

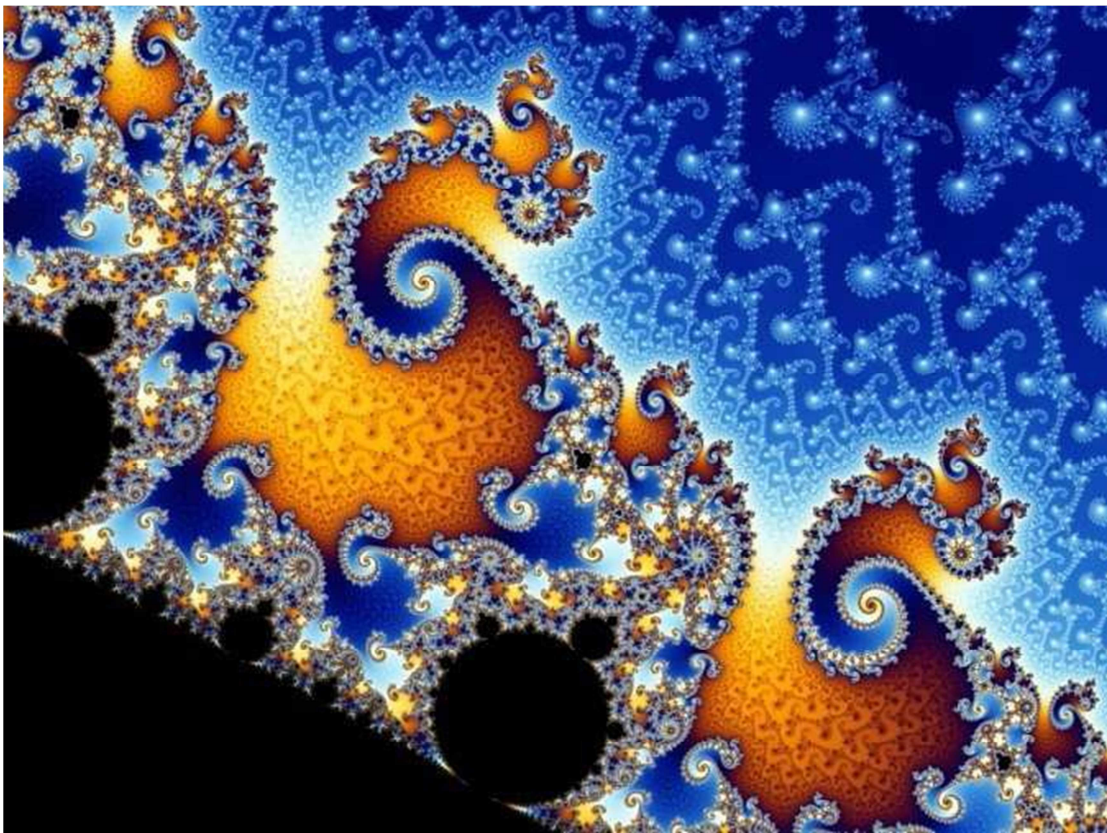
# Creating and Leading Adaptive Organisations:

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## The nature and practice of emergent logic

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"The effective leader is someone who searches for the better question, accepts inexperience, stays in motion, channels decisions to those with the best knowledge of the matter at hand, crafts good stories, is obsessed with updating, encourages improvisation, and is deeply aware of personal ignorance."

Karl E. Weick



## Abstract

This study examines how leaders enable their organisations to adapt and succeed in complex environments. Through the joint lenses of complexity theory and the cognition and social neuroscience of leadership it focuses on how leadership directly influences the creation and ongoing function of an adaptive organisation. The study includes the comparison of four leaders through embedded case studies as an abductive approach to initial theory building, and the follow up of two of them as a comparative method of analysis, and it generates a substantive theory of leadership cognition called emergent logic. This leadership approach is especially relevant to leading complex human systems in emergent environments, the scenario for the majority of organisations in the present day.

This thesis addresses two questions: How do leaders of adaptive organisations think? And what do leaders of adaptive organisations do?

