project Fusion as described in my reflection notes.

“In May 03 the project manager asked for a full time change manager. After many objections from (one team manager) who apparently didn’t see a role in Fusion for a change manager, I was allocated to the project as a part time change manager.”

In addition, the separation between the two original IS teams caused confusion around the change management component of the project. There was a strong sense that the project was conducted in two different environments (geographically and culturally) and some people took change management activities into their own hands when the project moved over to the second DHB for the final project of desktop standardisation. Once we agreed in principle that change management was an important enough component of the project’s success, we negotiated how it would be implemented, finally arriving at an agreement that part time change management based on an approved plan would suffice. The late adoption of the change management programme some months after commencement of the project also contributed to difficulty in implementing it. Managers and personnel alike had not been introduced to change management as part of the initial project plan and it was therefore difficult to link key change management components to
project milestones, especially in terms of releasing staff for training and communications activities such as the change workshops.

Having assessed the change and the three organisations’ capacity for change, we reviewed the literature on change management, discussed with stakeholders our proposed plan and introduced the action research process and principles as a way of managing change. We developed a change management plan in collaboration with project team members, the project manager and some team managers. It was signed off by the IS management team and the project manager for Project Fusion. This change management plan was the AR intervention for the research and became an opportunity for empowerment of those experiencing the changes brought about by the project.

5.2.2 Action research as the foundation for change management

While developing the change management plan we reviewed the action research process and associated principles in terms of their usefulness for managing change and empowering project participants, especially the project team members, in adapting to change. The empowerment component of action research (Reason, 1999a) was incorporated into learning new technology, processes and developing new relationships as a result of the ICT project. What we learnt from our experience of change as a process was fed back into the way the personnel worked so that they could use those change skills in future organisational changes. We negotiated AR as a way of managing change with the project manager and IS management team who agreed with it in principle. The concept was then presented to the rest of the IS department personnel who agreed to use the principles and process if they added value to their work (Day et al., 2006).

Although the management team endorsed the use of AR in managing change, individual management styles at times conflicted with the spirit and principles of AR. For example, when the change workshops were discussed with the IS Manager for the purpose of negotiating a day out of the office for the project team to participate in the workshops, the manager insisted on these workshops being made compulsory for all IS personnel. This conflicted with the principle of voluntary participation in AR activities and initially
seemed problematic. Making the workshops compulsory (and therefore the use of AR compulsory) conflicted with the AR principle of voluntary participation (Reason & Bradbury, 2001) and seemed to undermine the philosophy of the change management project. To counter this effect, we indicated at the beginning of each workshop that participation in the activities was voluntary and if anyone felt uncomfortable doing anything in the workshop they would not be pressured into taking part.

It was during these workshops that we introduced action research as a way of working and of adapting to the changes brought about by the project. Action research became a way of life (Day et al., 2006; Reason, 2006).

*The AR cycle as a change management pattern*

We used the AR cycle in many ways, situations and levels. The change management plan itself followed the cycle of assessment, planning, implementation and evaluation alongside the project (McArdle & Reason, 2006). This four step cycle was characteristic of how the project was managed. The project manager, who was a registered PMI project manager and openly used the PMBOK project management process (Project Management Institute, 2000) synchronised the AR cycle with his project process. In addition, each subproject was treated as its own AR cycle, marking the ending of the cycle with a planned lessons learned discussion in order to reflect on the achievements of the completed subproject and the implementation of what we had learned into the next subproject. In this way the AR cycle was built into the project’s structure. Although there was a demand for inclusion in each step of the cycle, workload, priorities and conflicting demands competed for attention thus reducing the capacity for many to participate fully in the cycle.

The relative ease of building the AR cycle into the project itself could be explained by the cyclic nature of healthcare delivery and project management being similar to that of the AR cycle. However, the change management plan as a cycle of its own was not easily synchronised with the project’s AR cycles due to its late entry into the project. Although this was difficult in the broader sense, each subproject formed its own change
management cycle: different people were affected in different ways by each subproject which meant that the target and goals for change management shifted as we moved from one subproject to the next, following parallel cycles (main project cycle, main change management cycle, subproject cycle with its concomitant change cycle). Within all these cycles were the many, smaller cycles of action performed by small groups and individuals. The use of the AR cycle was prevalent in most of the project’s activities as demonstrated in Figure 5.1 where cycles occurred within cycles, upon cycles, and alongside cycles (Checkland, 2000; Day et al., 2006). Each step was practiced with differing emphasis and capability, depending on the need for the cycle and who was using it. Some people had a greater affinity for using such a cycle than others: those with a clinical background used it more easily as their clinical training incorporated a similar cycle (Waterman et al., 2001).

![Figure 5.1 Action research cycles as practiced in the project](image)

Using the AR cycle for change management was not enough. Relationships formed the foundation of achievement for some of the project’s goals and so partnerships,
friendships, colleague relationships and other ways of working together influenced change management and the adaptation to the changes brought about by the project.

The AR partnership for change management relationships

The complexity of the organisation, the infrastructure project, the bringing of two departments into one on many geographic sites, and the new relationships this implied made for complex relationships that shifted and adjusted throughout the course of the project. The concept of partnership assumes that we share our experiences, aspirations and plans, as well as the associated risks and benefits (Wastell, Kawalek, Langmead-Jones, & Ormerod, 2004). It also implies that there is a sense of perceived equity, democracy, shared understanding and connectedness with those around us who are also in the throes of the shared experiences (Orr & Sankaran, 2005; Reason, 2006). There is an expectation of shared responsibility and equal power. This understanding of partnership in AR underpins its execution in the workplace. In order for the partnership between researchers and employees to strike up, project participants appear to demand evidence of the value that AR adds to their work (Day et al., 2006). In Project Fusion this acceptance of the value-add of AR was not universal in the IS department. One manager, some project team members and some general IS personnel were not convinced of the value of AR and therefore did not attempt to use the cycle, partnership or reflectivity in any part of their work. Others used AR with varying degrees of success and commitment.

Sensitivity to initial conditions, especially during restructures, meant that relationships emerged and morphed unpredictably. Tensions arose and conflict became an issue at times. The establishment and maintenance of the relationships needed for AR partnerships depended on whose turf we were on, the foundation of the initial relationship and the network of relationships that waxed and waned as the project progressed. Power played an important role in the development of partnerships, providing needed support for those partnerships but at times also contributing to their destruction. For example, while the project was based in the first DHB one team leader appeared to fully support and use AR in her contributions to the project. However, when we moved over to the
second DHB (and on to her turf) she abandoned the relationships with the change manager and project manager and took matters into her own hands regarding communication and support for those people in the second DHB with whom she felt a strong affinity.

“When I saw what was happening to the people here (the first DHB) I thought how the hell are we going to stop that much pain over at Counties. Then our involvement changed. It wasn’t from a training perspective. ….it was ‘we know the business perspective’.”

There were three key partnerships between individuals: they were between the change manager and project manager; project manager and IS Manager; and desktop project manager and project manager. These partnerships served to strengthen the links between the project and those who were experiencing the changes brought about by the projects. The nature of these partnerships differed because of the different people involved and the different roles of those partnerships. The change manager/project manager partnership had the strongest AR influence in that we buddied one another in change management. The partnership between the project manager and IS Manager was broader than change management and AR, but incorporated some aspects of reflective activities, and used the AR cycle as part of managing the project. The mentoring relationship between the project manager and desktop project manager had all the trademarks of partnership. However, there is the risk of partnerships being misinterpreted as this one was.

“Less of the DD and MM show ‘me and my shadow’ and the power trip that came with it for her. That didn’t go down well with people.”

The power relationships such as in these partnerships are at risk of being corrupted by those involved as well as those who watch them from the outside (Reason, 2006).

When the partnership concept was devolved to the lower ranks and people were invited to participate actively and openly in the project and its consequences things became messy. Power was not as easy to detect and use; mentoring was at risk of being too superficial to be valuable; the added value of this participation was not as easy to determine, and contradicting messages were being transmitted between ranks. For example, there was a
demand for open and transparent communication between everyone in the department, especially about detail and future implications regarding this project. However, although the management team supported transparency they made calls about what and when to reveal sensitive information such as restructure plans and business case details. This led people to be suspicious of professed partnerships and suggestions that the managers and leaders of the project were being open and transparent about important change aspects of the project.

“Management seems to have forgotten or underestimated the human factor. They propose a change and then are surprised by the strength of feeling that comes back at them. I would expect management to sit down with their staff and talk about the restructure plans long before there is any proposal.”

On the other hand, there were those who had a strong experience of partnership in which they participated in exciting and stimulating aspects of the project, stretching themselves in new ways, learning to take on new responsibilities. It appears that these people had team leaders and/or managers who were open and transparent about working alongside their teams, and provided learning and leadership opportunities. At times the leadership style of one person collided with the style of the management team as a group.

Although partnership is important for AR to work as a foundation for change management, and although it is desirable, the development of an environment for fostering the partnership attitude to change is difficult. This approach works for some and not for others, depending on relationships, tensions and existing potential for conflict, the value that AR can add to a project and the workplace, and the transparency and potential for trust in the department or organisation in which it is being implemented.

A reflective approach to change

Reflexivity involves becoming observers of others, ourselves and our actions in order to enrich our knowledge, insight and practice (Pillow, 2003). It is a dynamic process that links us as selves to our world, connecting relationships, insights and activities linked to our research and the wider environment. It includes the perspectives, assumptions and biases of all aspects of our research (Weber, 2003). At first it was difficult to introduce
the practice of reflection. It was hard to articulate the nature, process and practice of reflection to people who are primarily task and action oriented, with a preference for concrete, results-focussed thinking rather than abstract conceptualisation of their actions, environment and understanding of the broader aspects of their work. In reality it was a difficult shift to make from the task orientation of generally introverted people to the open, more extrovert nature of AR where people often are exposed and left feeling vulnerable (Bell, 1998). However, as the project progressed we discovered that many routine office activities provided opportunities for reflection, such as planning sessions, meetings, and lessons learned discussions.

A range of reflection activities emerged as depicted in Figure 5.1 (Day et al., 2006), which predisposed people to use the AR cycle and adapt to the changes brought about by the project. In this way reflective practice was enabled according to the affinity of different people to different forms of reflection. For some, reflection came easily and they absorbed its practice into their daily work, convincing others to follow suit. Some people, however, simply did not adopt any form of reflection as evidenced by one person at a change workshop who appeared to be completely disconnected from his work environment and did not know the name of the new IS Manager for the department.

![Figure 5.2 Continuum of reflection available to action research participants (Day et al., 2006)](image)

We found that most people related to the more formal, structured forms of reflection. As in the implementation of the AR cycle, we found that many existing structures had reflection opportunities built into them, such as the planning for Project Fusion and
lessons learned meetings. When such reflection opportunity is built into normal working activities, people are more likely to reflect. When we added reflection as an extra component of their daily work, we were obliged to negotiate time and ensure that the time spent on reflection was not considered a waste. Some interviews that were overtly for research purposes offered a cathartic experience that most interview participants valued (Orr & Sankaran, 2006). They had been thinking about what to talk about in their interview and took away with them a deeper understanding of their experiences. The less formal reflections were primarily between individuals as in the regular discussions between the project manager and change manager, the change manager and project team members. Meta-reflection, which traversed levels of reflection, was limited to the community of practice between the change manager and project manager. A further level of meta-reflection in terms of the research occurred between the change manager and clinical director of IS who was also conducting research in the department using action research. As researchers we tended to use memos to self, ‘I-mails’ and our reflection diaries and journals.

The opportunities for reflection are outlined in Table 5.1 which indicates the existing organisational structures used for reflection as well as the use of interviews by appointment. People tended to not engage in personal introspection as this appeared to conflict with their task-oriented approach to their work. However, there were some people who were willing to attempt this form of reflection in the face of exhaustion, distraction, and competing demands on their time and energy. The learning review, written group reflection, and professional development were the most easily accessible forms of reflection. Reflexive practice, community of practice and written reflection were mostly done by the change manager, project manager and clinical director of IS. The project’s core team formed their own community of practice in terms of learning the new technology, processes and relationships for project success. Their reflections on their adaptation to change were revealed in the thematic interviews towards the end of the project.
<table>
<thead>
<tr>
<th>Model</th>
<th>Aim</th>
<th>Methodology</th>
<th>Mechanism</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning review</td>
<td>Identify successes and opportunities for improvement</td>
<td>Review project performance at milestone achievement</td>
<td>Group meeting marking milestone achievement</td>
<td>Applying lessons learned for improvement for subsequent milestone</td>
</tr>
<tr>
<td>Written reflection by group</td>
<td>Provide handover for organisational continuity</td>
<td>Post implementation assessment by project team</td>
<td>Group discussion, group writing, meeting with stakeholders</td>
<td>Continuity of project objectives to stakeholders</td>
</tr>
<tr>
<td>Community of practice</td>
<td>Project learning for effective IT implementation</td>
<td>Identify learning needs, provide training as and when required, learning on the job, learning by participating in project</td>
<td>Monthly team meetings, technical training, participation in software development</td>
<td>Technical skills development, collective continuous improvement</td>
</tr>
<tr>
<td>Reflexive practice</td>
<td>Learning and continuous improvement by critical and creative reflection</td>
<td>Select topic of discussion, explore themes arising from practice</td>
<td>Monthly structured group discussion, Weekly/ad hoc discussions</td>
<td>Action orientation to team, strategic and thematic problem solving</td>
</tr>
<tr>
<td>Professional development</td>
<td>Individual development</td>
<td>Reflect on professional project role</td>
<td>One-on-one discussion weekly and ad hoc</td>
<td>Iterative learning and application of new insights</td>
</tr>
<tr>
<td>Thematic interview</td>
<td>Learning and insight by critical and creative reflection of recurring themes</td>
<td>Identify recurring themes in daily project activities, explore them in depth</td>
<td>Semi-structured interview, one-on-one</td>
<td>Iterative learning related to specific individual needs</td>
</tr>
<tr>
<td>Written reflection</td>
<td>Review events and/or activities, plan for next cycle</td>
<td>Document thinking and observations</td>
<td>Structured reflection journal, memo writing, emails to self</td>
<td>Incorporate learning in next milestone, cycle, event, activity</td>
</tr>
<tr>
<td>--------------------</td>
<td>------------------------------------------------------</td>
<td>-----------------------------------</td>
<td>-----------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>Unframed reflection</td>
<td>New insights from critical and creative reflection with no structure</td>
<td>Consider all aspects of any theme that emerges during deliberate period of unstructured reflection</td>
<td>Convergent interviews, one-on-one. <strong>REFLECT</strong> mnemonic</td>
<td>New insight to inform future reflection</td>
</tr>
</tbody>
</table>

In summary, reflection was introduced into the way people work in the IS department, making use of existing structures such as those indicated in Table 5.1. People tended to relate to the more formal, structured reflection available to them. We introduced other forms of reflection such as convergent interviews. Not all people reflected in the same way or to the same degree. The change manager, project manager and clinical director of IS formed a community of practice – since reflective thinking came fairly easily to us, we were able to engage in higher levels of reflection, providing new insights for others to practice but the absorption of these insights depended on people’s capacity to consider them in the face of the demands of the project and their operational daily activities. Such opportunities for reflection in the workplace cannot be underestimated (Checkland, 2000).

**5.2.3 Planning for change management**

Following a literature search on change management, we developed the change management plan which was structured to include leadership, learning, communication and support as its foundation. Each of these will be discussed below in terms of how the change management was conducted and the response from the people in the IS department.
Leadership

We considered leadership to be essential for effective change, especially for engagement in the project and its planned outcomes. Kotter’s eight steps of change leadership (1996) were woven into the project and the change management plan as outlined in Table 5.2. Key elements of the project were matched to the eight steps so that components of leadership were built into the project process thus providing support for leaders rather than depending wholly on their individual leadership styles, understanding of the project and commitment to its planned outcomes.

Table 5.2 Summary of application of Kotter’s eight steps of change leadership (1996)

<table>
<thead>
<tr>
<th>Kotter’s Eight Steps of Change</th>
<th>As applied in the Infrastructure Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop a sense of urgency</td>
<td>Aggressive timeline</td>
</tr>
<tr>
<td>Develop a guiding coalition</td>
<td>Steering committee made up of IS management team and other stakeholders. The IS Manager was the project sponsor. Champions were found in the two DHBs to support the project especially during the desktop deployment phases.</td>
</tr>
<tr>
<td>Develop a vision and strategy</td>
<td>Vision and strategy as depicted in the suite of business cases. Vision explored in the change workshops and reiterated in project communications.</td>
</tr>
<tr>
<td>Communicate the vision</td>
<td>Vision communicated in detail in the Change Workshops</td>
</tr>
<tr>
<td>Empower a broad base of people to take action</td>
<td>Project team taken from general IS personnel. Training provided. AR used as basis for change management.</td>
</tr>
<tr>
<td>Generate short term wins</td>
<td>Staged project of six interdependent sub-projects</td>
</tr>
<tr>
<td>Consolidate gains and produce more change</td>
<td>Built next step of project on the last one</td>
</tr>
<tr>
<td>Institutionalise new approaches in the culture</td>
<td>Staffing restructures marking significant changes in the department (Zehir &amp; Keskin, 2003).</td>
</tr>
</tbody>
</table>

This use of Kotter’s eight steps of change appeared to work well: however, people seemed concerned by the aggressive timeline and the insistence that once the project was up and running it could not be stalled, delayed or turned back to the previous state. There was a ‘go, no-go step’ before the activation of each technology milestone since the technology itself did not allow for a roll-back in the event of failure – it simply could not
be rolled back technologically. These were times of high stress for the project team since
the decision to go ahead was not retractable. Although it fitted well with Kotter’s steps of
consolidating gains (building one success upon another), and generating short term wins
(distinct milestones that are forced to go forward), some of the managers had difficulty
supporting the ‘go’ decision in the ‘go, no-go step’ prior to going live with new
technology in some of the milestones. This was expressed afterwards as follows, by one
of the team members:

“We couldn’t have done the project differently. It was so big and we had limited
resources so would have ended up doing it the same. If you plan more and put
back the start date you’ll never get going!”

However, there were those who struggled with this combined form of built-in and
iterative commitment. A combination of naïve management (new to the role, difficulty in
taking responsibility for team outcomes, and difficulty in negotiating team boundaries),
inexperience in leadership and lack of understanding of the complexity of the project
resulted in extreme stress for some leaders, including team leaders and managers in the IS
department. The result was a tendency to lead a call to stall the project or demand a
reassessment of the project plans, or simply to express lack of confidence in the project’s
outcomes as described in my reflection notes after a change workshop.

“He feels that the project is too ambitious and that we should shelve some of it.
Some of his concerns are that (a team member leaving that week) will not longer
be able to do the specialist work....which means that a huge load is being placed
on the rest of the team...By the time they have employed a new team member that
aspect of the project will be over....staff are not coping with the workload....stress
is very high.”

The project’s vision was encapsulated in the six business cases outlined in Chapter 4. The
November newsletter for the project stated the vision as follows:

“A consistent look and feel whenever you use a computer, regardless of whether
you use one at Counties Manukau or Waitemata DHB, is what Project Fusion is
all about.”
The vision emerged as a result of the first set of change workshops in which we invited IS personnel to express their understanding of the vision after a presentation providing a detailed description of the project and its expected outcomes. At the beginning of the project the IS personnel were also invited to give it a name, the best choice being Project Fusion. The name was apt, but there were naturally those who used the name to express their negative views of the project by calling it Project Confusion!

The guiding coalition in Kotter’s eight steps was derived mostly from the IS management team with the IS Manager herself being the project sponsor, and the management team the steering group. This was met with some criticism within the IS department, the project and the DHB stakeholders. There was consensus in the criticism that some stakeholders had been excluded and that the leadership provided by those directly involved in the project, i.e. the managers, were at risk of being unable to provide governance on a more abstract and strategic level. To counter this, the project manager included the DHB stakeholders in regular meetings to discuss project milestones and pertinent details, and to assess and plan mitigation and management of any issues and risks that concerned them.