Among the major findings the study reveals that a critical success factor is the leader's capacity to create and guide a complex human system by establishing and maintaining a shared mental model of its collective purpose, guided by deeply held and articulated values. The cognitive constructs of complexity and emergent logic have a direct and indirect effect on individuals and the organisation, and facilitate the creation of an adaptive operational culture and organisational mind, and the complementary enabling structures that allow for ongoing evolution through emergence, transformation and diffusion as required. Thus the organisation and its people can progressively build more complex emergent mental models and solutions in the face of increasingly common unpredictable situations, leading to the capability for organisational adaption and evolution over time.

In contributing to the theory of creating and leading adaptive organisations, supported by empirical research, this study has improved our understanding of the effect of the leader's cognitive capacity on organisational adaptability and the level of entanglement; revealed the links between the creation of adaptive organisational structures and their culture; examined the growth of individual and collective capability to manage the increasing complexity and emergence created by successful adaption and evolution; identified the common elements of various types of complex systems that are relevant to adaptive change; presented a model of emergent logic and described the empirical use of that model over time.

## Acknowledgements

This thesis has been a journey as emergent as those to which it refers. It meant stepping out of my business of twenty years and life as I knew it to enter the world of academia. Travelling the path would not have been possible without the help and encouragement of many people who accompanied me along the way.

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I wish to express my gratitude to the Business School and to Leah Hill and Sam Wells in particular, for their backing, enthusiasm and commitment in tackling the administrative hurdles which made it possible for my journey to continue.

This brings me to Sam Wells, my principal supervisor. Words cannot adequately describe the debt of gratitude I owe to Sam. In terms of the thesis journey, he kept me going, steered me back on track and pushed when I slowed or got stuck. He believed without a shadow of doubt in the uniqueness and value of what I was attempting, and he managed the task of bounding and focusing my work with aplomb and great kindness. In terms of my personal journey, the opportunity to have someone of such graciousness, keen mind and wise spirit as my mentor and friend was a wonderful experience. I could not have done it without you Sam. Thank you.

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# Thesis Declaration

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution to Fiona Kerr and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

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Signed.....(Fiona Kerr)

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# Chapter 1 - Background

The arc of the thesis story - the rainbow's beginning, bands of colour and pot of gold.

This thesis includes all of the required structure and content of an academic work, but by way of an attempt to convey my reason for undertaking such a task, I begin with the story arc as a piece of this size can be daunting in the following of a single narrative.

## ***The beginning of the rainbow's arc***

I have almost thirty years of experience in organisations in formal as well as advisory roles, much of that time occupied with assisting people to understand the interconnectedness and the potential adaptivity of their organisation, and the possibility for it to flourish in the face of (inevitable) change. Over this time I have observed consistencies in how adaptivity and resilience was grown and nurtured over time. This thesis is specifically concerned with the role and impact of the leader, which I observed to be a critical factor in every successful case I witnessed in the process of growing adaptivity and resilience.

The thesis is also informed by the consistent failure of formulaic organisational interventions to achieve the desired effect or solve persistent problems – indeed it was not uncommon for such practices to set up such problems due to the unanticipated side effects of complexity's interconnectivity. In my experience this was minimised when the organisational leader had an understanding (even if intuitively) of that complex interconnectivity, and combined this with deep self-knowledge about what drove them, a level of comfort with emergent outcomes and the ability to merge this with mature operational competence.

Years of observation served as the motivation for the thesis case studies which span a number of years and have produced not only a substantial body of empirical work but have informed the theory of emergent logic that the thesis presents.

## ***The bands of colour***

The bands span a number of disciplines including psychology, social neuroscience, cognition theory, complexity theory and organisational leadership –the rainbow is a complex arc! The areas of complexity and cognition are, for me, exquisitely entangled and as such predominate the arc's bands, yet the picture I paint differs from current combinations that sound the same such as adaptive or complexity leadership. Whilst they claim, quite rightly, that a complex system is self-organising and self-managing, resulting in leadership emerging at all levels; they conclude that the CEO position is not pivotal to adaptive capability and sustainability.