In this project there was a range of sources of leadership (Day & Norris, 2006a). Some of the IS management team were new to management, while one manager did not appear to be engaged in the project at all, and others appeared to carry more than their share of the leadership and management burden as evidenced by the apparently lopsided organisational structure of the IS department with almost 45% of the department reporting to one manager, while four managers led the balance of the department. Within the IS department, there were those whose leadership role was mandated by the position they held as manager. There were other leaders who were indirectly involved in the project because of their executive role in the DHBs and the shared services organisation. There were also unmandated or informal leaders whose leadership emerged as a form of contingency leadership – the people who rose to the occasion when leadership was required but not available at the time or for a specific need. There were novice and mature leaders. There were formal leaders whose role positioned them as
logically appropriate leaders. There were tangential leaders who appeared to be mandated as leaders but had not aligned themselves to the project and appeared to be following a different vision. At one extreme some of the leaders appeared to be in direct conflict with one another, while other leaders seemed to work as a well-oiled machine that delivered the type of leadership most followers sought. There were also those who were in leadership roles but did not appear to lead at all. Some leaders appeared to exhibit a combination of these facets of leadership depending on the situation or their shifting role in and out of the project.

Interestingly, although people described the kind of leadership that they ideally would have liked to see, they appeared to select leaders with whom they simply connect (Kouzes & Posner, 1990), regardless of those leaders’ support or lack of support for the project. They expressed this in terms of leadership qualities they did not want to see in their leaders. They appeared to feel that the project and department managers were key leadership figures. Yet they had several complaints about the perceived tone of the leadership that was provided, such as:

“People were actually going to get it working and it was a sledgehammer approach. You don’t need to add more stress. It would have been a fun environment to work in and change but you don’t need the Hitler approach saying, ‘we want this, this is going to happen, we don’t care’. I understand why they wanted to say that because basically they didn’t want those things to be slid under the table.”

On the contrary, others saw the same people as being more than adequate in their leadership roles. One person described three sorts of leadership – overall project leadership, technical leadership and

“...another form of leadership where ....people were going out talking to people getting the word out there, this is coming and all sort of thing and people were aware of it (the project).”
Different people saw different leadership from the same leaders. There were two instances where some people saw a leader as being capable and successful, while others saw the same person as fundamentally unable to provide leadership for the project. In addition, people did not see the leadership they felt should be happening, as stated below:

“Management tell us they are telling us everything but we know that isn’t the truth. We don’t trust them any more. We feel that they were betraying their staff. We feel abandoned by them.”

Despite this discontent, there was a quality of leadership that left people feeling they could relate to the leader of their choice. Unfortunately some of those leaders were either too distanced from the project because they had no formal link to it, or they were tangential to the project in that they should have been involved but had a different agenda. One such leader was described in this way:

“I’m talking in terms of ‘the man has a vision and the man can express his vision’. He really was a man of the world. You want to be in that world and work in that world. He’s a visionary. Not unrealistic. But a vision. I want to go there.”

There were occasions when people were promoted into leadership positions, or hoped to be promoted as a result of the project. They were therefore new to leadership and were in the difficult position of having to learn about leadership while providing it under difficult circumstances in a project with tight deadlines, critical dependencies and a group of people who were critical of the leadership they received. In a situation where one such person received leadership that met his needs he said of his own opportunity to lead:

“And it was good, I really enjoyed it, I picked up things, hey, how to manipulate people, ‘I know we’ve got no people, but you’re the man,’ you know, just get him to actually do stuff that he hates doing but, yeah, and he does it with a smile on his face.”

In summary, there is a mix of leadership styles and capability. There is also a mix for those who follow in selecting their leaders in unpredictable ways usually related to how well they identified with the person, rather than as the result of an objective assessment of the leader’s role in the project or their leadership skills and capacity to see the project.
through. Kotter’s eight steps of change leadership (1996) were structurally built into the project with mixed results. Some people found it too stressful to follow or lead in the project since these steps were mostly irrevocable and not negotiable. Others found it useful that the project must forge ahead despite our concerns about its success or possible failure, and that we could focus on the work at hand while acting out the fundamental steps of change leadership without the complexity of inventing, learning or negotiating them on the trot. In addition to leadership we built in communication as a key component of the change management plan.

*Communication*

Communication is essential for successful organisational change (Elving, 2005) and as such was considered a critical success factor for Project Fusion. In the spirit of the change management plan, we developed our communication plan in line with the concept of complexity of health organisations (Begun et al., 2003), making the most of communication opportunities as opportunities for reflection and discussion, providing information about the project and promoting the building of a single community in the new IS department (Elving, 2005). Discussion with different stakeholders gave insight into the ways in which healthcare people communicate: there were several complaints that even if managers confirm that they have communicated important information to their staff, the information still does not appear to diffuse through the organisation, department or team. Bearing this in mind, we developed a communication plan that addressed the key aspects of the project in different ways for different audiences, and repetition, clarity, simplicity and brevity were considered essential for communication to be effective (Axley, 2000), as described in Table 5.3. Consequently we had a website for the project, a newsletter, emails to stakeholders, update emails to all users (used sparingly), meetings with IS personnel and stakeholders, guest visits to management meetings, and we encouraged corridor conversations.
Table 5.3 The communication matrix

<table>
<thead>
<tr>
<th>Audience</th>
<th>Communication media</th>
<th>Message</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>External: the public</td>
<td>Media releases</td>
<td>Changes about merging of IS department, new IT technology, impact on how your healthcare is delivered</td>
<td>4 for the whole project, linked to milestones</td>
</tr>
<tr>
<td>Internal: the DHBs, healthAlliance, IS department</td>
<td>Intranet website</td>
<td>Detailed information on the project’s goals, milestones and how it affects daily activities, what to expect, who to contact for more information.</td>
<td>Ongoing, weekly updates.</td>
</tr>
<tr>
<td></td>
<td>Newsletter</td>
<td>Reiterating project goals and milestones, providing updates on project progress, impact information such as go live dates and how they will affect daily activities in the DHBs, healthAlliance, IS department.</td>
<td>Monthly</td>
</tr>
<tr>
<td></td>
<td>Existing DHB newsletters</td>
<td>Feature articles on key project milestones and achievements.</td>
<td>Bi-monthly</td>
</tr>
<tr>
<td></td>
<td>Presentations to stakeholders</td>
<td>Purpose and goals of the project, how they impact on the stakeholders</td>
<td>Mostly at beginning of project, then as invited.</td>
</tr>
<tr>
<td></td>
<td>AllUser emails</td>
<td>Confirmation of Go Live with new technology, confirmation of milestone achievement, brief update on aspects of the project specific to user/stakeholder interests.</td>
<td>Associated with completion of sub-projects, mostly linked to final desktop standardisation projects.</td>
</tr>
<tr>
<td></td>
<td>Meetings</td>
<td>Updates on project progress, answer questions, deal with concerns, prepare for next stage of project.</td>
<td>Attended existing meetings with stakeholders, internal meetings in IS department, project team meetings.</td>
</tr>
</tbody>
</table>
We chose this broad array of communication tools in order to be able to send the project’s change message as effectively as possible in media that most people could relate to and understand in times of stress and information overload. Other operational communications about non-Fusion events, activities, and workload continued as normal. It was our task to penetrate the noise from these other activities with our Project Fusion messages. The communication plan aimed at meeting the need for people to know what was happening, how it would affect them and what was expected of them. Its goal was to “…facilitate the changes associated with Project Fusion by keeping the right people involved, engaged, informed and ready for the changes when they happen.”

People appeared to experience the communications linked to this project in different ways. When asked near the end of the project, there were those who felt that enough communication had been done and that it was mostly effective. Interestingly those who did not feel that communication was effective gave combinations of reasons for this. Several people seemed unable to take on the new information until it became meaningful to them. This meant that although we, as project team members and IS managers, had communicated according to the communication plan there were those who simply did not take on board this information until the project actually impacted on them. Because of this tendency written communications in the AllUser emails, the newsletter and intranet website were considered to be valuable. People could look up the information as and when they needed it. It also meant that these people could have been compromised in their capacity to respond to and use the information since the point of impact for the project collided with their need for information.

The differences between the IS departments of the two DHBs impacted on the ways of communicating for the project. There was a distinct sense of difference and people were aware of the different communication styles of the two departments. Difficulties in merging them into one with standard processes were highlighted by these communication style differences. The one DHB team had offices and many meetings while the other had an open plan office where conversations were often overheard, people felt included, and
it was easier to just jump up and ask questions as described by this person when talking about his ease of communicating with people around him:

“…communication was very good. What helped was that it’s open plan, it’s one area and if there’s a problem and I came in, yeah, we’ve got a problem, and we’ll do this about it. It’s all one bundle. It was easy to communicate because we were all together. And that’s what I like about it – it’s really there, you can feel it when you walk in…”

There was a sense of overload at certain points during the project when people desired more information, were given it, but were unable to process it for a number of reasons. They could not make use of the information because it was either too technical, was untimely (too early or too late), did not appear to be useful at the time of delivery, or appeared to be pertinent to other people rather than applicable in their own situation, or the stress was so high (with low resources, high workload, not enough time to spend on informing ourselves, and looming deadlines for milestone achievement) that people were not in a position to make sense of incoming information.

The beliefs regarding communication differed from person to person in terms of those who delivered it. This influenced the form, structure and functionality of communication and how we delivered change management (Checkland, 2000) and was evident in a number of ways.

- The IS personnel felt that the management team provided information on a need-to-know basis. This was supported by the lack of transparency for the business cases – they were never released for scrutiny by the personnel on the basis of confidential information regarding restructures, potential staff redundancy, and other sensitive information. This left people with a sense of distrust and abandonment. From the managers’ perspective there were situations of subsequent difficulty in planning communication regarding these sensitive aspects of the project. For example, an update meeting was planned for the IS department and at the last moment was converted into an announcement regarding the final of three departmental restructures resulting from the project.
• In addition to this difficulty in communicating sensitive aspects of the project, there were those who did not agree with the communications plan. This dissonance emerged late in the project when the project focus shifted to the second DHB for the desktop standardisation. Because people became engaged in the project only when it impacted on daily work activities, those who had until then been unaffected, were surprised by the apparent lack of available information. They complained that they had not been told about the project’s details, nor had they been given an opportunity to discuss the impact with their manager, the project manager or any project team members. It is interesting to note that these same people had attended the change workshops, received the AllUser emails, been in discussion with their manager about the project and been invited to meetings to discuss how the project would impact on their daily work activities. It appears that people prioritise what communications get their attention, depending on the demands of their workload at the time. This could be construed as communication noise which, if a person is left at a disadvantage because of it, will cause resistance to the change that is being communicated (Elving, 2005).

• There are those who solve communication problems that they perceive. Even if they are involved in the development of a communications plan for a project they will independently develop incidental solutions to communications problems that they perceive. For example, one such person developed a poster about one of the project goals for the desktop deployment. This effort was not consultative, nor did she appear to objectively assess the need for it. The poster was received by users in the DHB with mixed reactions: it met some of the need perceived by this person.

• There is immense power in informal conversations, eavesdropping and casual chat sessions with colleagues. These conversations appear to play a major role in the ways in which people work as a community. The freedom to say what is on our mind, the lack of serious consequences when we make throw away comments, joke about our difficulties, and clarify other people’s experiences when we ourselves feel overwhelmed by the changes before us. The project manager did a round with the whole department on a regular basis, casually asking questions, dealing with issues and generally keeping his finger on the pulse of activity. There were times, especially
when people were experiencing difficulty, when they indicated they would have liked to see more of this from their team managers and the IS manager.

To round up, the communication plan was developed in collaboration with the team managers, project manager and IS manager and signed off as part of the project plan. It was delivered in multiple formats and media, making use of clarity, brevity and repetition, bearing in mind who the audience was at all times. Many people participated in the delivery of the communications relevant to the project and there were many different experiences of communication. We tend to sit up and take note about changes just as they start to impact on our daily work; until then we pay lip service to receiving and using information. We communicate according to our organisation’s or team’s culture, and this is exacerbated by the design of our offices (office per person vs. open plan office space). An overload of information seems to collide with our initial engagement with a project, on the cusp of its impact on our daily work activities. We have conflicting beliefs about communication – personnel want more information than management are prepared to share, late engagement in a project creates conflict with a communication plan already in progress, people solve communication problems unilaterally especially if they enter the project some time into its progress. Casual communication is powerful in that it provides opportunities for people to clarify information and gain a shared understanding and create a community of practice in ways not otherwise available.

At times the boundaries between communication and learning become blurred. A large component of project communication boils down to learning. The following section outlines the training programme and its related findings.

Learning and training

Learning is an important way of achieving change (Argyris, 1976). The learning and training that occurred on Project Fusion was complex. Each of the seven projects affected different people in different ways. In addition, there was a need for technical training, process training, user training (for non-technical people such as clinicians), as well as the
need to learn new ways of working and develop new relationships with colleagues as a result of all the change. Project Fusion was the first large scale organisational implementation of the software being used in the world. This meant that the project team were doing double-loop learning (Argyris, 1976) in order to accommodate any first implementation issues and solve problems that they otherwise would not have needed to confront. Some aspects of the project brought about newness for the second DHB that distilled the need for new learning on the part of the IS team based there, such as the implementation of thin client and terminal server for some administrative teams in the second DHB.

The complexity appeared to be the greatest for the HelpDesk team. Parallel to their own learning and the implementation of changes in their own work environment, they were required to assist IS personnel in their learning when solving problems, as well as deal with the DHB users who had a combination of learning and troubleshooting needs in most calls to the HelpDesk during the project period and for a short while after completion of the project. To add stress to complexity, the workload for HelpDesk doubled during the desktop standardisation implementation period while users were shifting from the DHB-based infrastructure to the single, shared services-based infrastructure. For three months the HelpDesk dealt with one DHB on the new infrastructure while the second DHB shifted over. They learned as they worked.

In response to this complexity the training and learning opportunities were also complex. Teams were sent for training: those who attended training first hand were trained so that they could teach others how to use the technology. One team appointed a trainer to document processes and train their team. This trainer was not made available to train personnel in other teams, despite overlaps. Some of the project team members were consultants who were global experts on aspects of the technology – these people worked alongside the IS personnel and part of their consultant role was to train the personnel in using the new technology. However, this coaching, mentoring and teaching had to be juggled with a heavy workload and other distractions such as trouble shooting and problem solving. A need arose for the management team to improve their management and leadership skills. This need was met by employing an external coach. In addition, two
IS staff members were identified for project management learning. The project manager took on the role of coaching and mentoring them.

The IS department had its own training team whose mandate was to train users within the DHBs for software they use in their daily clinical activities. This extended to providing training on Microsoft Outlook. Both DHBs already had an arrangement with Microsoft for training on other Microsoft applications – since this was paid for by the trainee’s department it was not covered by the project’s budget. Added to all this was the need to learn as we experienced new technology, new processes and new relationships. This resulted in blurred boundaries regarding who received and provided training under which circumstances, which in turn collided with the need to provide straightforward technical training related to the project.

There was a tension about learning that at times seemed difficult to manage. There was no doubt that training was essential. In principle the IS managers and project manager held up training and learning as a priority. On the receiving end there was a strong demand for training. People wanted to be trained so that they could get a glimpse of the future in addition to learning how to do things.

“There wasn’t a clear understanding of what the XP environment would look like or how it would work until our own PCs were XP’d. We did not see the other systems in action until they went live. There was not a strong sense of what the project means in concrete terms.”

However, as is the nature of projects, when people were given such a glimpse there was no guarantee that the final product would be like that glimpse. The training team (for DHB user training) were scheduled to upgrade their desktops to prepare the training. However, the ongoing need for adjustments that were characteristic of ICT projects meant that the training team had to develop their MS Outlook programme just before the desktop standardisation project started with limited time for lesson preparation.

The lines between communication and training blurred during the project. Since there was little provision for the DHB users to learn how to use the new operating environment
of Office 2003 with all the updated associated Windows applications, and to adjust to the single logon and new security rules, communication became essential in terms of developing brochures for users to assist them with their first logon, show them how to use the new versions of the applications and highlight the changes. The tension between the demand and need for training and the actual delivery was apparent during the part of the project for the DHB users. This resulted in an exponential increase in HelpDesk calls which included many questions about how to use the new operating environment in addition to troubleshooting requests.

A paradox arose regarding the timeliness of training. Although the demand was high, the capacity to allocate time for people to leave the department and their workload for that training was diminished by the temporary sharp increase in workload and the decreasing resources to get through it all. This was compounded by the challenges the managers faced in managing their teams’ workloads while simultaneously learning their new roles (which resulted from the project) and the new technology and processes confronting their teams. In most instances training came late. This impacted on how people adapted to the changes brought about by the project and how they handled the increase in workload with its accompanying increase in stress.

“The darkest moment was going live ... and not knowing how to do things. Not having the training that we needed until after we went live. It was linked to learning and knowing how it all works.”

People wanted to learn up front about the new technology but if they did, then they would still not know about the ongoing adjustments to the technology. However, only a few people insisted on this learning regardless of its appropriateness to their daily activities and they appeared to find the changes easier. Some people appeared to learn in spurts as the project impacted on them while others made learning a continuous thread in all their work. This grabbing at learning rather than waiting for it appeared to be linked to an individual and personal conviction about the value of learning; it was the exception rather than the rule.

In summary, although learning was considered essential for project success it was not easily achieved. Just-in-time learning would have been the ideal but different people
needed learning in different ways and at different times. Training was provided in many forms but did not meet the needs of everyone. There was a tension between the demand for learning and the capacity to release staff to attend, and for staff to absorb it all. The boundaries between communication and learning became blurred and at times communication tools were also learning tools. IS personnel not only learned the new technology, processes and relationships but they also were required to reflect on their work as they learnt, perform trouble-shooting and problem solving activities and help others learn all that the same time. Many of the people in the IS department were required to provide support at the very time when they most needed it themselves.

**Support at the turning points of change**

The last aspect of the change management plan was about providing support at times of going live with new technology. Two groups of people needed support of very different kinds. The first was the IS personnel whose teams were receiving new technology and processes, and the other was everyone who used a computer in the two DHBs and healthAlliance (for the desktop standardisation). For the desktop standardisation the people providing the support were also in need of it as they were the first to have the new desktop just before the rest of the organisation changed over. This meant that the vendors (of the new technology software and hardware), the IS department and representatives within the DHBs all needed to work together in the interests of consistency, learning and being able to get on with their daily work activities without compromising productivity or patient safety. In addition, communication tools such as information brochures were developed so that the HelpDesk staff could refer callers to the documents to help them learn the new software.

It was at the times of go live that sensitivity to initial conditions became most pronounced. Despite the availability of extensive support, some changes brought about by the project had disproportionate consequences. For example, a small switch was overlooked in the terminal server system in the transfer of the clinic bookings team in one of the hospitals to thin client. This caused the whole outpatients department to go down for a few days. The clinic attempted work without the computers, and their staff kept
trying to complete their work electronically in the short periods when the system was available until the problem was discovered and rectified. Frustration was extreme. There was a great deal of concern over patient safety and the compromised capacity of the clinic to get on with patient care safely. While resources could not be allocated to provide support for these people as they struggled on, those who were available relied on relationships and regular updates to keep supporting the clinic team.

In the IS department the boundaries between learning, training and support blurred. The training was late in many instances and at times just-in-time formal training would have been more effective than the training/support that occurred in response to the situation at hand. This resulted in support coming over as inadequate for a number of reasons. People were not confident that they knew what they were doing at the time of go live. Conversely they felt confident that they were able to help users in the DHBs, even when they themselves felt unsupported and abandoned. It was at go live time when people began to feel they had more than a glimpse of the future which was now becoming their present. They suddenly had a sense of what was really happening to them and it was starting to make sense to them.

“Now we’re finding that we are asking the right questions.”

In summary, support at go live times was essential for change management success. However, because learning was difficult for many and training was late for some teams, support took on a teaching role that it otherwise would not have had. There was a blurring of boundaries between training, communication and go live support. The capacity of the IS department to provide and receive support was compromised by the disproportionate workload, unpredictable consequences for small actions or inactions, and the lack of resources to deal with major unexpected issues. Despite the difficulties in providing support people began to make sense of the changes we had all been talking about during the preparations for each subproject’s go live.
Workshops as a tool for change management

In addition to this comprehensive change management plan, we developed a workshop programme (Greenly & Carnall, 2001) for the project team in order to facilitate their role in the project’s goal of a single IT infrastructure with its associated changes in processes, technology, relationships and culture. The IS management team identified so strongly with the content of the workshop that they insisted that the entire department attend in order to achieve the fullest potential for change. Since resources were limited for a whole day out of the office while operational work demands continued, we negotiated a series of three two-hour workshops for the project team and two for the rest of the department. This kind of emergence of something different from the plan is characteristic of complex adaptive systems (Hanson, 1995) and action research (Reason, 2006). We used the workshops to communicate in detail the goals and objectives of the project, offer opportunities to explore the implications of the project on everyday work activities, consider possible change experiences, assess expectations and align them with the project’s expected outcomes, clarify roles and responsibilities, and gain a shared understanding of the project, its components and expected outcomes.