Organisations (as complex adaptive systems or CAS) certainly have these qualities, but in my experience such emergence has to be enabled by those with the power to do so. If this does not happen then what emerges has minimal impact or even negative consequences. When people are willing to step into the 'space' made by the dynamic and often unknowable situations which exist in a CAS, then innovation and novel change will occur. The leader holds such a space open or shuts it down, and has a critical impact on whether the space is seen as safe or too risky. Leaders who leverage self-organisation by building appropriate organisational structures supportive of informed choice and distributed decision making will gain operational advantage. Those who try to control and shut down self-organisation will only force it to act in detrimental ways.

A system adapts by learning, but it needs a leader who creates an enabling infrastructure, structure and power differential that allows for inquiry, reflection and action to foster such learning. Otherwise the organisation will still adapt (as nothing stays still), but it will learn to be recursive and push for stability, or will become static, brittle and at risk of breakage.

Cognition is a complex, entangled web, and how a person thinks (to a significant extent) shapes what they do. In the case of a leader, it appears to also affect the organisation they create. Yet few leaders step back and ponder what kind of organisation they want to create (and indeed the difference between that and what they are creating). A leader requires the understanding of an organisation as a human system: that which needs trust, tending, listening and pragmatic optimism to create a shared mental picture of why it exists and how people can work together to achieve its purpose. The colour bands of cognitive complexity, social and emotional maturation, and complex decision making come into play. Leading an emergent process means being comfortable with the idea that the leader cannot control but must instead steer the organisation (system), that there is often a clear purpose but an unknowable outcome and the best end state may emerge through trials of parallel options, bounded by pragmatic judgement.

A leader of an adaptive organisation balances its technical and operational aspects with human choice, intentionality (the need for an internal locus of control), and emotion. In complexity terms, this can cause small things to have large effects, and also the reverse of causing large things to have small effects. This is confusing for linear thinking leaders when their large gesture is dampened by the system (as when a seemingly small issue or gesture blows out of proportion). They look to blame where the complex thinker looks for patterns, and for what reinforced the system to act as it did. The leader who inspires has a galvanising effect, acting like a positive contagion and causing the whole system to flourish. While they cannot explain the effect in scientific terms, they trust it can happen. They understand the need to build a shared mental image of purpose which will give their people something to steer against. They monitor weak signals, trust their radar and intuition, listen, communicate candidly and reinforce strong shared values. They believe and make their belief public.

## ***The pot of gold***

So why is this important? Because knowing how such leaders think and what they do is useful. Insight into aspects of how leaders (and potential leaders) think is vital to understanding, choosing, training and supporting them. By support I mean that in my experience once decision makers who are capable of complex thinking begin to grasp the technicalities of complexity in terms of their organisations and interactions, it is a fascinating but frightening time as they become immersed in a complex interconnected world. They may have felt but now begin to see these interconnections, along with the holonic nature of events and circumstances nested within each other. Boundaries become blurred and hard to draw, and if they cannot control, then what can they do? They are becoming more cognitively complex, but until they get enough exposure to build a menu of diverse and expert 'scripts' in order to be able to handle multiple emergent options from which they can choose where to go and what to do, they can get lost! Critical support mechanisms need to be in place to guide their way and stop them retreating to the old ways of analysis and action, for both their sake and the sake of their organisation. They may be pressured to conform and need tools to withstand such pressure to shun ambiguity.

It is important to see what leaders of adaptive organisations do as there is little in the way of long term, embedded empirical studies that last from the start to the finish of an organisation's transformation. It is of great practical use for us to see the actions which result from their conceptual understanding – the effect of how they think. Studying the whole package of how they think and what they do in practice allows for useful data gathering, some theory building and much interesting conjecture, especially as the longitudinal study allowed me to contrast two 'emergent logic' thinkers, with one leader who was inconsistent in approach and one who was strikingly linear and control based in approach (interestingly the youngest). The two most successful leaders were followed up years later for this study, and the findings have aided in establishing the integrity of the theory of emergent logic.