The workshops were attended by the whole department according to their capacity to release personnel from operational and project activities. There was difficulty in gaining full attendance due to operational and project pressures, lack of resources to perform all the work during times when people were out at the workshops, lack of commitment for the workshops and change, and inability to see how they could contribute to the project outcomes. We followed an outline provided by worksheets developed for the change programme by the change manager. The worksheets provided the objectives of the workshops, each workshop’s agenda and instructions for group activities. Most people appeared to participate in the activities, ask questions and exchange insights with one another, but there were many distractions as people found it difficult to relate to the ‘touchy-feely’ aspects of change management, or they were answering mobile phones and trouble-shooting and multitasking. Although they were able to complete the group activity about stakeholders, customers and relationships (including roles and
responsibilities) there appeared to be superficial insight into these aspects of their work. This seemed to influence their commitment and capacity to engage in Project Fusion’s activities as they were more focussed on dealing with workload than looking broader and forward and adjusting to the changes of the future.

Group dynamics interfered at times with progress in the activity at hand, e.g. one team leader was flippant about everything in such a way that it was hard to hold a conversation with him, while others were engaged in trouble-shooting a problem on the phone. People also used the workshops as a venue to air dissatisfaction about their jobs and the project and to ask questions about detail regarding the project that their colleagues, team leaders or managers had not answered to their satisfaction. In some instances some people’s perspective conflicted with that of others, making dialogue difficult. Some people with differing perspectives patiently worked with the others in their group until a shared understanding was achieved. Although the workshops appeared to be a negative experience in some ways they did alleviate some uncertainty regarding the expected outcomes of Project Fusion: the IS personnel tended to not trust their managers (as demonstrated in a company-wide survey at the time of the project) and the workshop provided an opportunity to check and verify project-related information in a more neutral environment. Expectations were explored and unrealistic expectations discussed.

As a tool for change management, the change workshops provided an opportunity for the IS personnel to extract themselves from the daily demands of operational and project activities and reflect on the implications and expected outcomes of Project Fusion. Later some people did not remember attending the workshops, others were conflicted about the value they added, but most people used these workshops to clarify the project’s goals and implications, express concern about the project, explore other points of view, and learn new insights about the project and their roles in the department. This meant that the balance of the change management programme was more readily absorbed into the project’s process and people were more accessible for leadership, learning, communication, and support purposes. The issues around group dynamics, commitment and distractions played out in their daily work before and after the workshops.
In summary, change management is a critical success factor in ICT projects. Since these projects usually occur in complex adaptive systems such as healthcare, change management reflects the complexity of such a system. Change theories and models informed the development of a change management programme for the project, such as Lewin’s three stages of change (1951), and Kotter’s eight steps of change leadership (1996). Leadership, communication, learning and support were the essential components of the programme and were supported by the delivery of change workshops to inform personnel about the project and offer opportunities to engage in the project and its associated changes. The complexity of the project and the changes it brought about highlighted the need for astute change management for project success.

5.3 Discussion

When change is seen as a property of a complex adaptive system, change management takes on a new light. Action research is potentially a useful tool for weaving change, and leadership, learning and communication are essential components for successful change management.

5.3.1 Complexity of change and change management

From the findings indicated above, it appears that we generally assume that change, although in itself it is not linear, is perceived as a linear phenomenon that can be harnessed in a process. The corollary to that assumption is that change management follows a logical process, assuming that we can align how we manage change to how we create and respond to it (Amis & Slack, 2004). In addition, we assume that a change management programme can be aligned as a process with the process of project management. In fact, the findings show that change is messy, even when planned and carefully managed. This is especially the case when action research, with its cycles and principles of emancipation, democracy and learning, is added to the mix (Reason, 2006). Although we perceive our world to be predictable, comfortable, known and knowable most of the time, as depicted in Figure 5.3, ICT projects shift us into the zone of complexity. In this way we live out our straightforward change plans in ways that are full
of deviations, loops and iterations. If an ICT project is part of planned radical change then we are jolted beyond the zone of complexity and on to the cusp of chaos where things are unknown and possibly unknowable, unfamiliar, ambiguous, uncertain and unpredictable. In this context it could be argued that the role of change management is not to be

“...the process of managing change – reducing resistance to the change and increasing support/commitment for it ....Change management makes that change, whatever it is, happen” (Castle & Sir, 2001).

It appears that it is more likely that the role of change management is to ensure that we journey safely through the changes, looping through the cusp of chaos as we master new technology, processes and relationships in order to return to a new version of our comfort zone where we once again perceive our workplace as having low complexity (Day & Norris, 2006a). Eclectic change management is more likely to apply in this setting than using a single model of change management to predispose us to change our ways of working rather than deterministically making change happen as described by Castle and Sir (2001). This means that when we manage change we depend more on Moss Kanter’s model of complex change (2000) that occurs in multiple forms on differing levels in an
organisational setting than we would on the process-based models of Lewin and others (Elrod & Tippett, 2002). People do not experience change in a uniform or predictable manner. Our responses to change incorporate differing starting places, especially when people with different roles are subjected to phased projects such as Project Fusion. We usually respond to change when it affects how we go about our daily work activities: we may have set ourselves up to accommodate the expected changes but we generally begin our adaptation only when our work activities are affected.

At times this delay (or sometimes procrastination) in beginning to adapt can be misconstrued as resistance to change or lack of readiness for change. However, the demands of our operational activities, especially if we are working on both our operational activities and the project that is bringing about these changes, leave us under-resourced for proactive responses to change. In addition, if we tend to normally work reactively, then our response to change will be as reactive as our response to our daily work demands, as was the case in the IS department. However, this apparent resistance to change has its uses (Mabin et al., 2001). When we know what the constraints are for change we are able to work with them rather than against them. Resistance to change can potentially become a tool for change. The complexity of change and the potential to use previously perceived detractors from change to possible change facilitators causes us to review change management in light of the properties of complex adaptive systems.

The properties of complex adaptive systems are evident in health organisations and health ICT projects, as discussed in Chapter 4. Therefore change management itself is influenced by these properties in that we need to adapt our models, approaches and viewpoints to accommodate these properties in order to predispose our organisational change efforts to success. The influence of the properties of complex systems is discussed below (Begun et al., 2003; Plesk & Wilson, 2001).

- **Fuzzy boundaries.** Not only are there fuzzy boundaries between ranks and disciplines in healthcare (Dooley, 1997), there are also fuzzy boundaries between the way we work in our comfort zone and the impact of change that shifts us out of that zone. There are also fuzzy boundaries between change management, general
management and leadership. Those who took things into their own hands when the project affected their own DHB appeared to have created their own boundaries: we all create boundaries around our own patch but they are not clear to others until changes influence them. Changes in turn make boundaries that seemed clear appear fuzzy.

- **Influence of internal rules.** The establishment of a shared services organisation complicated the use of internal rules: although there were many commonalities between the two DHBs there was still a call for customisation for each DHB. These internal rules influence change management such that decisions are more complex when working on other people’s turf for the purposes of change management. Collaborative change management is not enough in that informal leadership on another person’s turf can result in resistance to change if people are inadvertently snubbed, ignored or misunderstood, or if leadership appears inappropriate or communication ineffective.

- **Emergence** is natural in complex adaptive systems and in a changing environment (Hanson, 1995), especially when most personnel are operating in the zone of complexity or at the cusp of chaos during a project. Unexpected consequences may emerge and they may be undesirable – it is at this point that a project may be considered a failure (Heeks et al., 1999). However, some unexpected consequences may be to the benefit of the project, even in the absence of leadership or change management (Smith, 2004). The role of change management is to identify this form of emergence and nurture and support it in order to assist in the journey back to the familiar.

- **Sensitivity to initial conditions.** Since health ICT projects can be considered a failure due to budget, time or scope blowouts (Glaser, 2003), small changes to a project can result in such blowouts while big adjustments can make no impact at all. Rather than attempting to guarantee success for a project, the change manager and project manager should be working at including into the project those components that predispose success. The art of change management lies in the capacity to plan change and work with the differences that emerge as we live the change plan and its consequences. Not all change projects result in the desired change and the projects that precede the one at hand could influence it one way or another. For example, the
fact that a similar attempt had been made in the past could influence the perception of

- **Tension and paradox.** While organisational change is desirable it comes as a double-edged sword (Brown & Eisenhardt, 1997). Changes are accompanied by increases in workload as we adopt new processes while simultaneously working at discontinuing the old processes and technology. Yet at the same time resources are stretched as some people leave the organisation, new personnel come in but need new skills, and project demands are being made upon already strained resources. Tension increases between the demands for an increase in resources as the workload temporarily increases while we are working in the zone of complexity. In addition, when projects are initiated in complex healthcare organisations, managers appear to support open, participative leadership regarding the project yet paradoxically lead in a more authoritarian manner in order to push the change through.

- **System and its agents are adaptive.** The agents in a system are linked by their relationships and the internal rules that govern them (Begun et al., 2003). The agents, the relationships and the system are adaptive. The art of change management lies in the ability to discern these relationships and use them while people are in the zone of complexity in order to return them safely from their journey to the cusp of chaos back to the newly familiar and apparently straightforward. It is possible that the agents and system demonstrate a tendency to change rather than to resist change and that the spontaneous changes can be harnessed to support planned change that is under way during a project.

- **Patterns are a natural part of complex systems.** Change is not a unique, individualist experience in that its existence forms patterns in an organisation (Bolman & Deal, 1999). The art of change management involves the identification of those patterns so that they can be incorporated into change management activities. Sensitivity to initial conditions, paradox and tensions, and the influence of internal rules all contribute to the patterns we create in organisations during changing times. Some projects may be considered a failure in their first attempt but a future attempt at implementation may be able to build on the alignment of certain patterns that emerge from the apparently failed implementation (Amis & Slack, 2004).
• **Complex systems are resilient.** The healthcare system’s resilient nature is demonstrated by the capacity for our healthcare system to absorb the multiple innovations, iterations and changes brought about by the implementation of knowledge management systems (Orr, 2004). Although there is a high rate of failure in ICT projects (Shore, 2005) we continue to implement innovations in healthcare knowledge management. Change brought about by health ICT projects is disruptive in an environment that is intolerant of the risk of medical error (Leape & Berwick, 2005; Riolli & Savicki, 2003). While change management aims at bringing people safely back from their journey through the zone of complexity, it is also important to build resilience in preparation for the next opportunity for change. The agents and their system are not only adaptable: they are also resilient in the face of relentless change and its accompanying disruption.

Since change management is influenced by these properties of complex adaptive systems, change management becomes an art that involves planning as well as sensitivity to the system and its unpredictability, its relationships and links, it patterns, paradoxes and tensions, and its resilience.

**5.3.2 Action research as a tool for weaving change**

Action research is an effective way of initiating and implementing change in organisations and other arenas (Baskerville, 1999; Maynard, 1995; McArdle & Reason, 2006; Reason, 2006; Waterman et al., 2001). One would prefer to use AR from the outset so that collaborative partnerships can be developed prior to the intervention that results in change, and so that the intervention is identified and finalised collaboratively between the researcher and the organisation in which the change is going to occur. However, it appears that AR is flexible enough to allow for its start time to occur after the host organisation has already identified and begun the implementation of its intervention, such as the infrastructure project in an emerging shared services organisation. It appears that the utilitarian and pragmatic nature of AR (Reason, 2006; Waterman et al., 2001), with its ‘real world’ basis gives it this flexibility. However, we need to be careful of the pitfalls of AR in such an environment.
According to Kock (2003) the threats to AR success are contingency, subjectivity and uncontrollability. It appears that when coupled with an ICT project that is subject to the strong discipline of recognised project methodologies, such as the PMI methodology (Cleland, 2004) the AR component is also subjected to that discipline. However, where AR is subjugated to the project, there is the risk of the researcher becoming a consultant (and losing the research role), or the AR component is reduced or disabled due to competing interests between the research and the project goals (Avison et al., 2001). Where AR is not the dominant component of an organisational change project there is the risk that it will be diminished and its impact negated. The AR role regarding learning, emancipation and democratic change will be at risk of being diluted due to the demands of the dominant project. AR uses up time, and in a strongly disciplined project, time is not available for anything that does not add value to the project. It is therefore essential, at the outset of negotiating a place for AR in an ICT project, that AR adds value to the project in such a way that it cannot be eliminated from the project during times of stress when people are operating in the zone of complexity, or worse, are struggling to return from the cusp of chaos. It is during these times when subjectivity can become a threat and poor decisions a consequence.

No apology is offered for the role of subjectivity in action research as such research is based on our experiences and how our learning can be returned to us in forms that inform future action (Brydon-Miller et al., 2003; Reason, 1998). We construct our reality, usually using language (Golinski, 2005), and it is that construct that we use when practising reflection in AR. However, the risk of subjectivity in our AR is more likely to arise from poorly developed constructs and from indulgent, undisciplined and incomplete reflection. Reflection needs time and attention (Pillow, 2003) and if its value is not perceived during the course of a project, especially if that project is task and action oriented, then reflection will either become too superficial to be of use or it will fall by the way (Day et al., 2006). During the difficult times in the zone of complexity, difficulty in reflective action is heightened, along with difficulty in making sound decisions and learning from our experiences. Boundaries are fuzzy during the time spent in the zone of
complexity and retaining the balance in subjectivity for the purpose of learning from our experiences becomes difficult, requiring stronger reflective discipline.

It is relatively easy to find opportunities to weave the AR cycle of plan, act, reflect and modify (Brydon-Miller et al., 2003) into ICT projects due to the nature of the project methodology used commonly in IS projects. The project cycle of methods such as PRINCE (Bentley, 1992) and PMI (Project Management Institute, 2000) correspond with the AR cycle, providing opportunities to build in group reflection sessions, written reflections such as handover documents, and individual reflections depending on the aptitude of different people for different modes of reflection. The AR cycle can be used repeatedly and simultaneously on macro and micro levels throughout the duration of a project. Although Kock (2003) emphasises the need for multiple iterations of the AR cycle to produce rigorous research results, it may be more productive to build several layers of the cycle into a project, especially if there are subprojects or the project is phased or the project is part of a complex adaptive system such as healthcare. The cycle needs to become a way of working, as much as reflection becomes a way of living (Day et al., 2006; Waterman et al., 2001). Every action becomes a cycle in that we are invited to review and reflect on our actions and ask always the question, “If I could do this action again, how would I do it differently, knowing what I know now?”

An important reason for taking on AR as a tool for change management is to shape an organisation towards democracy and emancipate its people so that they can become active partners in its progress (Reason, 1999a). Organisations are different in their structures and functions such that it requires a suite of approaches to understand how they work in their different ways (Bolman & Deal, 2003). This means that some organisations are more predisposed to the emancipatory results of AR than others are. Healthcare may be one of those types of organisations due to the mismatch of roles and ranks between management and clinicians. However, this is not the case for IT people who tend to be less socially orientated in their approach to work and more task and action orientated. It appears that they are less likely to engage in reflection and to achieve partnership with their colleagues and managers than clinicians are. There is a risk of political issues arising
where leaders and managers may sabotage the work of action research or simply remove the AR role from a project to retain their political position within an organisation and to keep and exercise the associated power (Reason, 2006). Conflict may arise when difficult and uncomfortable reflections as described by Pillow (2003) are needed in order to progress towards emancipation from the previous ways of working to the new ways. The added vulnerability (Bell, 1998) may make it hard for naturally introverted people to participate in emancipatory activities.

AR is useful as a success factor for change management in health ICT projects. It can be used to initiate a project or it can be initiated as part of a project. The cycle synchronises well with the project process, reflection is useful in supporting essential learning that is required for project success, and the roles of emancipation and democracy are useful in releasing people from previous ways of working to the new ways introduced by a project. This does not mean that they have to become politicised and activate for freedom and partnership in the workplace if it is not functional to do so. The usefulness of AR in change management is dependent on how people make use of leadership, communication and learning in order to support changes brought about by ICT projects.

5.3.3 Leadership, communication and learning in a changing workplace

Leadership, communication and learning weave together in the art of change, as we manage it collectively and individually, as we simultaneously respond to and manage change brought about by ICT projects. Since leaders come in different forms, styles and roles to contribute their own brand of leadership to the situation in which they are working, we cannot expect from them a single, linear approach to leadership. Models for leading change are useful in that they provide frameworks for us to use but in complex adaptive systems there is an art to applying those models and the theory that is available to assist leaders in their roles.

When ICT projects are initiated it is our leaders, not a single leader in the workplace, but a group of leaders, who usually take us out of our comfort zone in the less complex world of the familiar and simple. They use projects to shift us through the normally stimulating
zone of complexity, to the other side and give us a taste of chaos where very little is predictable, comfortable or knowable (Barton et al., 2004). Usually a decision to implement an innovation is collective, as was the case with Project Fusion where the IS management team, stakeholders in the two DHBs and executive leaders in the shared services organisation collectively agreed on the infrastructure project. Patterns of leadership emerged as a sponsor was identified, champions emerged, a steering committee was formed and the IS Manager appointed a project manager to ensure that the project was implemented (Cleland, 2004). These leadership positions are commonly associated with projects in an attempt at ensuring success (Pinto, 2004). Although much of the literature adopts the tone of a single leader with a vision, integrity and a transformational leadership style (Bryman, 2004) in influencing change it is the collective mix of leadership that appears to be more useful in a complex adaptive system.

Leadership is not guaranteed to ensure successful or desirable change, where unforeseen changes emerge which could contribute to or detract from project success (Smith, 2004). Either managers in leadership positions are over-enthusiastic about an innovation and make unrealistic decisions about them (Lovallo & Kahneman, 2003) or productive and constructive changes emerge without any leadership (Smith, 2004). Since there are many players in the leadership of a project, communities of practice appear to form. Leaders who identified with one another in a situation such as that of an ICT project appear to drift towards one another and provide a coalition of leadership in support of one another.

A community of practice occurs within a social context, such as an ICT project, in which groups of people learn collectively (Garrety et al., 2004). They establish a shared understanding of goals and ways of achieving the goals, and together enhance their capacity to perform within that context. This is also true for leaders involved in innovative ICT projects in complex adaptive systems. As they provide leadership they learn about such leadership as the consequences of their own leadership and that of their network (or community of practice) impact on the project’s progress (Amis & Slack, 2004). This is especially true when such projects introduce opportunities for promotion and new leaders are exposed to the complexities of their new roles as managers and leaders. It is the role of these leaders to establish a clear vision, articulate it repetitively to
their followers in clear and brief terms, and to communicate pertinent aspects of the project throughout its lifetime. On the other hand, not all the leaders available to a project are included in the community of practice of its supportive leaders. There are also leaders who appear to support the project but enact a different agenda (tangential leadership), those who demonstrate apathy to the project and pay lip service to it, and those who actively oppose it. There is a risk that a coalition of these leaders may occur in order for them to sabotage the project or at the very least resist its implementation (Hersey & Blanchard, 1993). It is the responsibility of the supportive leaders and the project sponsor to identify these leaders and their followers and work at defusing their resistance or using it to predispose the project for success (Castle & Sir, 2001; Mabin et al., 2001).

In the same way that leaders form coalitions (formal or informal), followers also form communities of practice or coalitions. We can expect project team members who are working in the zone of complexity to form communities of practice in order to enhance their learning of new technology, processes and relationships to facilitate their adaptation to the change they are facing (Garrety et al., 2004). People resonate with the leaders of their choice (Kouzes & Posner, 1990) and are therefore influenced by the commitment to the project of their chosen leader. This means that even if they are convinced of the project’s compelling case for change and other change leadership components are built into the project, such as Kotter’s eight steps of change (1996), then if the leader of their choice does not support the project, conflicts arise that the followers need to resolve. Leadership and followership are therefore complex concepts with leaders and followers forming communities of practice with one another as leaders, followers and a combination of both.