In one way it may seem to the reader that I am trying to fit such complexity into a new label or box called emergent logic. But my aim is to suggest in practice a higher level of interconnection and entanglement of a number of variables and discipline areas than is currently represented rather than presenting a new dogma, in an effort to examine the enmeshed nature of what people do and how they think for the purposes of practice and future research, and to build theory accordingly. I hope you can see the rainbow.

## **Context**

In this introductory chapter the background to the thesis is introduced followed by the justification for the research, a description of the research problem, an overview of the methodology and an explanation of the specific research questions.

The context for the empirical research arose from many years working in senior positions in a number of companies and subsequently in consulting or contract executive engagements to shape the organisation to fit its purpose. Over time consistencies were observed regarding the capability to build a 'fit for purpose' operation, and to increase the potential for the organisation to adapt and flourish through change. This led to initial theory building, and the emergent approach that was developed became the basis for the thesis' case studies and abductive literature search. The protocol for data collection was designed.

This thesis addresses the existing gap in understanding the process and practice of creating and leading adaptive organisations. Leading a complex human system (CHS) as a field of study focuses on a number of theoretical areas including leadership, organisational dynamics, complexity and the more recent areas of organisational cognition, systems intelligence and social neuroscience. Each field has built important knowledge and insights into the question of how leaders create adaptive organisations and what they do in terms of leading it, but only in the last few years has there been a consolidated attempt to extrapolate across fields, gain insight and build new theory around the interplay of these areas. (One exception to this is Buckley's perceptive (1968) paper "Society as a Complex Adaptive System" which was a bridge between complexity scientists and social entrepreneurs - a rare (written) offering by a systems oriented social thinker in a Newtonian era).

The aim of this thesis is to advance knowledge and add to the depth of understanding concerning the interconnectedness of leading complex adaptive human systems and cognition

This thesis is not about how an organisation acts as a complex system or what type of complexity label best suits. For contextual purposes, however, the reader is offered a relevant explanation of complexity theory, and a view of how complexity scholars have brought insights from the natural and artificial sciences to the field of management. To a large degree, up until the last decade whilst "mainstream management writers celebrate complexity sciences... [they] use them for repackaging the old design-and-control paradigm" (Zhu, 2007, p. 462). This situation is changing as different properties of complexity are brought to bear and the value of a leader's ability to understand and recognise key complexity properties becomes clearer. These properties include diversity, ambiguity, interdependence; flux and instability; self-organisation and the dynamic interaction between individuals and its effect on emergent outcomes.

Emergence within and across organisations is a foundational factor in the creation of adaptability, and there is growing if nascent understanding that emergence can lead systems and that leaders can foster emergence (Lichtenstein & Plowman, 2009). The position has moved noticeably even during the course of producing this thesis. It has left debates on complexity theory as metaphor or analogy (Stacey, Griffin, & Shaw, 2000), what type of complex system was applicable (biological, systems dynamics, homeostatic, autopoietic, chaotic,) or even whether complexity theory (or science or concept) could be applied to an

organisation. The position has moved and coalesced over the last decade to the present view captured here by Gupta & Anish (2011):

Organisation science researchers today widely agree that complexity is definitely not a management fad, it is not merely a methodology or a set of tools; instead it's a deeper perception of reality. Hence, business as 'complex adaptive systems' is not a metaphor or a technique: rather, by understanding the characteristics of complex adaptive systems in general, we can find ways to understand and work with the deep nature of organizations (Gupta & Anish, 2011, p. 4)

For the purposes of this thesis the term complex adaptive system (CAS) will be used (Schneider & Somers, 2006); (Hunt, Osborn, & Boal, 2009); (Gupta & Anish, 2011); (Kira & van Eijnatten, 2008); (Hock D. W., 1995); (Watson, Buckley, & Mills, 2011); (Uhl-Bien, Marion, & McKelvey, 2007) but with special mention of complex co-evolving systems (CCES), chaordic systems and panarchic systems<sup>1</sup>. System elements common to all which are relevant to adaptive organisational capability are emergence and self-organisation; learning and adaption; interconnectivity; non-linearity and co-evolution.

The human element brings in the variables of human choice and intentionality (Seel, 2006), including the need for internal locus of control and minimisation of cognitive dissonance. Along with the need for meaning, these act like a strange attractor (Mittleton-Kelly, 2003a); (Capra, 1996); (Kauffmann, 1993), (1995), (2000); (Dooley & Van de Ven, 1999); (Marion R. , 1999), which adds to the level of unpredictability of outcome already present in a non-linear system. Such human variables can have an amplification affect on seemingly insignificant events which snowball into significant events, or vice versa (Nicolis & Prigogine, 1989). However, a system requires such disequilibrium to grow (Wheatley M. J., 2006); (Gharajedaghi, 1999); (Helbing & Lämmer, 2008) and adapt by way of bifurcation, transformation or dissipation (Kira & van Eijnatten, 2008); (Mathews, White, & Long, 1999). This means that the term CAHS (complex adaptive human system) is also applicable.

A positive aspect of viewing an organisation as a complex system, no matter what type, is the empowerment it brings to those who think in terms of control and are thus daunted by the fact that complex systems are emergent, non-linear and uncontrollable. When synthetic thinking is employed (Ackoff, 2006) and the organisation is seen and understood to act like a system, huge powers of leverage

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<sup>1</sup> Mittleton-Kelly's (2003a), (2008) complex coevolving systems reflect the iterations of adaptation into larger scale evolution, the co-evolutionary aspect in terms of the interaction of the organisation with its external situation, (see also (Cilliers, 2005)), and also the holonic and scale invariant nature of complex systems (see also (Kira & van Eijnatten, 2008); (Jackson M. , 2006)). Chaordic systems (Hock D. W., 2005); (Kira & van Eijnatten, 2008) still term an organisation as a CAS but add useful detail regarding the mix of chaos and order (equilibrium states) that co-exist within one system (organisation), and the path towards bifurcation, dissipation and the step to the next level of complexity. Panarchic systems (Holling & Gunderson, 2002); (van Eijnatten, 2004a) add a further level of detail which is the different time frames of evolving hierarchical systems with multiple interrelated elements that sit within each other and act upon each other in an organisation, creating the possibility for a 'revolt (innovation) and remember' loop that allows small scale local change to quickly effect the much larger evolutionary path

are uncovered (Meadows D. H., 2008) to shape and steer it once we understand how it works (Meadows D. H., 2008). Because an organisation is a complex human system a large part of such leverage concerns the cognitive and behavioural aspects of systems intelligence (Hämäläinen & Saarinen, 2006), of winning hearts and minds, creating strong mental images of purpose and deep shared values as steerage (Meadows D. H., 2008); (Mitleton-Kelly, 2003a); (Wheatley M. J., 2006); (Kira & van Eijnatten, 2008).

The role and relevance of the leader in the process of change and transformation has been a focus of management theory for centuries and has been heavily influenced by changes over time in scientific, systems and (lately) complexity theory. There are a few theorists who question the assumption that the essence of leadership rests within the character or characteristic behaviour of effective supervisors (Ford & Seers, 2006), and theories such as complexity leadership theory and adaptive leadership (Lichtenstein, et al., 2006); (Heifetz, Grashow, & Linsky, 2009) site complexity theory as a basis for postulating that leadership is an emergent process based on agent interaction under tension, and occurs 'in the spaces in between' rather than residing within a leader's symbolic, motivational or charismatic actions. However, as this thesis will attempt to verify, the leader of an organisation is pivotal to the creation and enabling of such interconnectivity, tension and space of possibilities being available. Leading an adaptive, emergent process is much more nuanced than a simplistic top down theory of leadership (Osborn, Hunt, & Jauch, 2002).