The complexity of leadership is further compounded by the expectations of followers – followers view their leaders differently from how leaders view themselves and their followers (Bryman, 2004). Leaders appear to thrive on the cusp of chaos where things are uncertain, ambiguous and have the potential to creatively become anything, where innovations can emerge and morph into something useful for their organisation. Such leaders seem to have a vision that, even when well communicated, followers are unable
to comprehend and share. Somehow these leaders see something that their followers are unable to see. Leaders and followers also expect leaders to be decisive, a trait that leaders act out in order to be credible. The leaders communicate what they perceive their followers need to apprehend but the followers feel that they are being given an incomplete picture. Followers, on the other hand, operate more comfortably in their comfort zone of low degrees of complexity with some forays into the zone of complexity where they are stimulated and do most of their learning. They appear to use a different language when constructing their world than that used by leaders. It is at this juncture where followers and leaders need to trust one another in order to achieve the desired outcomes of a project (Moss Kanter, 2000; Senge, 1990). A shared understanding of the goals of a change project is important for its success but there are times during a project when stress, ambiguity and uncertainty make for difficult information processing, learning and communication. It is during these times that trust in leaders is important for ensuring continuing progress toward project success. As we master the new skills and processes brought about by a project (on our return from the cusp of chaos) our capacity to share the vision provided by our leaders grows until we gain a fully shared understanding of the vision of our ICT project.

Learning is essential for project success (Pinto, 2004). In a complex adaptive system effective change occurs at the point of tension between the status quo and the fluid future state, at the step of faith between the familiar and unfamiliar. It is at this point when meaningful learning occurs, in the zone of complexity (Fraser & Greenhalgh, 2001), since learning is what adults do when they want to change. In organisations learning and change are inextricably linked, occurring at any intersection between the familiar (and apparently unambiguous) and the unfamiliar (and apparently uncertain and ambiguous). Project team members and those not directly involved in the project and its outcomes are faced with the need to learn new technology and processes and to develop new relationships as they return from their journey through the zone of complexity and back to the newly familiar. During this journey people form communities of practice to enhance this learning, according to how they link with other people in the group (MacDonald, 2002). In phased projects it is possible that communities of practice emerge
parallel to each phase, especially if the boundaries of the new skills, technology and processes are defined by that phase. People use the growing uncertainty and ambiguity as a signal to form a community of practice and learn what is or could become pertinent to their role in the organisation (Day & Norris, 2006b).

Most of these communities of practice emerge spontaneously. Some are built into the structure of the project, such as the community of practice of learners in a project or the community of leaders proposing the project. Each community of practice appears to emerge to meet the need for connectivity with others, a sense of control over our work activities and the future, and the development of competence in our daily work (Orr & Sankaran, 2005). However, it is possible that each community of practice also has its own shadow of people who potentially or actually oppose the purpose and activities of a given community, or who resist the changes brought about by a project. The art of change management involves identifying these shadows and working with them in terms of how they can contribute constructively to the project’s outcome (Mabin et al., 2001). As we work within these communities of practice new alliances form and people develop new relationships as we shift into our newly familiar roles that have changed as a result of the implementation of an innovation by means of a project. It is these communities of practice that allow complex adaptive systems to adjust to innovations, for unexpected additions to a project to emerge without causing a project to fail and to allow for ambiguity and uncertainty as we leave our comfort zones, move through the zone of complexity and return from the cusp of chaos with new skills, technology, processes and relationships. Communication, leadership and learning are the tools we use to support the development of these communities in order to take advantage of change in complex adaptive systems.

5.4 Conclusion

Healthcare is a complex adaptive system exhibiting the properties of such a system, for example, emergence of the unexpected, sensitivity to initial conditions, blurred boundaries, influence of internal rules, tension and paradox, resilience, patterns and the system and its agents are adaptive (Begun et al., 2003; Plesk & Greenhalgh, 2001). In
Chapter 4 projects were described as complex adaptive systems themselves within the complex system of healthcare. The failure of ICT projects in healthcare systems is linked to the change process and the complexity of change. The implementation of an infrastructure project resulted in business process re-engineering as part of the complex adaptation characteristic of such a system. Critical success factors are used in ICT projects to predispose projects for success (Pinto, 2004; Wateridge, 1998). One such factor is change management. There are several models for change management, which appear to assume that one innovation’s change management can be done separately from another and that a single innovation is the only one that is influencing change at one time. However, in a complex adaptive system change abounds and all things are changing all the time at different rates and to different degrees. The properties of complex adaptive systems are observable for any change that occurs in a system. An ICT project in healthcare, therefore, usually jolts us out of the zone of least complexity where we are comfortable, and most things are known, knowable and familiar, into the zone of complexity where we are exposed to heightened degrees of ambiguity, uncertainty and the need to learn in order to survive the outcome of this shift. Our leaders use projects to take us to the cusp of chaos where things are mostly unknown and unknowable before assisting us in our return through the zone of complexity and into a newly familiar way of working in a newly comfortable zone.

To achieve this we plan for change. We usually make use of leadership, communication, learning (and training) and support during turning points. To facilitate our engagement in the changes happening around us, we can make use of the cyclical and reflective nature of action research (Waterman et al., 2001). People develop reflective skills according to their usual mode of working, however, ICT people form a community of employees who do not naturally seek new knowledge (as is the case of clinicians who are obliged to update in order to reduce clinical error and practice evidence-based care), and so there is mixed adoption of the principles of action research. Double loop learning as advocated by Argyris (Dick & Dalmau, 2000) is limited in daily practice and best used in the project team as we learn and apply in a cyclical manner so that others will be able to learn and apply without critically reviewing the application of their learning in the future. As we
lead people through change, learn new ways of working, and communicate to hold up a change vision and inform those involved in and affected by the changes, we enact our change management programme. Communities of practice form to enhance learning regarding leadership, our ongoing roles in the project, communication regarding the project goals and progress and learning of new technology and processes as we form new relationships.

As we use our change management programme, the action research cycle and reflection, we attempt to predict the future, catch glimpses of it from our leaders and follow them through the zone of complexity, to the cusp of chaos and back to a newly familiar work environment. The complex system in which we work in healthcare is conducive to change in the ways in which the properties of such systems are played out in our daily activities and in our projects. There is a supportive environment for change when we use action research principles of cyclic action (plan, act, reflect and modify the plan) and reflection, and when we use a network of communities of practice (and their shadows) to provide leadership, learning and communication for effective change. In doing so we practice the art of change management in the context of complex adaptive systems where things are uncertain and ambiguous, the unexpected emerges, and our attempts at implementing innovations can at worst be disastrous and at best exceed our wildest dreams, but with no guarantees.
Chapter 6  Findings and conclusions III: The fabric of change
6.1 Introduction

The previous two chapters described the findings regarding the implementation of complex ICT projects in the complex adaptive system of healthcare, and the use of change management as a critical success factor for such projects. During the course of the research it became apparent that we use a turning point for marking progress in our adaptation to change. This turning point appears to occur in most people’s experience of change and seems to mark the transition from the current to the future state. Chapter 6 describes the findings that emerged during the delivery of the change management plan in Project Fusion in which this turning point is explored as a potential critical success factor in the implementation of health ICT projects.

The chapter takes a look at change as a process that occurs naturally in a complex adaptive system. Then the turning point is described and explored in light of its role in ICT projects and the change journey through complexity. Change as a multi-dimensional experience is explored within the multiple and simultaneous contexts of organisations (in the greater context of their society and country), groups, individuals and the collectively individual experience of change. The discussion that follows links the change process to the change journey and the interwoven processes of daily work activities within an organisation. Change management is discussed in terms of an intervention that uses the transition phase (or the capability crisis) of the change process.

6.2 Findings

6.2.1 The change process in a complex adaptive system

The concept of a complex adaptive system implies that change, which occurs in constant flux, is mostly chaotic, unpredictable and affects the whole system in its consequences and concurrently is influenced by the system itself (Begun et al., 2003). We construct our understanding of the changes in our workplace by drawing the past into the present and future (where the influence of previously used processes, technology and relationships is seen in present and future ways of working) and we articulate our experiences using
language (Appleton & King, 2002; Colliver, 2002). Graphics are useful for assisting us in understanding our experiences, such as the change curve described below. We appear to use a process to change from the current state of what is familiar and known to the future state of the newly familiar and known, after we have journeyed through the zone of complexity, and begun the return journey at the cusp of chaos. Simultaneously we personally and collectively appear to follow a change process that marks the transition from before to after. These experiences of change in our organisations occur on multiple levels and in many forms.

Talking about change

When we plan, experience and evaluate change brought about by projects we need to talk about our experiences, articulating them in ways that make them available for us to learn from them (Appleton & King, 2002; Checkland, 2000). Action research facilitates such articulation as part of reflective practice, allowing us to critically reflect on our experiences, and facilitating learning on multiple levels in order to make our adaptations to change more effective than they would otherwise be (Reason, 1999b). However, as discussed in Chapter 5, such reflection does not come easily – using tools such as mnemonics and graphics becomes important in stimulating conversations aimed at converging understanding and sharing perceptions of a project and its consequences (Checkland, 2000; Day et al., 2006; Orr & Sankaran, 2005). According to constructivism we all perceive reality differently and we articulate our perceptions by means of language (Appleton & King, 2002). Checkland (2000) stresses the importance of being able to articulate such perceptions and implicit knowledge so that we are able to attain a shared appreciation of our collective and individual experiences in order to improve an organisation. We found that a graphic depicting the grief process (Elrod & Tippett, 2002) became increasingly useful as a starting place for talking about change as the project progressed.

In the early stage of the project we reviewed two models in the literature in order to establish a foundation for the project’s change management plan. They were:
the ‘death valley of change’ process (Elrod & Tippett, 2002) in which people individually pass through different phases of change in order to reach the end of the experience having assimilated the new ways of working, and

• the ‘concept-reality gap’ model of Heeks et al (1999). Heeks et al maintain that people crash and burn in changing environments when the change is too big to accommodate – changes should be built upon previous changes and should follow the ITPOSMO model (as outlined in Chapter 2) in which all aspects of the predicted change are analysed and accounted for before the beginning of a project.

Since we assumed that change would occur according to these two models we started talking about change using the graphic in Figure 6.1 which represents a combination of the two approaches indicated above (Elrod & Tippett, 2002; Heeks et al., 1999). It also incorporates BPR discussions around the dip in productivity that frequently occurs after the introduction of new processes while people are gaining new skills for the new processes and settling into the new way of working (Sylvestro & Westley, 2002).

![Figure 6.1 Graphic used for discussion about change](image)

Certain properties emerged as we used the graphic. The Y axis could be anything you want it to be in terms of your response to change, such as a dip in productivity, or grieving the loss of seniority or familiarity, while the X axis usually represents the passage of time, or the progress of a project. Initially, we (the project manager, change manager and IS team managers) used the graphic as a starting point for discussing what
we needed to take into consideration when planning change management. As a result of this, we took into consideration that

- individual people would follow something similar to the grieving process during the time in which they adapted to the new way of working (Elrod & Tippett, 2002);
- the goals of the infrastructure project should not be too different from the current reality, and if they were, then the project should incrementally build on smaller goals to achieve the final goal, or make use of the incremental success of the subprojects to take us to the final goal (Heeks et al., 1999), and
- productivity would be compromised during the course of the project as people took on new processes, learned new technology and built new work relationships (Sylvestro & Westley, 2002).

We found that by introducing the curve into our conversations we made it easier to talk about the changes brought about by the project. It also helped to achieve shared understanding and appreciation of the project’s consequences (Orr & Sankaran, 2005) – people were able to plot their own experience and their perceptions of the experiences of others in terms of the curve. This plotting of experiences within the curve appeared to assisted people in locating their experience in relation to that of others. In this way we were able to build on our own perceptions of reality in relation to those of others and attempt convergence of perceptions in order to achieve perspective on the project’s goals as well as an understanding of our own experiences (Appleton & King, 2002; Colliver, 2002; Kordes, 2005).

Although the graphic and the grief process model assume that people experience this curve as individuals, the people involved in the project talked about their individual and collective change experience in similar terms, using the same graphic to depict both. No-one appeared to allocate any boundary to separate their individual experience from their collective one. The graphic was used by almost everyone in the project as a way of expressing their experiences, understanding, expectations and connections with others who were also experiencing change, which appears to be typical of how we construct reality (Appleton & King, 2002). The graphic became a symbol of progress (where in the
curve people saw their experience at any one time), and of expectations, an aide to
discussion and gaining shared understanding, and a way of linking with others in the
same project as well as in conversations with those who were not directly involved in the
project, e.g. stakeholders in one of the DHBs such as senior managers. It appears that in
using the graphic in this way we were able to facilitate important conversations about the
project and people’s experience of the changes brought about by it.

In summary, the change management programme was developed using the change/grief
process (Elrod & Tippett, 2002) and Heeks et al’s (1999) model of change in healthcare
systems. We used a graphic to facilitate conversations about the anticipated change and
its consequences and to evaluate our experiences of change during the course of the
project. This became an important tool for exploring the nature and meaning of the
change process, its impact on the project’s outcomes, and the complexity of the project
and its context. The versatility of the graphic gave us the opportunity to explore change
more richly in this complex adaptive system, healthcare, in which we implemented an
equally complex IT infrastructure project.

**Complexity and the change process**

In the previous chapters we explored the properties of complex adaptive systems and how
they play out in the healthcare system and, more specifically, in ICT projects in
healthcare. The complexity journey is entwined with the change process in ways that
make it easier for us to establish a shared understanding of an ICT project and its
consequences and for us to see patterns that facilitate our associated adaptation.

Two things happen when we implement an ICT project: the project goals bring about
changes in technology, processes and relationships, and the people experience a change
process in their response to the project’s anticipated goals. With this in mind, an ICT
project, then, takes us from what could be considered the familiar, known and knowable
through to the cusp of chaos and back to a newly familiar world, as discussed in Chapter
5. This journey through varying degrees of complexity and back is in itself a process. The
aim of a business process is to add value to customers, such as clinicians, patients and
managers in a DHB. It consists of a collection of activities and tasks to be completed for achievement of specific goals much the same as any process does (Hammer & Champy, 2001b; Sylvestro & Westley, 2002). Processes are the basic tenet of BPR in which we aim to improve businesses by radically changing organisations and their processes (Hammer & Champy, 2001a; Lu & Yeh, 1998). Since processes aim to add value and consist of a collection of activities for achieving a goal, this journey could be considered a process. However, processes do not exist in isolation of one another (Anderson, Bider, Johannesson, & Perjons, 2005): they are played out in layers, combinations, patterns and varying degrees of complexity. In this way, the journey through complexity is linked to the personal and/or collective experience of change as depicted in Figure 6.2. The end point for the project’s journey is the achievement of the project’s goals: the mastery of new processes, technology and relationships in the newly defined organisation. The end point for the change curve is not the achievement of the project’s goals but rather the achievement of adaptation to the changes brought about by such a project and its goals.

![Figure 6.2 Graphic depicting simultaneous project journey and change experience](image)

People positioned their change curve on the journey according to the point at which the project impacted on their daily work activities. Although this appears to contradict their
earlier acknowledgement of the project’s implications, they continued to work in the context of business-as-usual until they couldn’t continue in the familiar way of working any more. While the project was happening around them most people made little active attempt at starting to change until the activities and consequences of the project affected their work directly. This is not necessarily resistance to change: it was more like a delay in response to change than active or passive resistance. They were overcome with additional workload caused by the project and therefore felt they were not in a position to proactively draw the changes to themselves. One goal of the project was to transform the normally reactive IS personnel into a proactive department by means of new technology and processes that supported a proactive social environment in the workplace. This tendency to react is demonstrated in the different perceptions of when the project started to have its impact as described by this interviewee:

“I didn’t have that much involvement in the (first DHB) experience. Until things started going wrong and they asked for resources on the floor and can we have some from you, and that kind of stuff, that was when the alarm bells started going off for me. I thought we’ll be much more involved when they get to (the second DHB) because we really care about our people……It’s not that I didn’t care about the people here. I didn’t understand what was happening to the people here.”

On the other hand, some personnel did not delay their response to the project’s consequences and actively sought out the resources and learning required to adapt as easily as possible (Day & Norris, 2006b). In contrast to the reactive approach of most of the personnel these people started their adaptive behaviours long before the project affected their daily work, which at times created difficult situations for them. They depicted their change process as starting and ending sooner than that of others and being less traumatic than those of the reactive personnel.

This complex combination of the journey process of the project and the change process of the personal and collective experience of change provides for a rich and multi-dimensional examination of change processes in organisations. Patterns and tensions
emerge, and most people appear to be able to talk about their change experience using the curve described above. Most people in this project were reactive in their response to the project and thus started their change curve some time after the beginning of the project, while others were proactive in their approach to change and began actively adapting as soon as they could, thus placing their curve closer to the beginning of the project’s journey.

6.2.2 Multi-dimensional change in healthcare systems

Since organisational processes are multi-dimensional and appear to occur in patterns, organisational change (which is itself a process) plays out in layers and patterns. Moss Kanter differentiates between macro, micro and revolutionary change (Tracey, 1994). When undergoing macro-change, organisations change their identity and culture, e.g. the emergence of healthAlliance, which resulted in a cultural change as discussed in Figure 4.2 in Chapter 4. We also change on more granular levels, e.g. by means of an ICT infrastructure project, where processes, technology and relationships change. Lastly, there is revolutionary change, where power relationships change and people compete for control over resources. These changes occur in the turbulent environment of complex systems like healthcare in which we observe change as it influences the organisation, groups, individuals, and the use of processes and technology.

From an organisational perspective

DHBs, as part of the larger national healthcare system of New Zealand, exist in a naturally turbulent state of their own. During the course of Project Fusion several strategic initiatives were being implemented, particularly the implementation of clinical information systems and the development of health knowledge management in New Zealand (Orr, 2004). This incorporated the implementation of software and processes to support the development of electronic health records in the two DHBs included in the research. During Project Fusion the first DHB completed their implementation (Orr & Day, 2004), while the upgrade for the second DHB’s clinical information systems was commenced towards the end of the project. On a broader level, the New Zealand Health Strategy (Ministry of Health, 2000) was implemented, while cultural interpretations of this strategy were released in the Maori Health Strategy (Ministry of Health, 2002). The
primary care interpretation of the health strategy saw the implementation of Primary Health Organisations (PHOs) as a result of the Primary Health Care Strategy (Ministry of Health, 2001b). As the demand for healthcare services increases with the burden of an aging population and the expanding profile of chronic conditions the need for concentrating funding on clinical care continues to grow. As a result DHBs began the process of implementing shared services organisations in order to reduce the costs of support services. New organisations emerged of which healthAlliance was the first (healthAlliance, 2001). It was in this turbulent environment that the organisations involved in Project Fusion adapted to the strategies that had been promulgated to date, aiming at meeting the fluctuating needs of their population in a changing world.

On a more granular level, each of the three organisations involved in Project Fusion had their own turbulent internal system. They were adapting to the establishment of healthAlliance, the changing demands and health burdens of their own communities, and the changes brought about by Project Fusion. This project resulted in changes in technology, processes and relationships as well as changes in the identity of the organisation in which the IS people were working – one month we were working for a specific DHB and the next for a shared services organisation. There was a strong sense of ‘us and them’, adding more complexity to the project while differences were absorbed as expressed in a convergent interview:

“It depends on the groups you are dealing with. It’s interesting. The team should really manage both sites equally – the application team. That team was mainly focussing at Counties – they didn’t have the view of how to send messages to both sites. When we worked on North Shore site because they didn’t see their role as significant. When you went to Counties it was like being in a new project with new people.”

In addition, clinical care changes all the time, with new research, new evidence for best practice, and new guidelines for evidence based care (Wells & Jackson, 2005). The two participating DHBs were forerunners in the implementation in New Zealand of clinical information systems and as early adopters were not only responding to changes brought
about by technology but were also creating those changes as evidenced by the development of such a system at Counties Manukau DHB prior to Project Fusion.

In summary, healthcare delivery on a national, local and organisational level is complex in a turbulent and changing environment. This, in turn, affects our experience of and response to changes as we work in groups.

The change impact on groups of people

The changes in organisational identity resulted in changes down the line within the IS department. The IS Manager’s role was redefined to incorporate both IS teams and a new manager was appointed with the departure of the previous CIO from Waitemata DHB, while the remaining CIO’s responsibilities extended to cover both DHBs. With the two departments merging into one, a single management team was formed, and the balance of the department’s structure was redesigned. Some people resigned from their roles and left the organisation to find other employment, taking with them skills and knowledge that were hard to replace. Other roles were disestablished and new roles were designed and set up. Standard human resources processes were used to facilitate the allocation of new roles to staff and to deal with any situations where people no longer had a role in the newly defined IS department. New teams were identified and established. New relationships were promoted within teams, the department and the newly defined customers.