In the last two decades organisational cognition has become a burgeoning topic for researchers as the need to understand the capabilities and limitations of managers and their employees as they deal with the vast scale of political, economic, social and technological change confronting modern organisations has been recognised (Hodgkinson & Healey, 2008). One of the key outcomes of this work is the growing understanding of how cognition affects many aspects of organisational life, and in particular increases the understanding of the cognitive (Schwenk C. R., 1988); (Wenstøp, 2005); (Patton J. R., 2003); (Lord & Hall, 2005); (Dane & Pratt, 2007); (Goodwin & Ziegler, 1998); (Hare, Camerer, Knoepfle, & Rangel, 2010) and social neuroscience aspects of leading (Sugrue, Corrado, & Newsome, 2005); (Goleman, Boyatzis, & McKee, 2001); (Druskat, Sala, & Mount, 2006); (Boyatzis R. E., 2008). These include such wide ranging elements as how the leader conceives of and structures the operational organisation; how they make complex decisions and how they interact with and influence their staff, both socially and cognitively, and as individuals and groups. This is critical as an organisation is a complex human system and as such outcomes are achieved through people and are primarily shaped not by their skills, roles and resources but by their attitudes, shared mental models and values, the ability to both elicit and cope with change and their capacity to trust in their leaders and their future (Mitleton-Kelly, 2003a); (Kerr, 2010); (Kira & van Eijnatten, 2008); (Liang, 2007); (Hämäläinen & Saarinen, 2007).

A leader's interaction and influence is now known to be not only interpersonal, but physical - research in the last decade has shown physical effects on both the leader's brain and the brains of employees. As

technology has advanced it has allowed us to observe neural activity of both individuals and multiple brains as people interact, thus informing a new research area of social neuroscience and neural networking, leading to terms such as shared neural nets (Goleman, 2006), organisational mind (van Eijnatten, 2004a); (Liang, 2010), and the poetic “hitherto undreamed of neural duet between brains as people interact”, (Goleman, 2006, p. 28).

The charismatic and inspirational value of being able to create a vision of the future has long been recognised, but such positive visioning is now understood to create new neural circuits that help to guide future behaviour (Carter, et al., 2000); (Loehr & Schwartz, 2003) through arousing hope (Groopman, 2004) and building synchronised mental models in the interacting parties through neurogenesis (Erikson, et al., 1998); (Boyatzis R. E., 2006). The new neurons hold the ‘map’ of where the leader is going and greatly enhance the capability for people to then deal with the anxiety of change (Howard, 2006); (Boyatzis R. E., 2006). Thus leadership creates purpose and interaction within and across organisational levels, and this interaction produces adaptive behaviour (Groysberg & Lee, 2009); (Fiksel, 2003); (Howard, 2006) through interdependence and connectivity (Uhl-Bien & Marion, 2009). The purposeful desire created and driven by a leader will drive effort and intent, and it is a key factor in Systems Intelligence (Hämäläinen & Saarinen, 2007); (Saarinen & Hämäläinen, 2010), Intentional Change Theory (Boyatzis R. E., 2008) and the construction of the adaptive capability of organisations. Many organisational conditions (for change) may have been present for a long time, “but when a capable leader appears, magic happens” (Boyatzis R. E., 2008, p. 309)

## Justification for the research

This thesis explores the research problem of how leaders create and lead adaptive organisations. Such an issue has a very large potential scope as it is cross disciplinary in nature, ranging across the fields of complexity science, organisational theory, leadership theory and psychology/ cognition/ social neuroscience. Exploring such an issue benefits from a combination of empirical study and theoretical research for abductive theory building and testing, and thus the timescale and theoretical boundaries of such a study can be prohibitive. This study has been conducted over a number of years (totalling 15 years in all when the additional field validation is included) , and its justification is both theoretical in terms of increased knowledge and theory building, and practical in terms of relevant findings and empirical observations for researchers in the areas of creating and leading adaptive organisations. It will lead to practical findings and act as a solid base for practical guidance for leaders and managers into the shaping of adaptability.

## Theoretical rationale

First let us consider the interconnection of organisational theory and the discipline of complexity science where there is a lessening (but still present) debate regarding aspects of complexity as metaphor, analogy or as applicable models for organisations. The call for empirical study and theory building shifted from positions such as the following up until the 2000's:

- Complexity science will end up a meaningless hype unless serious research ...shows that the CEO using the new science produces more competitively advanced firms than CEOs who do not (Maguire & McKelvey, 1999, pp. 54-55)
- The hope that complexity theory can provide us with ethnographies of emergent action (Letiche, 2000).