According to a presentation given by the new IS Manager to the department in the early stages of the project the reasons for these changes included:

- The support function provided by the IS department would diminish because of the standardisation and rationalisation of the new single ICT infrastructure;
- The automation of some functions would result in fewer people to perform the functions taken over by software;
- Like functions needed to be spread across teams;
- The newly established ability to provide remote support to customers, and
- The need for a focus on applications management and planning.
This restructure supported strong technical leadership and preparation for Fusion’s outcomes. In total there were three restructures of staffing over a period of 15 months, with the final restructure described as an expression of the outcomes of Project Fusion. The full implications of the need for a strong technical focus in the department, teams that could provide remote support, and the expression of the new processes underpinned the final restructure. These changes were experienced on a group and personal level, an expression of the outcomes of the project and the development of new relationships as indicated in this extract from a poem I wrote on restructure during a reflection period.

“What do others know that I don't know? Why do they look at me like that?
The sense that there is something more to this than meets the eye. Am I imagining pity? Am I the only one who doesn't understand what happened? Am I some kind of aberration and don't know it? Is there something I should know that they know? Am I a victim of my own actions, my searing questions, my living? Is this something I have done to me?”

In summary, multi-dimensional change occurs on national, local and organisational levels while simultaneously impacting on us as groups and individuals.

*The individual experience of change*

Although the changes appeared to be happening on a systemic, contextual and group level the impact was felt in varying degrees by every individual in the three organisations. The desktop deployment towards the end of Fusion left people with a new computer interface and different ways of using their computers, which included the following changes:

- New security policies limiting the amount of idle time a computer could be left open;
- Thin client computers for administrative personnel who used the computer for a limited range of functions;
- Upgrade of all Windows software to the latest version, including a new email exchange service which incorporated all the Auckland DHBs.

In comparison to the changes expected for the IS personnel, these changes to the DHB users were considered minor. However, most of the people who experienced the changes described them as significant and potentially disruptive. Efforts were made to minimise
the disruption but there were some incidents where users’ managers had overlooked their computers to include in the exchange for newly built ones. Some computers could not be rebuilt for various reasons, such as designated research computers, and had to be accommodated unchanged and non-standard in the new infrastructure. Learning to use the computers with the new operating environment and upgraded Microsoft Office 2003 slowed people down for a few days. New logon features were an issue for a day or two until people got used to them. Working with the thin client upgrade was easy for the first DHB but totally foreign for the second DHB’s users who had to learn the entire concept, processes and implications from scratch.

For the IS personnel this individual experience was heightened. On an individual level most people experienced loss of aspects of previous roles, processes and relationships, especially during the restructures. We expected these people to experience the ‘death valley of change’ (Elrod & Tippett, 2002) on an individual level and did indeed witness this. Resistance to the changes initially appeared in the forms described by Lewin’s first stage of change, when we appeared to unfreeze from our usual way of working (Lewin, 1951). Adjusting to new ways of working occurred on an individual level and usually appeared to follow a process of confrontation with the new concepts, learning new processes and technology, and adjusting accordingly to accommodate the changes into individual work patterns. However, this strongly individual experience did not occur in isolation: although people worked through the change process as individuals, they did so in the social context of their colleagues, peers, friends, managers, customers and stakeholders. Their individual experience was simultaneously a collective change process.

In summary, we change individually within the context of the groups in which we work and live, which in turn shift and change within the social and organisational context of our daily lives, which are influenced by the greater systems of healthcare on a local, regional and national level.
The collectively individual experience of change

It appeared that change did not occur in either a discreet individual or a group experience. It occurred simultaneously on an individual and collective level – people were individually going through the change process in a shared experience. Commitment to the project appeared to emerge simultaneously over a period of weeks but was experienced individually as depicted in Figure 6.3, which demonstrates the perception of an individual’s experience of the changes parallel to their perception of the collective experience.

As we progressed through the project people began to take for granted that they could use the curve as a way of expressing their experience of change. Almost everyone identified with the curve as a change process. Gradually people started to refer to the curve as a standard and plotted their own experience of change with a different, customised curve that represented their own ‘slough of despond’ as Pilgrim puts it. They either dropped the curve below the standard or flattened it and kept it above the standard, depending on how they felt about their change experience. No-one drew a flat line at the bottom of the curve – there seemed to be an assumption that everyone would rise again as they adapted to the changes brought about by the project.
Some people had more than one personal curve depending on whether they perceived their involvement in the project as having two phases or not, e.g. linked to one or the other of the two DHBs involved in the project. In this scenario the standard represented the change process for the whole project and they plotted their curves for the two (or more) phases of their role in the project, as depicted in Figure 6.4. It is interesting to note that in this scenario the change curve was flatter for the first phase of deployment of standardised desktops (first DHB). This individual explained that his home DHB prior to the emergence of healthAlliance was the first DHB to experience the changes, which meant that his adaptation was not as big as when he transferred his project work to the second DHB. To perform the new skills he had mastered he had to learn how that DHB’s internal personnel worked and also how the IS personnel from that DHB, and how their pre-Fusion processes, technology and relationships worked. He experienced additional changes when he learnt about the other DHB’s processes and technology, and developed new working relationships with IS personnel he had not yet encountered as part of his daily work routine.

Another person who became involved in the project during the desktop deployment phase drew a personal curve that rose sharply at one point only to dip into the slough again halfway through her experience of the project as depicted in Figure 6.5. She indicated that the first dip represented her difficulty in getting the preparatory work done for the
deployment. She felt unsupported prior to the rise and soon after she received the support she needed to perform her role in the desktop deployment, she began to follow the change process as she understood it.

![Image of multiple curves for one person's change process]

**Figure 6.5 Multiple curves for one person’s change process**

It appears that the standard also represented the collective experience. During the convergent interviews towards the end of the project, people were asked to plot their own change curve against that of the collective curve. They assumed that the standard curve was that of the collective experience and then they talked about where on the curve they felt the rest of the department were in relation to their own progress through the process. Interestingly, the individuals interviewed felt they were ahead of the collective, albeit not far ahead, as can be seen in the figures above. The people interviewed were either from the project team or were managers of the IS department. They expressed a sense that there was a lag between their own adaptation and that of others within the IS department and also the users in the wider DHB and healthAlliance setting. Their perception of being ahead of others in their change process could be due to:

- The interviews being held near the end of the project, with some project team members having had the opportunity to progress significantly in the change process since the beginning of the project, while users in the wider DHB and healthAlliance setting had only begun their journey with the desktop standardisation;
• Their involvement in the project team and their perception that they had had more opportunity to master the new processes, technology and relationships than other people; or
• Their management role which gave them an overview that others had no access to which meant that they felt they were more in control of their situation than others.

The impact of merging the two DHBs’ IS departments into a single unit within a new organisation, while simultaneously implementing a single ICT infrastructure represents significant multi-dimensional change, which impacted on individual, collective and contextual levels (Dooley, 1997; Moss Kanter, 1985). As we progress through the change process we experience a transition as described by most change theories (Elrod & Tippett, 2002). It is interesting to note that Schneider and Goldwasser (1998) describe this transition as a period that occurs soon after a commitment has been made to change and people begin to realise the implications of this commitment. We found that this transition in the experience of those involved in Project Fusion was significant. Towards the end of the project we reviewed the data collected thus far and identified themes about change that merited further exploration by means of convergent interviews (Rao & Perry, 2003). The purpose of the interviews was to reflect on the change experience, while paying particular attention to the transition phase and the dip that followed (as depicted in the change process graphic).

6.2.3 Transition as a change turning point: a capability crisis

The people who participated in the convergent interviews were selected from the management team of the IS department and from the project team for Project Fusion because of their heightened experience of the changes brought about by the project. Those who were peripheral to the project were not interviewed because their experience of change was for the most part probably low-key and not significant enough for considered reflection. The goal of convergent interviews is to provide an opportunity for unframed or partially framed reflection on emerging themes that are pertinent to the research at hand (Rao & Perry, 2003). The data to date had reflected that there was a time when most people affected by the project felt a sudden dawning that the changes to come
were big; that their commitment to the project would have significant (and possibly) profound consequences. This would be followed by what they described as “the dark times”. Based on conversations and observations reflecting this, I compiled a list of trigger words, phrases and themes that would facilitate reflection on these two components of their change experience. We talked in private (in a closed room) for roughly half an hour per person, and the interviews were recorded. The first two interviews were not tape recorded, which made it difficult to transcribe the phrases and tone of the reflection. After each interview I made notes of my own reflections about that interview. Based on my difficulty in taking notes while simultaneously maintaining eye contact and managing the interview, and in transcribing as accurately as possible, I started to use the tape recorder so that I could retain contact with the person talking. This adjustment was the result of using the act/reflect cycle of action research that had by now become a way of working for me as a researcher and colleague (Day et al., 2006). A description of the findings from these interviews follows.

Generally, project participants described this time as a fundamental, stomach-wrenching experience of crisis as a result of realising what they were involved in. In short, it was an “Oh No! Moment” in which people felt they had taken a step of faith into the unknown, only realising at this point that everything in their previously predictable work lives became in an instant, unpredictable, scary, irrational and out of their control. All they concerned themselves with was surviving the moment, and possibly, the project. The crisis usually happened soon after the project began and in many cases was short-lived. For some it was a momentary experience, while for others this crisis seemed to go on for months. Although for some it was an extremely intense experience, the intensity did not appear to match the duration. For some it was an extremely intense and difficult transition experience that took months to work through, while for others it was intense but of short duration or mildly bothersome for spurts of time – there were several variations of the combination of intensity and duration. It appeared that experience in projects, as managers or as leaders, influenced the intensity and duration of the crisis. Those with less experience in projects, management and leadership roles appeared to have the most intense crisis with a tendency for long durations. It also appears that the next time such a
transition moment were to occur, people learnt from the last one and appeared to adapt more quickly, depending on their approach to learning (Day & Norris, 2006b) and change in general as described by a team leader regarding the three restructures that occurred during the course of the project.

“The second restructure toward the end of last year was easier. I took the approach of let’s see what happens. The third one in April – hardly thought about.”

The onset of this crisis appeared to occur some time after the commencement of the project. The business case had been accepted and approved by the business managers (stakeholders in the three organisations), the planning had been completed, personnel had been allocated to the project team and work had begun. The onset usually occurred when the project impacted on an individual’s ability to continue working in the manner to which they were accustomed. In most cases the onset was unpredictable, even though one knew, from previous experience, or from warnings from the project and change manager, that the crisis would occur. One interviewee volunteered:

“Once it started affecting the day to day activities...once the ball started rolling, you could hear people saying ‘this is happening’...But it really didn’t hit me until the one I’m actually working on started changing... ‘I can’t do this any more’.”

For some people there was more than one crisis. Most people experienced their first or only crisis soon after the beginning of the project. Others had crisis moments of varying degrees of intensity, depending on their involvement in multiple aspects of the project – one manager was involved in three of the projects and had several crisis moments. Some crises were associated with the beginning of a new component of the project, e.g. managers involved with multiple sub-projects experienced crisis moments corresponding with the start times of the sub-projects.

Some people did not have any crisis points as described above (Day & Norris, 2006b). The two people interviewed about this differed in their descriptions of why. The first was the person who originally proposed the project: he stated that he had no qualms about the project because he knew everything it involved and was confident at all times that it
would succeed. He was a manager and this was his special field of expertise in the use of information technology. The other person was on the project team from the outset and said that once he realised the implications of the project, he decided to learn everything he needed to know to continue with his job. He also took charge of his destiny by doing some things that were frowned upon by his manager, e.g. rebuilding his computer to the new standard, without permission, in order to understand how it worked and to predict any issues that may impact on his customers.

Personal reality took on new features, becoming a differential of the status quo, the future state and other people’s experience, aspirations and fears. Most interestingly, the analysis described above identified a small number of recurrent themes that were common to participants’ experience. Six themes emerged from the data that described the capability crisis: a heightened sense of ambiguity and uncertainty, workload concerns, leadership, communication, concerns about resources, and predictions of failure (Day & Norris, 2006c).

A heightened sense of ambiguity and uncertainty

While their world’s foundation was rocking, people felt that anything they had previously seen as certain and clear was no longer so. Most people felt there was a high level of ambiguity and uncertainty. This sense remained with them for the duration of the project. The need to deal with uncertainty was expressed at the outset, during the change workshops. People felt that a more concrete sense of the future and what they were in for would have helped them to deal with the changes resulting from the project. More involvement in the assessment, planning and decision phase of the project was also seen as an important way of dealing with uncertainty and ambiguity. Some people felt that the wrong people had been consulted during this phase and that the wrong people had been allocated to the project team. These views were expressed in the face of considerable efforts by the project, change and IT managers to avoid just these problems. In the early months of the project there was a demand for comprehensive testing of all technical changes prior to release. This was an attempt at ensuring certainty and avoiding having to deal with problems later in the project. However, despite the resounding call for testing,
people were vague about the purpose, nature and expected outcomes of this testing in the early months of the project. During the ensuing months testing remained an issue but resources (see later) were not available for this activity and stress levels rose as the project progressed and changes were frequently released without testing. There came a time in every person’s project experience when their work was fraught with frustration. They were recently over their capability crisis and wanted to get on with working in the new way but felt hampered by the project team’s progress, the lack of resources (people and money) to get the work done, and the seemingly impossible workload caused by the project. There was a conflict between the future state and the operational reality of having to complete current work.

*Disproportionate increase in workload*

Several participants felt that too much was happening too fast and that the workload itself resulted in ambiguity and uncertainty. The project team were focussed on completing their work according to the project plan. Some staff left the organisation and took their knowledge with them. Those left behind were given the additional work until someone could replace the person who had left. The project itself introduced problems in the way things were done and this simply added to the existing load, resulting in complexity, uncertainty and ambiguity. One typical response stated:

> “People already had a lot of work to cope with. Then you add the project with the things they were doing complicating the business-as-usual work.”

People who were not directly involved in the project team were aware that project team members were more productive than the business-as-usual staff. There was a sense of unfairness that the project team were given whatever resources they needed to get their work done, sometimes at the expense of the rest of the staff’s work. They had to make things work, even if the project work looked like it was impossible. And if the project work was incomplete at the time of moving on to the next milestone, the business-as-usual staff had to take on the overflow, fixing things that were not working and completing unfinished project tasks.
Competing for diminishing resources

Staff complained about under-resourcing, inaccurate resourcing (using the wrong people in planning and implementation), not using people with substantial organisational knowledge, not taking advantage of appropriate knowledge capital of certain people in the department, and not having enough money allocated for things such as hardware and contractors. Regardless of whether they were in the project team or not, staff indicated that the wrong people had been consulted in the planning and decision making. They felt that several key aspects of the current state were ignored and that not enough research was done in making the business case decisions, the project planning and the selection of the project team.

“Those who were involved were not experienced enough, didn’t have the historical knowledge of the organisation and the paths they were going down and the people they were talking to were wrong.”

There were concerns that the people making decisions did not have insight into the clinical situation in the DHBs, and that anything that went wrong with the infrastructure could impact on patients’ lives.

“One of the things that came through very strongly to me throughout the project was the project people and in fact our own people don’t really know how a hospital works. They might know how networks and infrastructure work….Do these people understand the day to day things that happen in a hospital?”

There was also a sense of competing for available resources – money, equipment, time and people were in limited supply and people found themselves negotiating for appropriate resources with mixed results. In addition, once the resources had been allocated, people discovered that what they had negotiated was inadequate for the enormity of the task at hand. Communication became difficult during the time of crisis.

Communication paradoxes and tensions

Communication was crucial to the staff especially at the capability crisis point. There was a hunger for information, which was high on the list of critical success factors for the project as explored in the change workshops. Their description of the need, scope and mode of communication was broad. Interestingly, however, there was a sense that
although much information was available people could not hear the message due to the crisis and were glad of written communications to which they could refer later.

“I think the communications were very important. It gave the people the information that they needed...Most of them didn’t read the emails until it was time to roll and then they went back and read them. ...When they realised it was ultimately going to affect their PCs they made the effort to find out more about the project.”

Later in the project people complained about the amount and nature of information that was communicated to them. There was a tension between what they wanted to be informed about and their response to information that was passed on to them: a sense that nobody told them what was happening and yet they were getting too much information that appeared to have little to do with their immediate situation.

Learning, as a form of communication, was a high priority in terms of surviving the project (Day & Norris, 2006b). During the early months people expressed in general terms their need to attend training. There was, however, a tension between the desire and expressed need for training, and the ability to release resources and pay for training. Although there was a strong expression of commitment to allocate people to attend training programmes, it was hard to act on that commitment, since the demands of the project, the increased workload, the difficulty in communicating, and diminishing resources placed extreme stress on those making the allocation decisions. So much so that one operational team was sent for training after their new technology’s milestone was achieved. The surreal nature of the crisis moment and sudden insight into the demands of the project appeared to interfere with the managers’ abilities to schedule timely training. The learning experiences were mixed: some people were comfortable with coaching and on-the-job learning while others attended training days. Most people felt a sense of overload and indicated that the training was too short, too condensed and too superficial. Most felt that the training should have occurred earlier in the project. There was a demand for a proactive approach to allocating training sessions that could not be met due to the reactive nature of the department’s culture but more specifically, to the debilitating effect of the capability crisis.
Emergence of complex leadership patterns

There appeared to be a tension between the desire to stop the project at the time of a person’s crisis and the urgency that had been created to lead the project to a successful conclusion. This urgency corresponded to the first of Kotter’s (1996) eight steps of change leadership. Since most people experienced their crisis at different times within the project’s timeline, the managers’ commitment and urgency appeared to be misplaced and insensitive to their staff’s experience, concerns and fears.

“There was a bit of arrogance saying ‘this is what is going to happen, we don’t care’, ‘we don’t care how it works, this is how it should work’. That sort of put the jitters with everyone because we knew that was not how it was going to work.”

People identified leaders who were visible and those who were not. The project manager was the most visible leader, having been given full reign over the project. The IS manager, who was also the project sponsor, was considered to be invisible and was missed during times of extreme stress and when major issues surfaced. There was a sense that leaders could not be all things to all people, although this was what people wanted. Some staff felt that certain managers were really good in their leadership role while others felt the same people had the wrong attitude to the project, did not take them seriously, were unrealistic about the project, were inadequate in their direction, and made value judgements rather than appropriate judgement calls.

The sources of leadership, as discussed in Chapter 5, supplied complex combinations of people who could lead others through the change process and journey, or not lead, depending on their role in and out of the project, and the followers who identified with them as depicted in Figure 6.6. Leadership emerged from people who were not expected to lead, while others who were in a leadership position appeared to disappoint their followers, especially during times of extreme difficulty and stress. Interestingly, the relationships that existed between the leaders prior to the project continued to influence their leadership of the project as evidenced in the ongoing conflict between some leaders, the supportive relationships between others, and the unfaltering support or sabotage of the project as an expression of their initial response to the project. This complexity of leadership became an issue for people during their capability crisis when they went
looking for constructive leadership, support and direction only to find their hope and expectation to be misplaced and their leaders operating to a differently perceived agenda.

“*But they present a proposal (about the restructure) and feelings and insecurity and fears well up as we listen to the proposal, wondering who will have a job at the end of all this or what will happen to the work we’ve already been doing. The emotion that comes up is quite strong and management don’t seem to consider that it happens.*”

Different leaders appeared to have different perspectives on the project vision and supported it, sabotaged it or they became diverted from it due to conflict with one another or a follower, or preoccupied with their tangential agendas.

In addition to the complexity of the leadership relationships and those of their followers, leaders are also followers. Although it is our leaders who take us to the cusp of chaos when introducing change, they themselves may also be experiencing a capability crisis as they realise the implications of their decisions. As one manager put it about her own uncertainty when approaching the start of a new milestone,
“I’ve had these moments with every milestone. At times like this I wonder if we are doing the right thing. Then I look at (the project manager) and he’s still smiling...I trust him and become confident again.”

The complex patterns of leading and following during difficult periods of the change process, coupled with the heightened sense of ambiguity and uncertainty, disproportionate workload, difficulty in communication, and competition for resources, may lead to predictions of failure.

**Predictions of failure**

People appeared to be committed to the project in principle. They knew it was going to bring about major changes to their work life and they were prepared to accommodate these changes. During the capability crisis, however, they appeared to be unable to imagine project success and consequently developed some concerns as indicated by one of the project team members.

“There were concerns about builds and technical work and how we will work, moving forward into the future.”

These concerns appeared to grow into predictions of failure as people perceived a reduction in the effectiveness of their capabilities. They became aware of the new skills they needed in order to continue working and that the old skills would no longer be effective. This was described by a participant as follows:

“You’re identifying problems but you don’t know there are solutions in the situation. Since you don’t know, you feel it’s a losing battle.”

Things seemed to go wrong for a while. In an environment of increasing complexity people had a heightened sense of issues and difficulties, especially when training had been delayed. Their capacity to perform well at work appeared to be compromised by the capability crisis and it was during this crisis that their capacity to solve problems and make good decisions was also compromised.
“I don’t think we’ve had a week without something going wrong. So I think it’s pretty hard for them to buy the idea (of project success) when they haven’t been able to really see the advantages of it.”

A sense of frustration developed in which people experienced a heightened awareness of their transition from the old way of working to the new ways and yet they felt inadequately prepared. They wanted to be able to perform in the new way and yet there was a mix of old and new, with an accompanying disproportionate increase in workload. It was hard to identify the right way of dealing with issues and new problems in addition to performing new processes, procedures and activities. This was expressed as frustration: frustration that they did not know how to help customers and colleagues, frustration that they were not being heard in terms of what they could and should be able to contribute to the project, frustration that they needed to learn so much and yet could not devote enough time and energy to that learning.

“I was frustrated because I couldn’t help them (customers and colleagues) do things…if anyone came to me about issues, if I couldn’t help them I became frustrated, at me, not them.”

At the same time as this frustration there appeared to be a background chatter of predictions of failure. People in and out of the project seemed unable to see how this project could succeed, let alone realize its long term benefits. It appears that for most participants this chatter remained in the background with the exception of a brief interlude during their capability crisis.

“There was a lot of talk around me about the project … ‘it going to work’ people around you creating an uncertain environment by the things they say…making it hard to deal with the situation …saying things like ‘how’s this going to work? We’re never going to get it off the ground’.”

An interesting counterpoint to this observation is the recurring theme of the project manager and other managers reiterating that everyone had to make it work. Some participants found it hard to relate to what they called ‘Hitlerism’ when the managers did not appear to take their concerns seriously and merely repeated that the project would go
ahead and that it would be successful. This was described by a team leader quoting snatches of conversations she witnessed:

“But you can’t do things like that” ... “but we will do it this way”... “but you don’t understand you can’t do it like that because...”... “we have do to it, we have a time frame and we have to go ahead”... “we’re rolling”...

Finally, when each person’s capability crisis ended people were able to continue with their contribution to the project and adapt to the changes it brought about in their daily work lives. This adaptation appeared to be more about simply getting on with the work than about a conscious effort to change. As their crisis receded individuals were able to solve problems, learn, make increasingly better decisions, and start to make sense of the changing technology, processes and relationships. There was a contrast between those who simply carried on with the work at hand, those who continued to appear to struggle with their own capability crises and the background mantra of the managers that the project will succeed, as described by one of the managers:

“...you had to be very firm, say, no, this is what we’re doing, even if it doesn’t sound the right thing at the time.”

These aspects of their predictions describe a time when people had a strong sense of their own inadequacies in delivering the project successfully.

In summary, almost everyone has one capability crisis (or more) near the beginning of a project or each milestone. This crisis appears to herald a sense of realisation regarding the implications of the project – the increased workload, expected resourcing difficulties, communications and the leadership required for success. However, all this is found wanting during the crisis moment, and one is left with a sense of ambiguity and impending failure, knowing that there is no way out of the project (short of finding another job), and wanting only to survive it and the changes that accompany it. It is evident that this moment of crisis is inevitable for most people working in projects, and is viewed by many as something merely to be survived. In terms of change management, this moment of crisis could be viewed as a tool to facilitate change (Day & Norris, 2006c; Lubitsh, Doyle, & Valentine, 2005; Mabin et al., 2001), rather than something that
impedes it. The crisis is usually an individual experience in terms of onset, intensity, frequency and duration. However, it later becomes a collective experience in that people use it to identify with one another’s feelings, difficulties and successes during the course of a project.

6.3 Discussion

The findings have shown that change occurs in multiple dimensions primarily in the form of a process. There is a turning point that marks our response to changes brought about by ICT projects in a complex healthcare system, whereby we acknowledge the ineluctable nature of change, commit to it, and act on it when certain events have played out in the project’s process. The recurring emphasis that emerges from this research is that of the processual nature of change in the complex adaptive system of healthcare and how our adaptation responds to that process.

6.3.1 ‘It’s all about processes’

It appears that we adapt to changes brought about by health ICT projects by simultaneously following a change process and going through a change journey of complexity. These processes allow for the expression of the properties of complex adaptive systems so that ambiguity and uncertainty, complexity, paradoxes, puzzles, contradictions and conflicts (Plesk & Greenhalgh, 2001) can be constructively and positively handled during the course of the processes in order to predispose people to succeed in adapting to changes brought about by these projects. How we construct our understanding of the world, the organisation in which we work and the implications of health ICT projects influences how we use these processes (Appleton & King, 2002; Checkland, 2000).

The processual nature of change

The first literature that comes to mind when most people talk about change is the stages of grief theory popularised by Kubler-Ross (1970). If we use this process for viewing organisational change, we assume that such change causes loss and that we grieve for the way things have been while we traverse the process (or follow a set of logical steps) of
grieving until we adapt to the new way of life without the old and familiar. Although this process is relevant in our experience of change, especially major change that results in some losses, it is a splittist and possibly superficial approach to organisational change. We do not follow a linear process from one point (the familiar) to another (the unfamiliar with loss of the familiar) (Snowden & Stanbridge, 2004; Stroebe, 2001). The process of adaptation includes us taking on new and exciting (and dismaying) changes with anticipated loss and gain, and all this occurs within a complex environment. Others who have explored this process in various settings and expanded it from its grief application appear to have established a pattern of before, transition and after steps in the process (Elrod & Tippett, 2002), very similar to Lewin’s model of change where we unfreeze, change and refreeze (Lewin, 1951). It is moot that we unfreeze and refreeze in a complex adaptive system which is characteristically turbulent (Brown & Eisenhardt, 1997). It is this lumpist or holistic approach (Berenson, 2004) to a change process that is more appropriate, where links, connections and patterns within a broad process are sought to facilitate our experience and understanding of change.

A process is defined as a set of activities and tasks aimed at the achievement of goals and objectives in order to add value for customers (Hammer & Champy, 2001b; Sylvestro & Westley, 2002). An example in healthcare of such a process would be the nursing process in which a collection of nursing activities is performed in order to assist a sick person in regaining their health. In the same way an ICT project such as Project Fusion, follows an implementation process, explicitly so in formal project management practice (Cleland, 2004). The project management process becomes an additional process to the existing business processes, such as the nursing process and other clinical and non-clinical processes. Simultaneously personnel are adapting to changes around them as they work, following the change process to varying degrees of intensity, duration and complexity. All these processes become entwined into the fabric of an organisation and become the current state of how we go about doing our work, with minor to moderate adjustments as we respond to fluctuations in the complex everyday environment. BPR brings about radical change that aims at breakthrough improvements in an organisation (Hammer & Champy, 2001a; Teng et al., 1996). BPR and infrastructure projects (like Project Fusion)
aim at major change which can either result in a significantly different organisation or one that has barely changed, depending on sensitivity of the organisation to initial conditions (the butterfly effect) (Ashmosh, Duchon, & McDaniel, 2000; Gleick, 1987; Snowden, 2005). Radical change episodes could be considered a punctuation of the equilibrium of a system (Gersick, 1991) in that they introduce a bigger shake up in a system than the fluctuating rhythm of the organisation. However, a complex adaptive system is more resilient than it is stable or in a state of equilibrium (Gleick, 1987; Snowden, 2005) and so the introduction of such changes could be viewed as yet another process in the fabric of an organisation.

In this way, we use processes to adapt to change, while we simultaneously adjust processes that form part of our daily work activities. BPR aims to reshape an organisation by means of radically changing processes in order to achieve specific, pre-determined goals but there are many situations in which we are unable to precisely articulate the future state, leading to some of the stated failures of such projects (Snowden & Stanbridge, 2004). An ICT project introduces change by means of its own goals and multi-dimensional processes, as clearly articulated as possible at the outset. We adapt to the project by means of the process of change while we simultaneously travel through the journey of change to achieve the project’s goals. This journey takes us through the zone of complexity (from our comfort zone of the familiar and known) to the cusp of chaos (where our leaders show us the new, unfamiliar and unknown) and we return to the newly familiar as we master new processes, technology and relationships. The change journey becomes a process in which we add value to what we do (for ourselves and our customers) by achieving project goals in the form of a set of activities and tasks that are characteristic of projects. Thus the change journey can be viewed as a process. This process is overlaid by our personal change experience, which appears to characteristically follow the change process of before, transition and after. These processes become entwined with one another for individuals, groups and on the larger scale of organisations. Processes are therefore themselves multi-dimensional, affecting people and the organisation in complex ways, as they are played out as part of our daily working activities.
Complexity of processes in complex adaptive healthcare systems

The change process, and other processes in healthcare, is subject to the properties of complex adaptive systems. Our response to change depends on the initial conditions at the time of the introduction, or even the planning, of a change (Rowe & Hogarth, 2005; Snowden, 2005). For example, if a change does not initially affect our daily working activities we will postpone our attention to the change. There is the risk of misconstruing such postponement as resistance to change, in the form of denial, when it is a response to change based on initial conditions. The boundaries in healthcare organisations are fuzzy and so the implications and potential impact of planned change are usually unclear (Begun et al., 2003; Plesk & Greenhalgh, 2001). Implicit internal rules of the system, i.e. ‘this is how we work here’, influence our response to change in that we use the change process in ways that are characteristic of how we work in the healthcare system. For example, any clinical care, especially emergencies, will divert our attention from changes brought about by an ICT project, putting the associated change process and adaptation into the background of what we are doing as part of our daily work activities. This means that we use the change process to adapt in multiple ways – it becomes a means for us to file and/or work on our adaptation activities while we get on with other more pressing work. Tension, paradox and contradiction are played out together in the change process: interestingly, under these circumstances resistance to change can be used to facilitate change (Mabin et al., 2001), and we appear to reject change while remaining committed to it, while some of us appear to get stuck in the process and others progress through it with ease.

The change process plays out as sets of patterns of and within the steps of before, transition and after (or current state, transition and future state as described by those involved in Project Fusion). We shift in and out of the three phases of the process, on multiple levels and as groups, individuals and within the adaptive organisational context. Most people progress through the process, but in differing ways (Elrod & Tippett, 2002). Some people do not engage in the process – they leave the organisation or department where the change is occurring, while others allow the changes to wash over them and may or may not become dysfunctional in their role in the organisation (Ashmosh et al.,
2000). We adapt to some changes in the forefront of our daily work activities while other changes, such as those associated with an ICT project in a clinical environment, become back burner adaptations. Most of us, however, adapt to change according to the curve in Figure 6.1 with very few people flat-lining and not emerging at the end of the process with some degree of change showing up in their work patterns (Narine & Persaud, 2003; Stacey, 1995). Action research plays a role in identifying these patterns: the active, deliberate reflective role of AR in organisational change programmes helps us use these patterns to facilitate our adaptation to change (Checkland, 2000; McArdle & Reason, 2006). Reflection in the complex, changing workplace helps us identify and use those phenomena that emerge while we progress through the journey of change (through complexity, turning at the cusp of chaos and return to the newly familiar as we master new processes, technology and relationships) and through the change process of before, transition and after.

The constructed process

How we construct, articulate and use these processes, and how we understand and articulate the context of processes, influences how we adapt to change. From a constructivist perspective, history and language play an important role in how we conceptualise and understand our world and its context (Colliver, 2002; Golinski, 2005). So that we can relate to change in the context of the healthcare system and its organisations we articulate adaptation in ways that help us identify with others who are experiencing the changes with us, and in ways that help us contextualise the changes we face. We use mnemonics, graphics, words and phrases to facilitate this articulation, such as the change curve in Figure 6.1 so that we can talk about our experiences, plot our perceptions of change and our adaptation to it in a graphic. We also hook our concepts, ideas, assumptions, perceptions and understanding into mnemonics, e.g. the REFLECT mnemonic for practicing reflective action research (Day et al., 2006). These constructions then create a basis for action (Colliver, 2002) – using the change curve graphic facilitates our understanding of the context of the change we are dealing with and the progress we are making in adapting to changes such as those implied by an ICT project like Project Fusion. The change process, expressed in the curve, orientates us to the shift from before...
to after, while the change journey, expressed as the shift from the familiar, through complexity, turning at the cusp of chaos, to return to the newly familiar (Figure 6.2), orientates us to the contextual change that produces the more personal adjustment represented in the change curve of Figure 6.1.

The complexity of healthcare organisations creates an environment of simultaneously subtle and overt changes to which we respond subconsciously and deliberately (Snowden, 2005). The processual nature of change implies history (Appleton & King, 2002) as expressed in a shift from the before/current state through a transition to an after/future state. In addition, from a constructivist perspective, processes allow us to deal with puzzles, contradictions and conflicts in the workplace and in the context of projects in healthcare (Appleton & King, 2002; Charmaz, 2000). The process orientates us to our adaptation to change, while it helps us to understand our response to the project in progress. However, it does not predict, or help us predict, precisely how people will live the process or what the exact outcome will be or emerge and become. Paradoxes and tensions are common in complex adaptive systems (Begun et al., 2003): the change process and change journey through complexity give us opportunities to deal with ambiguity and uncertainty that accompany paradoxes, tensions, puzzles, contradictions and conflicts. These processes facilitate the handling of complexity while we remain focussed on the potential future state, and simultaneously monitor for emergence and accommodate it (Snowden, 2003). In this way the change processes are self-limiting in terms of their scope and capacity to be prescriptive about the future changed state. They assist in our capacity to act and adapt, based on our construction of the proposed future state in projects like Project Fusion, and that construction in turn provides the context in which we follow the change process and journey associated with such a project.

In summary, ‘it’s about processes’. We respond to our complex and changing environment as organisations, groups and individuals on multiple levels, using processes. We change from the current(before state, by going through a transition to the future(after state, while following the change journey through complexity to the cusp of chaos to return to the newly familiar while mastering new technology, processes and relationships.
These processes allow for the expression of the properties of complex adaptive systems so that we can change in the style of the system in which we are working and living and bring about to the best of our ability changes that benefit our organisation, work groups and ourselves. Using the change process and the change journey we are able to construct an understanding of our perceptions and assumptions in order to adapt to the changes happening around us in terms of the projects that are characteristic of our workplaces in healthcare. There is no guarantee, however, that our construction of the changes or our use of the change process and journey will ensure constructive and positive outcomes. It appears that how we handle the transition between before and after determines how we construct the rest of the change process and deliver its outcomes afterwards.

6.3.2 Transition phase as turning point for change

Usually small groups of people in an organisation make decisions about implementations of innovations like Project Fusion. One or two people come up with a good idea, present it further up the hierarchy of decision making, and make a case for stakeholders to review and approve (Rogers, 1976; Smith & Song, 2004; Teng, Grover, & Guttler, 2002). The final decision is communicated back through the ranks of the workforce and the decision is implemented, often in the form of a large project if the innovation is considerable or its implications are far reaching (Wall, Cordery, & Clegg, 2002). Executives may become enthusiastic about the project and its promised outcomes in an inadvertently destructive manner because of their distance from the actual work involved in the implementation (Lovallo & Kahneman, 2003). It is usually up to the people in the ranks to ensure the success of a project that is introducing an innovation but they were not the people who came up with it, nor were they the people who decided to go ahead with the initiative. However, this does not rule out the probability that those in the lower ranks of an organisation will approve of such a project and will implement it with enthusiasm – there are usually early adopters, vacillating accepters and laggards in taking on the innovation (Rogers, 1976). It simply means that they were not in on the earliest phases of the initiative and this may influence how they respond to the change implications of the project. Consequently, there is a lag between the change journey of the managers, leaders and stakeholders and that of the rest of an organisation’s workforce.
While some people appear to thrive on the cusp of chaos in a complex adaptive system, many prefer to work in an environment that is familiar and known, while making irregular forays into the zone of complexity where aspects of their work world are unknown, unfamiliar but knowable (Barton et al., 2004; Begun et al., 2003; Burns, 2001). Leaders and managers are therefore more likely to be positioned in what they may consider to be their normal work day on the far side of the zone of complexity while most of the workforce is positioned in their own comfort zone of what is familiar, as depicted in Figure 6.7.

![Figure 6.7 Positioning of leaders and followers in complex adaptive systems](image)

This means that there is a disconnect between the organisation’s leaders (and decision makers) and its followers and workforce. This gap is usually bridged by means of an effectively communicated project vision, which should be aligned with the organisation’s strategy to predispose the project for success (Keeling, 2000; Pinto, 2004; Strassman, 1997). It is during such a project that our leaders take us out of our comfort zone right up to the cusp of chaos (where they, the leaders, are more likely to be comfortable) in order to implement the approved initiative. This is a considerable leap for many people,
especially those who do not normally operate in proximity to chaos, where the increased complexity of interaction with one another can be inhibitive in terms of being able to perform normal daily work activities. This re-positioning in a complex adaptive system provides a possibly frightening view of a world that had to date seemed comfortable but has become unfathomable, unknowable and uncontrollable. It is at this point that the need to be competent, in control of their destiny, and connected to those around them during such times of heightened uncertainty and ambiguity (Orr & Sankaran, 2005) becomes emphatic.

The heightened sense of ambiguity and uncertainty, coupled with perceptions that workload is disproportionate to the output required, seemingly mismatched resources for which and whom everyone seems to be competing, difficulty in communicating, a sense of inadequate leadership and predictions of failure, form a composite of a capability crisis that marks a pattern of people embarking on change (Day & Norris, 2006c). This appears to be a tipping point where commitment to the project is marked by the lived implications of its potential success. Since we appear to attribute meaning to our change experiences by articulating them, this crisis is potentially an opportunity for us to further construct our experience in other, similar projects, in order to facilitate our adaptation to new changes in the future. The crisis marks a turning point in the change process so that we are able to place an historical perspective on our change experience, marking our change progress in order to continue to the next phase of change. The easier it becomes to identify this crisis, and the more neutrally it is presented (that is, it is not good nor bad to have such a crisis, it is simply a landmark in the change process), the easier it is to see our change progress and therefore cope with the perceived discomfort and potential difficulties while out of our comfort zone. It is at this point that change management potentially has the greatest impact on the future success of a project.
The utility of the capability crisis

When, as with most people, the crisis does occur, two overarching components of change management emerge in this transition or capability crisis. When viewed from a manager’s position, especially that of a project and change manager, it becomes clear that we need to predict and diagnose the nature and severity of the crisis in order to intervene and assist people in dealing with it so that effective change can occur without the pain and difficulty usually associated with health ICT projects. Since people follow a process when changing and that process involves this transition step, and we change in a complex system where we shift from our comfort zone through the zone of complexity to the cusp of chaos and back, change management programmes should address the process and journey of change simultaneously.

The capability crisis is usually followed by a dip in our response to the change, and most people talk about dark times during and soon after the transition step, when they feel that too much is happening too soon and they are frustrated that they are unable to perform in a manner to which they are accustomed (Elrod & Tippett, 2002). It is rare that people will flat line at the lowest ebb of the change process and not be able to emerge from it to complete their own change process (Stroebe, 2001). However, it is possible that they could stall at the cusp of chaos for too long and their mastery of the new processes, technology and relationships becomes compromised where things are unknown and frequently unknowable (Barton et al., 2004). This could account for some project failures when too many people are unable to take on the changes they confront. For most people the crisis is short in duration, ranging from a momentary panic to months of stress (Day & Norris, 2006c). An extended crisis is frequently accompanied by a recent promotion, naïve management practice or novice leadership skills, or lack of project experience coupled with a senior project role. Regardless of experience and seniority, many people experience more than one crisis, depending on their ongoing role in an ICT project and the milestones in which they are involved (Day & Norris, 2006b). It is possible to experience a crisis at the beginning of each milestone as we take in the meaning and impact of it on our daily work activities. Diagnosis of the capability crisis equips
managers and leaders for an intervention that will predispose the people to change and the project to succeed.

6.3.3 Transition management as critical success factor

The change management programme that deals with this capability crisis (or change transition) in order to predispose the project for success, should include diagnosis of the crisis, and interventions such as management of workload, resources and training; provide opportunities for learning; emphasise the role of useful communication, and develop a coalition of leadership.

Diagnosing the Capability Crisis

Since this capability crisis occurs for most people, the change manager, project manager and leaders should expect it to happen (Day & Norris, 2006c). It is most likely to occur soon after commencement of the project, usually when the new technology, processes and relationships start to impact on people’s capacity to perform everyday activities. Since it is associated with commitment to the project and its outcomes, managing resistance to change may not be productive (Ashmosh et al., 2000). The approach of using change management to ensure that project goals are achieved by changing the way people work as described by Castle & Sir (2001) may be counterproductive. It may be more constructive for change management efforts to assess the constraints to change (Lubitsh et al., 2005; Mabin et al., 2001) and use this apparent sign of resistance to change as a tool for change rather than a component that needs to be eliminated from the project. With this approach in mind, it may be useful to use the change process graphic as depicted in Figure 6.1 to warn personnel of the occurrence of this capability crisis by describing the crisis and what it means as a form of transition from the current state to early achievement of some aspects of the future state of change. In this way people are drawn to the expectation of a combination of craft, professional and specialist skills on multiple levels and in differing degrees of success until they achieve their newly familiar comfort zone (Bolman & Deal, 2003; McLaughlin & Kaluzny, 2000). Managers and leaders, who perform comfortably at the cusp of chaos, could be alerted to destructive occurrences of the capability crisis in the case of newly promoted personnel who have not yet had an opportunity to mature their management and leadership skills (Day & Norris,
However, being aware of the possibility of a capability crisis for most personnel involved in or affected by a project is not enough – the benefits of this awareness may well be made void in the presence of managers and leaders themselves experiencing a capability crisis. Awareness and diagnosis of this capability crisis predisposes managers and leaders to facilitate change management in the form of responsive leadership, sensitive communication, support during difficult times, and opportunities for reflective learning.

**Workload, resources and training**

The capability crisis represents a time when workload disproportionately increases, when we are performing tasks and activities in the old way and will later abandon them once the new tasks and activities have been mastered (Day & Norris, 2006c). We are learning and performing new tasks parallel to the old tasks and yet are frustrated by our short-term failures to perform optimally (Castle & Sir, 2001; Kallio, Saarinent, & Tinnilla, 2002). Our workload is temporarily disproportionate to the outcomes and in a complex healthcare organisation there are few ways to support this load for any length of time before clinical care is at risk (Wears & Berg, 2005).

Bearing in mind that managers themselves are possibly experiencing their own capability crises, the change management programme associated with an ICT project should plan for this workload increase. Since decision making is compromised during the crisis, it is essential that important decisions regarding resource allocation and training are made during project planning stages so that those concerned are enabled to work with the best decisions about resources and workload that were available at the time (Project Management Institute, 2000). For example, training is frequently postponed during times of high stress in a team or department and it is training that is essential for a successful project if people are going to be using different processes and technology as a result of it (Kotnour, 2000). The change management programme should include a detailed schedule for training so that should a manager or team leader be busy with their own capability crisis, they will be able to enact the earlier decisions without compromising their team’s capacity to adapt to the changes. However, during difficult times in complex adaptive
systems such as health ICT projects it is important for managers to monitor for emergence and take advantage of opportunities for learning as they arise (Snowden & Stanbridge, 2004). Learning occurs in projects in complex ways that involve double loop learning as described by Argyris (1976) in which project team members learn about what they are learning about in a reflective manner so that they are able to adapt at a greater and more effective pace than those around them (Sense & Antoni, 2003). They are also able to form supportive communities of practice that predispose the project team to successful learning as they turn their new skills from craft to specialist capabilities (Garrety et al., 2004). It is essential therefore, that project teams are put in a position to enable other people affected by the project’s outcomes to form communities of practice and therefore provide a supportive learning environment. In this way the load for decision making regarding learning and training allocation with the concomitant competition for resources (to receive training and provide people to carry on with the work at hand) can be shared between managers, members of the project team and the wider personnel who are affected by the project.

Resources become a high priority and yet they appear to diminish as the need appears to grow. Again, decisions regarding resource allocation should be worked through during project planning and in most cases they are (Pinto, 2004). However, it is characteristic for ICT projects to demonstrate some degree of emergence common to complex adaptive systems and resources need to be reconsidered and matched to the need more closely as the project progresses (Snowden & Stanbridge, 2004). The change management programme should provide opportunities for reflection (Day et al., 2006), as in the action research process, on stages of the project to allow for adjustments to the project plan in order to reallocate resources. However, if many people are experiencing a capability crisis simultaneously their capacity to reflect on progress and adjust the project plan will be compromised, especially if they are participating in the background chatter of predictions of failure. In this instance it would be advisable to make use of the community of practice that is common in projects (Garrety et al., 2004) in order to create an environment of mutual support and learning.
The role of learning in the management of the capability crisis

Not everyone who is faced with change experiences a capability crisis (Day & Norris, 2006c). There are those who embrace the change as a challenge or an opportunity to enhance their situation. These people use learning to turn the unfamiliar into the familiar while moving in and out of the zone of complexity in a complex and rapidly and unpredictably changing environment. It appears that a growing sense of ambiguity and uncertainty are stimuli for more learning (Day et al., 2006; Wall et al., 2002), rather than an indication that there may be a problem as is the case with the capability crisis. It could be argued that we need to unlearn what we know in order to learn new technology and processes for successful change (MacDonald, 2002), but the change process, viewed in constructivist terms, implies that our previous practices and processes influence the success of achieving the future state (Appleton & King, 2002). The need to learn is juxtaposed against the time and resources needed to support the learning (Sense & Antoni, 2003) – however, if learning is prioritised there is a lowered risk of wasted resources thus lowering the risk of compromised capability due to an extended capability crisis. Project team members appear to learn on two levels as described by Argyris (1976) where they do single loop and double loop learning, building on their experiences in the project in order to develop their new skills, processes, technology and relationships. People learn in different ways, making it difficult to ensure that all personnel affected by a project are able to learn effectively in order to achieve planned project outcomes (Ballard, 2005). Learning could become a political component of a project in which those who learn more effectively are able to achieve promotion, compete more effectively for resources and develop more powerful communities of practice (Markus, 1983). It is the learning that enables empowerment of participants in a project and predisposes people to emancipation from the previous state to the future state (Pearce, 2004; Senge, 1999).

Communication is a key component of learning in the project environment and operates on multiple levels using a range of media.

Using sensitive, targeted communication

Communication is difficult during times of planned change. Sensitivity to information overload, the need for communication and the difficulty to assimilate it during this phase
means that key messages about the project should be relayed during times of reduced stress (Axley, 2000). Communication and learning become intricately linked such that the participants in a project are able to learn new skills and not lose sight of the project’s expected outcomes (Elving, 2005). There is a need for crisp, brief, to-the-point, repetitive communication (Axley, 2000; Tan et al., 2005; Waring & Wainwright, 2002) during the time when most people are busy with a capability crisis, at the cusp of chaos when it is hard to process information. However, despite the need for simplicity, communication for those experiencing a capability crisis in a complex adaptive system should make the most of multiple media, e.g. intranet, emails, team and group discussions, and at the same time maintain a core message that is repeated so that people can hear the message when they are most unable to take it in (Elving, 2005). In this way we can communicate with people in ways that resonate with them, with the safety of the written word filed in an easy-to-reach format on the internet, for example. The vision of the project should be communicated in simple terms, almost as a mantra, in order to help orientate people during times of heightened uncertainty and ambiguity, and while they learn their new skills and technology (Collyer, 2000; Elving, 2005; Tan et al., 2005). The change management programme should incorporate information about the proposed change associated with an ICT project and a learning programme, so that communication opportunities become learning opportunities (Day & Norris, 2006b; Michaels, 2002; Orr & Day, 2004).

People are hungry for information, for a shared understanding of the project (Orr & Sankaran, 2005), for a community of practice, at a time when they are least able to achieve it. This is an opportunity for leaders to intervene and help us through our capability crises for transition to the newly familiar at the end of our change journey through complexity.

*Leadership as a capability crisis intervention*

There is a mixed composition of leadership in most ICT projects in that there are mandated leaders, e.g. team managers, tangential leaders (mandated leaders who appear to have an agenda that does not support the project), leaders in other parts of the
organisation who are indirectly involved in the project, and informal leaders whose leadership emerges as a form of contingency leadership (Day & Norris, 2006a). Since people resonate with different leadership forms from different people (Kouzes & Posner, 1990), it is important to establish a leadership coalition for the purposes of the project at hand (Day & Norris, 2006a). However, leaders may be grappling with their own capability crisis at the same time as everyone else. Since change is complex and occurs in multiple dimensions, it needs to be matched by multiple layers of leadership that are greater than the sum of governance, championship, and organisational leadership (Moss Kanter, 2000; Turner & Muller, 2005). Although it is useful to build change leadership into a project in the form of Kotter’s eight steps of change (1996), it is not enough to ensure that all the leaders influencing a project will work together to achieve its vision, goals and planned outcomes. We need a composite of leadership from all leaders associated with a project, where there is a convergence of leadership activity for key aspects of a project, when attempts are made to set aside conflict for the greater good. Leaders who support their personnel during times of change are more likely to have resilient teams who adapt effectively (Harland, Harrison, Jones, & Reiter-Palmon, 2005). It is worthwhile negotiating a leadership coalition before the project is signed off for commencement so that during the time spent at the cusp of chaos leaders are able to enact their agreement while dealing with their own difficulties arising from increased complexity, working in the unknown and unknowable, and while they master their own changes (Day & Norris, 2006a; Turner & Muller, 2005; Walumbwa, Lawler, Avolio, Wang, & Shi, 2005). Since people follow leaders with whom they resonate it is unrealistic to expect the project manager to provide the bulk of a project’s leadership (Kouzes & Posner, 1990; Shore, 2005; Turner & Muller, 2005). In the same way that the project team forms a community of practice it is recommended that the leadership associated with and affected by the project form a community of practice with a shared understanding of and commitment to the project’s goals, impact and benefits.

In summary, when we know that people are likely to experience a capability crisis we can prepare them for it, diagnose it when it happens and offer some intervention in the form of managing resources, training and productivity; providing sensitive communication;
using opportunities for learning and forming communities of practice; and developing a coalition of leadership to provide clarity and support for the project’s goals, processes and planned outcomes.

### 6.4 Conclusion

In this chapter we explored change as it is experienced in a complex adaptive system; that the fabric of change is an integral part of organisations. We work in organisations by using processes and we change from one way of working to another by following our own personal and collective processes of change – the ‘death valley of change’ process as described by Elrod & Tippett (2002) and the journey of change through complexity (Day & Norris, 2006b). We express the use of processes, by means of the influence of organisational history on the way we work now, and our ability to construct our understanding and appreciation of change experiences linked to health ICT projects. Since healthcare is a complex adaptive system and health ICT projects exhibit the properties of such systems, also being part of one, there are multiple dimensions of adaptation to change. These dimensions appear to exhibit the features of the change process as we adapt to change on multiple levels and construct newly familiar ways of working when new technology, processes and relationships are introduced by means of health ICT projects.

In the change process the transition from the before state to the future state is marked by a capability crisis which consists of a heightened sense of ambiguity and uncertainty (as we begin the journey through complexity), perceptions of disproportionate increase in workload, seemingly unmatched resources and competition for diminishing resources, perceptions of inadequate leadership and predictions of failure. Understanding of the nature and implications of this crisis is useful in change management planning and decision making during the course of the project. For change management to achieve its potential as a critical success factor in health ICT projects we should diagnose and prevent or minimise the effects of this transition crisis, and intervene with workload and resource management, training planning, sensitive and useful communication, and a coalition of leadership. Learning plays an important role in preventing and/or managing
capability crises for those affected by changes brought about by health ICT projects. This learning is a core component of such a change management plan. If a change management programme were to focus on a single aspect of the change process, the capability crisis that occurs during the transition phase is potentially that aspect – those who are in the middle of such a crisis have difficulty performing their daily work activities, while decision making and leadership are compromised. Efforts to reduce the incidence, intensity and consequences of the capability crisis are well spent in terms of setting people up to be able to perform more effectively during change, reduce frustration, improve the capacity to communicate during stressful times, and provide leadership that resonates with most people.
Chapter 7  Conclusions and implications
7.1 Introduction

Chapter 7 wraps up the thesis with an overview of the research, reiterating the research assumptions and themes under investigation. The findings will then be drawn together in a summary of the complexity of health ICT projects, the art of change management, and the fabric of change. Conclusions will be presented, indicating that we do indeed experience change as a process and a journey through complexity, that early diagnosis of the capability crisis (transition period) in the change process is essential for effective intervention involving leadership, learning, communication and management of resources. The limitations of this research will be outlined, such as the methodological limitations and those of the entire research project. Then we indicate how this thesis contributes to knowledge in terms of methodology, theory and practice. Implications for the research are explored in this chapter, outlining opportunities for future research. The chapter ends with a summary of the thesis and closing remarks.

7.2 Overview of the research

Although health ICT projects appear to tend to fail, we continue to implement innovations in the evolution of healthcare information systems (Heeks et al., 1999; Orr, 2004; Shore, 2005). In order to contain the growing costs of healthcare delivery, and to channel the subsequent savings back to the core business of DHBs (clinical care), shared services organisations have been established between DHBs in New Zealand, such as healthAlliance in Auckland (Dibbern et al., 2004; healthAlliance, 2001). A consequence of the establishment of healthAlliance was the development of a single IS infrastructure for the two participating DHBs and healthAlliance itself. This project (Project Fusion) was used for the research that looked at how we adapt to change associated with ICT projects in the healthcare context. Action research was used on two levels: to support the implementation of a change management plan as a critical success factor for the project, and for the purposes of research (Checkland, 2000; Sankaran, 2001). The research was conducted using a constructivist approach (within the context of critical research) which assumes that reality is bounded by our understanding of it by means of language and
history (Appleton & King, 2002). Gounded theory principles were used as part of the recurring AR cycle to inform future iterations (using constant comparison and iterative literature searches), inform decisions regarding iterative data generation (using theoretical sampling to support decisions regarding convergent interviewing) and analyse the data (Charmaz, 2006; Strauss & Corbin, 1998). The content of the research was expressed in terms of assumptions and themes for understanding how we adapt to change linked to ICT projects in healthcare.

The research assumptions and themes
The research was based on a set of assumptions about how we change in response to ICT projects in health, and the themes for exploration about that change.

The assumptions were that

- Change abounds in healthcare;
- Healthcare is a complex adaptive system;
- Health ICT projects tend to fail, and
- There is possibly a supportive environment for change.

The research themes explored the

- Link between project success or failure and the change process;
- Role played by IS infrastructure in business process re-engineering, and
- Need to examine the role of change models and theories as expressed in change management programmes for health ICT projects.

These assumptions and themes became the context in which the research about change as a process in a complex adaptive system, such as healthcare, was examined via Project Fusion. Project Fusion was an expression of healthAlliance taking on IS as a combined service for two Auckland DHBs.
The research project

Project Fusion marked the joining of two previously independent and separate IS departments for two different DHBs in Auckland. The primary goal of the project was to establish a single IS infrastructure for the two DHBs and healthAlliance, the new shared services organisation. This project consisted of seven subprojects which involved

1. Reviewing the existing WAN and LAN for future alignment, upgrading and enhancement;
2. Establishing a single server infrastructure and upgrading the servers;
3. Aligning the email exchanges for the three Auckland DHBs (thus extending the project beyond the scope of the two participant DHBs) and upgrading to Exchange 2003;
4. Automating server reporting and management;
5. Automating application management and deployment;
6. Standardising desktops for DHB1 by upgrading to Windows XP and MS Office 2003;
7. Standardising desktops for DHB2 by upgrading to Windows XP and MS Office 2003.

The project’s aims were to save money on IS as a support service and redirect the savings to clinical care, improve service related to ICT by standardising technology and processes, automating some processes, and providing more opportunities for proactive service. The research took the form of an AR-based change management plan, making use of opportunities to use the AR cycle, reflect upon actions and modify future actions (especially those related to critical success factors) in order to predispose this project for success.

7.3 Drawing the findings and conclusions together

We set out to examine the use of change management as a critical success factor and how the change process expressed by Elrod & Tippett (2002) as the ‘death valley of change’ influences the success of ICT projects. The data generated by the change management plan, the AR cycle, and other project activities distilled findings about the complexity of
health ICT projects, and change management as a critical success factor in complex projects in complex adaptive systems. These findings reflect the research associated with the assumptions and themes outlined above in the description of the research problem. However, characteristic of action research and complex adaptive systems, other findings emerged about the transition phase of the change process. These findings lead to new conclusions about how we adapt to change linked to health ICT projects (and possibly other organisational change projects).

The complexity of health ICT projects

The NHS of New Zealand is an expression of a complex adaptive system, exhibiting the properties of such a system in characteristic ways (Begun et al., 2003; Plesk & Greenhalgh, 2001). The two DHBs associated with Project Fusion reflected these properties as well, as did the project itself. The project occurred in an environment where the healthcare system is sensitive to initial conditions, for example, the existing ICT platform for the EHR allowed for the further development of clinical components, subject to the need for a single ICT infrastructure. The emergence of a shared services organisation is characteristic of complex adaptive systems where unpredictable, and yet useful, initiatives emerge and people take advantage of them. The merging of the two IS departments required a single ICT infrastructure from which Project Fusion emerged. The boundaries between the subprojects of Project Fusion were crisp and clear, and yet the boundaries between the IS departments prior to healthAlliance were not, nor were the boundaries between clinical care and the enabling services provided by the IS department.

The influence of internal rules in healthcare systems is evident in projects – how we practice clinical care influences how we deliver ICT innovations by means of projects. ICT projects are full of paradoxes and tensions as evidenced by the difficulties experienced in planning and delivering learning opportunities, the delivery of communication during difficult times, and the provision of leadership. Patterns are natural in health ICT projects as exhibited in our tendency to encapsulate them in project methodology such as PRINCE or PMI, and in the way in which we appear to follow a
process like the ‘death valley of change’ (Elrod & Tippett, 2002). We seem to prefer to work and live in an environment of low complexity but projects take us into the zone of complexity where we are stretched, learn new processes and technology, and develop new relationships in order to once again reduce the perceived complexity of our daily work activities. In this way, the healthcare system is resilient as demonstrated by our ability to absorb projects that have been defined as failures in the ongoing evolution of health information systems.

Bearing in mind these properties of complex adaptive systems, project managers still need to make use of critical success factors in order to reduce the risk of failure, which seems to hound ICT projects (Cleland, 2004; Glaser, 2003; Pinto, 2004). Most factors appeared to work well in this research project, and within its context of complexity. The project was strategically aligned with the core business goals of the two DHBs and healthAlliance, as evidenced by the efforts made by the project proponents when presenting the business cases. The happy user was core to the success of the project, and so the goals of each subproject were deliberately attuned to making it easier for healthcare personnel to use the new technology and processes associated with their daily work activities. However, sensitivity to initial conditions made this difficult to achieve because of the complex and diverse needs of users in different settings throughout the DHBs. Project management was set up so that the project would be successful, making the most of established project management practice and an experienced project manager. The scope, budget and timeline formed strong boundaries for the project.

A change management plan was developed in order to assist people in adapting to the new technology, processes and relationships. Leadership was essential for the project’s success but in the context of a complex adaptive system where people are taken out of their comfort zone, through the zone of complexity and to the cusp of chaos by their leaders, leadership took on new features and characteristics (Day & Norris, 2006a). Although learning was considered a critical success factor, it was difficult to plan and support opportunities for learning in this complex project where multiple demands and reduced resources to meet those demands diminished people’s capacity to set aside time
for learning and to adapt their daily working activities to maximise what they were learning (Day & Norris, 2006b; Orr & Day, 2004). Change management, in the context of healthcare and associated ICT projects as complex adaptive systems, became an art and a science.

The art of change management

As a critical success factor for health ICT projects, change management becomes an art in a complex adaptive system such as healthcare and associated ICT projects. The inclusion of action research principles in a change management plan, facilitates the delivery of the plan by means of AR’s cyclic nature of act and reflect (Waterman et al., 2001), the partnerships that are characteristic of AR projects, and the use of reflection to iteratively learn and consequently improve as we progress through a project. It is interesting to note how well action research principles fit into a change management plan. The cyclic reiterations of acting, reflecting and applying learning to the next phase of a project appear to synchronise well with the project management process. In this way AR can become a way of working, especially when we see how the reflexive employee contributes constructively to change initiatives (Day et al., 2006). In addition, AR is easily adapted for use in a complex adaptive system in that it takes advantage of emergence, sensitivity to initial conditions, and communities of practice (as expressed in the partnerships that evolve amongst learners in the project team, researchers, change managers, managers and leaders). Reflection becomes a way of working in such an environment where existing mechanisms for group and individual reflection (allowing for varying degrees and forms of reflection) can be used to enhance our capacity to deal with change and to predispose projects for success.

Although we cannot assume in complex adaptive systems that change occurs sequentially and predictably, we still need to plan for change. Such planning involves providing leadership, managing clear and concise communication and creating an environment in which learning is fostered in order to facilitate change. It is useful to build leadership principles, such as Kotter’s eight steps of change (1996) into the project plan but on its own such a framework is not enough. There is a need for multi-faceted leadership
consisting of mandated, informal, situational and responsive leadership in a messy, complex environment that requires transformational leadership from people who are themselves in need of leadership, learning how to provide leadership in new roles, or being called upon to lead in difficult times. People gravitate towards leaders with whom they identify, regardless of the role of that leader in the project at hand. Leaders take us out of our comfort zone to the cusp of chaos where they reveal to the best of their ability, the vision of a project and help us master new processes, technology and relationships associated with ICT projects. It is at times like this when we need a coalition of leaders to assist us in our change journey to the new ways of working.

People within an ICT project team usually form a community of practice for learning their new processes and technology. These new relationships support the development of a learning community that fills the gaps created by a traditional training programme. There is usually a tension between the stand that training and learning are essential for project success, and actually providing the resources for effective training to occur in a situation that is characteristically under-resourced. The art of change management lies in facilitating the development of a community of practice, and supporting the delivery of just in time training, coupled with other forms of learning, such as mentoring and coaching. Double-loop learning is characteristic of ICT projects: project team members are learning for their own purposes, whilst simultaneously supporting the learning of their customers and colleagues and critiquing the effectiveness of their own performance and that of the project as it progresses to completion. Communication becomes a tool for leadership and learning, presenting the project vision, updates on progress, and feedback on activities. The art of communication in ICT projects in healthcare lies in matching the properties of complex adaptive systems with the need for communication – using the principles of multi- and equi-finality in delivering important messages, reducing the effect of ‘noise’ created by other simultaneous change initiatives and the demands of everyday work. The healthcare environment is partially supportive of change as evidenced in the emergence of new and more effective ways of working regardless of deliberate change projects such as Project Fusion. However, there is a need for support
in terms of assisting people in adapting to new processes and technology resulting from such a project.

In short, our leaders take us out of our comfort zones, through the normally stimulating zone of complexity, to the cusp of chaos by means of ICT projects, where they show us what the project means to us in terms of new ways of working. They assist us to adapt by providing opportunities for learning, by supporting our efforts at mastering the new processes, technology and relationships, and keeping in touch with us by means of communication.

*The fabric of change*

Although the research set out to examine the art of change management as a critical success factor for health ICT projects, we uncovered new insights about the transition from the ‘before’ state to the ‘after’ state in the change process, in the context of our individual and collective experience of organisational change. People talk about change in terms of their single, individual experience situated within their collective experience of the same change. Although the theory about change as a process is mostly expressed as a sequential set of steps as described by Elrod & Tippett (2002) as a ‘death valley of change’, we do not necessarily follow the process as expected (Stroebe, 2001). In addition, this process occurs within the context of the complex adaptive systems of healthcare and health ICT projects, in which we are jolted from apparent low complexity of the familiar and known work environment, through the zone of complexity to the cusp of chaos. We appear to follow this journey by means of a project and return to a newly familiar workplace, having mastered new processes and technology and developed new relationships.

While we are on this journey we appear to simultaneously follow the ‘death valley of change’ process. The transition described by Schneider & Goldwasser (1998) was examined during Project Fusion and became known as a capability crisis. This period is characterised by a heightened sense of ambiguity and complexity (which marks the shift from the familiar and known in a complex adaptive system to the zone of complexity); a
disproportionate increase in workload while we compete for diminishing resources; the emergence of complex leadership patterns; and a tension between the demand for information and difficulty in absorbing and using it. This crisis marks the turning point of change for most people but it is often a sign also of compromised capacity to perform in the project. The utility of the capability crisis lies in our ability to diagnose it early and intervene with effective leadership, clear, sensitive and targeted communication, workload and resource management, and multi-dimensional learning.

The journey on which we travel through complexity when we introduce change associated with ICT projects occurs simultaneously with the ‘death valley of change’ process of collectively and individually adjusting to new processes, technology and relationships. These processes occur in a multi-dimensional manner that reflects the multi-dimensional nature of organisations and the people who work in them. These processes are the construct of the people who experience them – the onset of the capability crisis is frequently as personal as not being able to continue doing old processes on new technology that affects a single person. The art of change management lies in blending an understanding of complex adaptive systems (as expressed in the healthcare system), and the complex interactions of different people (clinical, technical and management personnel) with one another and other components of the system in which they work. There is value in using processes and their multifarious expression in the healthcare system, especially the change process and change journey associated with health ICT projects as part of a change management programme.

In short, healthcare is a complex adaptive system and the properties of such a system are also evident in health ICT projects. Change management in healthcare and associated health ICT projects becomes an art when blending the properties of complex adaptive systems with leadership, communication, learning and support. Adaptation to change is usually expressed as a process from the ‘before’ state to the ‘after’ state, while we travel the journey of change to the cusp of chaos and return, mastering new processes, new technology and developing new relationships with the people around us. The capability crisis marks our transition from before to after – early diagnosis of this crisis predisposes
a project to success when we intervene with a coalition of leadership, communication that is sensitive and targeted, opportunities to develop a community of practice for learning, and the provision of a supportive environment in which to adapt.

7.4 Conclusions

Three primary conclusions have emerged from this research.

Assuming that change abounds, healthcare is a complex adaptive system, health ICT projects tend to fail, and three is possibly a supportive environment for change, then project success or failure are linked to the change process, IS infrastructure plays a role in business process re-engineering, and there is a need to examine the role of change models and theories as expressed in change management programmes for health ICT projects.

During the course of a large infrastructure project that resulted from the establishment of a shared services organisation for two Auckland DHBs, we learnt that:

- ICT projects, occurring in the complex adaptive system of healthcare, are themselves complex adaptive systems. Success or failure of such projects is strongly influenced by the properties of complex adaptive systems, such as emergence, sensitivity to initial conditions, fuzzy boundaries, internal rules, paradox and tensions, patterns, and resilience of the system.

- The art of change management in health ICT projects involves the recognition of these properties of complex adaptive systems. The art lies in optimising the effect of leadership, communication, learning and support within the context of these properties.

- The fabric of change in complex adaptive systems is made up of our adaptation to changes in the workplace in the form of a process (a personal and collective transition from the before to the after state) and a journey through complexity to turn at the cusp of chaos and return to the newly familiar everyday work processes, technology and relationships. The transition from before to after is useful in change management if diagnosed early and if interventions involving sensitive and targeted communication, complex leadership, and effective
management of workload, resources and learning. The models for change management that are already being used retain their utility. They are complemented by the capability crisis, which marks the transition from before to after, as well as a new model of change as a journey through the zone of complexity (regarding our collective and individual adaptation to change in the workplace).

7.5 Research limitations

There are two forms of limitation for this research: methodological limitations and limitations that apply to the whole research project.

Methodological limitations, as discussed in Chapter 3, applied to action research and grounded theory. These included contingency (the tendency for an AR project to lose its focus and follow the data or interesting events that end up limiting the significance of the research), subjectivity (the risk that personal viewpoints and circumstances inappropriately influence the research outcomes), and uncontrollability (the result of the system being sensitive to initial conditions in such a way that nothing significant emerges from the research component of the project) (Avison et al., 2001; Kock, 2003). These limitations did not have an overtly negative effect on the research since grounded theory principles (Charmaz, 2006) were used throughout the project in the interests of rigour and were complemented by convergent interviewing (Rao & Perry, 2003). The convergent interviews were in turn analysed using the grounded theory analysis process (Charmaz, 2006). We also used principles of Checkland’s soft systems methodology (Flood, 2000) and cyclic AR activities and reflection (Baskerville & Pries-Heje, 1999). We aimed at using the research to promote success for the infrastructure project, while simultaneously looping the research through the project, making use of the AR cycle of plan, act, reflect, modify the plan and repeat the cycle (Brydon-Miller et al., 2003; Sankaran, 2001).

Limitations also apply to the research project as a whole. This research is about the art of change management as it is used in health ICT projects in order to predispose them for success, in light of so many ICT projects failing (Heeks et al., 1999; Shore, 2005), while
we continue to implement more health information systems in New Zealand (Health Information Steering Committee (NZ), 2005; Orr, 2004). We discovered the role of the capability crisis that marks the transition from the before state to the after state in such projects (Day & Norris, 2006c), and how it contributes to project success. Because this research is based in the constructivist paradigm (Appleton & King, 2002; Golinski, 2005), we propose that the outcome of the research is limited to health ICT projects as we have constructed our understanding of it in the research associated with the infrastructure project that resulted from the emergence of a shared services organisation between two Auckland DHBs. The principles of the outcome of the research, as they relate to change management and change as a process and journey, can be applied to other ICT projects within the scope of healthcare and possibly other complex adaptive systems. What has been learnt from this research can be transferred to other, similar situations (Caelli et al., 2003; Denzin & Lincoln, 2000; Strauss & Corbin, 1998; Urquhart, 2001), projects and systems, but not generalised for all other forms of project that result in radical, rapid organisational change that is usually associated with BPR.

Despite the limitations described above, the research has made significant contributions to the body of knowledge in terms of methodology, theory and practice.

### 7.6 Contribution to knowledge

This research has contributed to the body of knowledge in terms of how action research was used, the theory that was developed regarding the process and journey of change in complex adaptive systems with a practical application of both methodology and theory in future health ICT projects.

*Methodological*

Although action research has been used in IS research in the past its potential has not been exploited well (Baskerville, 1999; Baskerville & Pries-Heje, 1999; Myers, 1997). We usually assume that AR addresses a problem by providing a mutually developed intervention in a real-world situation and then, by means of the four steps of the AR cycle, we implement the plan and reflect on our actions, improving future steps as we go.
(Kock, 2003; Maynard, 1995; Rapoport, 1970; Waterman et al., 2001). We assume that, because good research is replicable, an AR project should have at least a second cycle, or iteration and that the more iterations there are of a project the better the research results will be (Goede & de Villiers, 2003; Kock et al., 1999).

The contribution made by this thesis includes the following:

- Although we assume that AR comprises an intervention that has resulted from a critical assessment of a situation, it is not essential for AR to foster the solution to the problem. The project used for this research was already under way when the research was included into its profile. The value that AR added to the research came in the form of conducting change management by means of the AR process, which is possibly what Lewin set out to do when he coined the term (Lewin, 1951). This research uncovered the value of change (resulting from ICT projects) by means of AR, which allowed us to learn about how we change by means of the change process and journey.

- Multiple iterations are indeed important in AR projects but they are not necessarily limited to repeat iterations of a whole project. This research uncovered the natural rhythm of multiple iterations within a project and their sub-iterations, as discussed in Chapter 3.

- AR is made up of repeat cycles of action and reflection. Reflection became a way of life for the researcher and the participants, in such a way that the practice of reflection continued well after the end of the project (Day et al., 2006). Although at the outset of the research participants felt that reflection on their actions and cycles within Project Fusion were spurious and better done by the researcher whose job it was to reflect on the research, we found that many work activities had reflective components that could be used for the benefit of reflection in the workplace.

- Constructivism as a way of knowing in the context of this research allowed us to use stories, observations, reflection efforts, and experiences to construct our understanding of how we adapt to change linked to health IS projects (Appleton & King, 2002). This approach freed us to allow theory to emerge and AR supported the us this theory as it emerged.
A criticism of AR is its apparent lack of capacity to rigorously support the development of theory, that AR is more about action than it is about theory and the development of models that inform our practical daily work activities (Kock, 1997; Reason, 2006). We used the principles of grounded theory to facilitate the emergence of theory (Charmaz, 2000; Goede & de Villiers, 2003; Kock, 2003; Strauss & Corbin, 1998). The result of this was a combination of the AR cycle, constant comparison, and regular data analysis cycles using the grounded theory data analysis steps (for selected data). Theoretical sampling was used near the end of Project Fusion when it became clear that theory was emerging regarding the transition phase of the change process as described in Chapter 6. This combination of AR, grounded theory and the principles of constructing our reality using language and history, facilitated the development of theory about change in healthcare, change in health ICT projects, change as a process and journey in a complex adaptive system.

Our research uncovered theory as follows:

- The use of AR as the foundation for change management linked to health ICT projects, regardless of the starting point of the change management component of the project;
- The value of the emerging reflexive employee;
- Change as a journey through complexity as we move from what is familiar and of low complexity in our healthcare workplace through the zone of complexity where we are stimulated and learn at our best. The journey continues while our leaders take us to the cusp of chaos to take on the vision associated with the project in progress, and assist us in developing our new skills, processes, technology and relationships for our return to the newly familiar world of apparently low complexity.
- Change as a process through the ‘death valley of change’ with a transition phase as described by the capability crisis which is characterised by a heightened sense of ambiguity and uncertainty, a disproportionate increase in workload, competing for diminishing resources, paradoxes and tensions regarding communication and learning, complex patterns of leadership, and predictions of failure. The utility of this
crisis lies in how early we diagnose it, and the interventions we use regarding leadership, learning and communication, and management of resources, workload and learning.

- The combination of the change journey and change process and the role of change management as a critical success factor.

Although this theory is useful, its value needs to be expressed in practice in the workplace, in health ICT projects where people are struggling with the change implications of a project they are implementing.

*Practical*

People use theory in two ways – espoused theory and theory in use as described by Argyris & Schon (1976; Dick & Dalmau, 2000). The value of using AR lies in applying new theory as it is being developed. In the case of Project Fusion, we were able to capitalise on the new insights as they emerged, and used the capability crisis as a change management component for subsequent project milestones, developing our understanding of it as we progressed through the project. In developing reflexive colleagues during the course of the project we were able to promote mutual empathy, improve communication, and create a shared understanding of the project and our mutual experiences (Day et al., 2006; Orr & Sankaran, 2005).

The healthcare process of diagnose, treat and evaluate is reflected in the AR process of act and reflect. In practice the capability crisis is useful when diagnosed and the interventions of leadership, communication and learning, and management are implemented: the change management intervention aligns well with what we normally do in healthcare and can therefore be more easily synchronised with projects in healthcare.

These contributions to the body of knowledge have implications for the future.
7.7 Implications of the research

The cyclical and reflexive contributions of AR, the insights gained from using grounded theory, the development of theory regarding the change process and its transition marked by the capability crisis, and understanding the change journey have implications for the future.

For change management linked to health ICT projects

Since ICT projects do not have a good track record for success (Glaser, 2003; Shore, 2005), we become concerned about the potential for failure when we could be paying attention to what is happening to the people associated with the projects, and intervene to assist them in dealing with their capability crisis. Having reduced the social and personal impact of change on the people implementing such projects, we can then deal with the other critical success factors associated with ICT projects. Change management is a critical success factor and should be managed with priority. The implications for change management linked to health ICT projects lie in

- The view that healthcare is a complex adaptive system and that health ICT projects are also complex adaptive systems. Health ICT projects that acknowledge this and make use of the properties of complex adaptive systems, especially in the art of change management, will possibly be more successful than expected.
- The use of the change process to lead people through their collective and individual experiences of the project. The implication is that we need to identify and use the capability crisis, which if neglected, may be destructive enough to predispose a project to failure.
- Change management becomes a critical success factor, up there with alignment with business strategy, effective management of cost, time and scope, effective project management, leadership within the project and organisation, and effective learning.

These implications for change management also have an effect on the implementation of knowledge management systems in healthcare.

For implementation of knowledge management systems in healthcare
Knowledge management in healthcare is still a young endeavour with some countries ahead of others in their development of the EHR, as discussed in Chapter 2. In New Zealand we have already come a long way in developing our health knowledge management systems (Orr, 2004) but there is still scope for extensive development as expressed in the Health Information Strategy for New Zealand (Health Information Steering Committee (NZ), 2005). We already intuitively continue to implement new knowledge management projects in the face of previous failure – complex adaptive systems are resilient and have been able to absorb these initiatives regardless of perceived failure. The art of change management based on an understanding of the fabric of change (the change process, the capability crisis and the change journey), could contribute to more successful implementation of the Health Information Strategy for New Zealand, and in other countries, when we are better able to facilitate change during the course of an ICT project and afterwards as we adapt to the new processes, technology and relationships.

For future research
Complexity theory has recently been used in the context of healthcare organisations (Plesk & Wilson, 2001), but we still need to use a composite of organisational theory to understand how healthcare works and how we adapt to changes (Bolman & Deal, 2003). The research in this thesis has implications for organisational research in the context of healthcare leadership and how we implement ICT projects. The role of complexity theory needs further exploration in healthcare especially considering the growth of the ageing population, chronic conditions, and the need for evidence-based care simultaneously on individual and population-based scales. Although we feel that health ICT projects generally fail, it may be that these failures are being absorbed by the complex adaptive system of healthcare and need to be evaluated differently – the computer is not squandered in healthcare as indicated by Strassman (1997), nor are ICT projects as disastrous as we may think they are as indicated by Collins & Bicknell (1998). Failure of health ICT projects may depend more upon our lack of understanding of healthcare as a complex adaptive system and the need for the art of change management as a critical success factor (Castle & Sir, 2001; Freed, 2006; Heeks et al., 1999).
Future research may include the following:

- The application of complexity theory in understanding the use of critical success factors for health ICT projects, over and above leadership and project management;
- The link between the project management process, and change as a process and a journey through complexity;
- The influence of the capability crisis amongst leaders when the demands on leadership from them are high during the course of a project;
- Resolving the ‘problem of learning’ during the course of a health ICT project;
- The influence of communities of practice on project success linked to adaptation to change, with special reference to experiencing the capability crisis during times of transition; and
- The influence of a well-managed transition, i.e. capability crisis, on health ICT project success and its subsequent influence on the development of comprehensive knowledge management systems for a nation, community and/or individual.

The research reflected upon in this thesis has implications regarding change management in health ICT projects, the implementation of health knowledge management systems, and future research.

7.8 Thesis summary and closing remarks

In conclusion, this research was conducted on the basis of the assumptions and themes that healthcare is complex and change abounds, health ICT projects tend to fail, even though there is a supportive environment for change to occur. The alignment of IS infrastructure as expressed in the emergence of shared services organisations for collaborative DHBs plays a central role in business process re-engineering for the shared services organisation as well as the participating DHBs. Project success (or failure) is linked to the change process and there is a need to examine the role of change models and theories as expressed in change management programmes for health ICT projects. The research was conducted in an emerging shared services organisation for two large
Auckland DHBs in New Zealand, using an infrastructure project, Project Fusion, to examine these assumptions and themes to learn about how we adapt to change linked to health ICT projects. The goal was to research the role of change management as a critical success factor for health ICT projects in the ongoing need for developing health information systems in New Zealand.

We used action research and grounded theory within the constructive approach to tap into this knowledge. The AR cycle becomes a way of working, enhancing the effectiveness of change management programmes associated with health ICT projects, especially regarding the role of reflection and learning during the course of a project in which much is changing and the tension and paradox exist between getting through the workload and simultaneously learning new processes, technology and relationships with diminishing resources.

We concluded that health ICT projects are themselves complex adaptive systems within the context of healthcare as a complex adaptive system. The art of change management in such a system is a critical success factor for project success. The capability crisis (an indicator of transition in the change process) is an important factor in the art of change management, and leadership, learning and management play important roles in our adaptation to change linked to health ICT projects. This contribution to the body of knowledge has implications regarding our future understanding of health ICT projects and how we employ change management as a critical success factor in such projects. More research is recommended to gain a fuller understanding of the implications of the conclusions indicated above.


Moss Kanter, R. (2000). Leaders with passion, conviction and confidence can use several techniques to take change or change rather than react to it. Ivey Business Journal, 64(5), 32-38.