Over the next few years there was a move towards seeing relevance in experiments in the physical and biological (complexity) sciences as having relevance for social systems. However, such experiments still failed to address the psychological effects of the emergence process (Schneider & Somers, 2006).

This thesis attempts to examine such effects and to tie them in with how organisations adapt. It also provides an empirical observation of organisations in a state of change (also termed flux) and thus 'poised at the edge of chaos'. Such a state is of particular interest to Organisational Complexity Theorists as they consider that an organisation has to be in this state in order for change to occur, based on the concept that people have to let go of the old before they can make room for and take hold of the new. It is a critical test of the leader's capability to intuitively use the principles of complexity (Mittleton-Kelly, 2006), without which they will find it difficult to leverage the associated increase in self-organisation and co-evolution towards the emergent new. Weak signals need to be listened to and complexity nurtured at all levels (Kira & van Eijnatten, 2008). As the organisations studied in this thesis are in such a state of change, the thesis answers the need for

Qualitative analyses (which) could and should be used to study leadership processes in these poised organizations relative to other organisations that are not in the same state (e.g. are frozen)." (Schneider & Somers, 2006, p. 362)

Regarding the leadership of a complex (adaptive, human) system, this thesis attends to the need to develop implications for leadership practice, both theoretical and practical (which Schneider and Somers see as the "ultimate goal of leadership research" (Schneider & Somers, 2006, p. 362)). Further, it attempts to answer the call for research "regarding ...mediating variables and the process by which leadership in a CAS might work directly" (Schneider & Somers, 2006, p. 363) and to offer relevant insight in regard to the view of Denison, Hooijberg & Quinn (1995) that



Effective leadership behaviour in [paradoxical, complex] circumstances is problematic; and the nature of those requisite skills and the complexity they entail remains to be defined by both researchers and practitioners. (Denison & Hoojberg, 1995, p. 537)

The scope of both the empirical research and theory development attempts to address the gaps identified by Lichtenstein & Plowman's statement that "we simply do not yet know the right role and degree of influence that formal leaders do and perhaps should have in enacting a leadership of emergence", (Plowman & Lichtenstein, 2009, p. 628) and the following call for future research:

Learning more about the role of leadership at each stage of emergence will be important in furthering our understanding of leaders as enablers. For example, is the role of enabler more complex at one stage of emergence than at another? If so, what does that mean? How do differing levels of complex leadership present themselves in organizations? These questions warrant further research attention. (Plowman, et al., 2007, p. 354)

They further call for:

An equally important area of study to examine those emergent surprises that lead to failure rather than success. Are there differences in the way leaders enable emergence that contribute to failures rather than successes (Plowman, et al., 2007, p. 354)

The third and fourth case studies in this thesis fulfil such a role – the third case study reveals a complex interplay of differing skills and capability delivered in an inconsistent manner, with inconsistent outcomes which had deleterious effects on the organisation's resultant capability for adaption. The fourth case study describes a linear leader who was unable to lead, and in fact blocked an adaptive, emergent process.

## Practical rationale

The practical rationale for this thesis focuses on how the activity of building and leading an adaptive organisation is reported in the academic literature, and the relevance (in terms of applicability and transferability) for leaders and managers to their operational situations. Both personal experience and exposure to executive decision makers suggest that leaders would welcome ways to improve their understanding and ability to create a positive, aligned, flourishing, productive organisation, able to adapt to the dynamic situation of ongoing change yet maintain a clear sense of purpose and cohesion.

Practicing managers may resist the prospect of engaging with academic literature, yet many remain interested in wise counsel which can be put to good use (as attested by the popularity of well written

airport leadership books that succeed in taking an academic idea and translated it into useful, information which can be put into direct practice. In her article "Organizing as Explaining and the Doing of Managing", Annie Pye (1993) engages with a number of senior executives from large UK organisations, and concludes that theoretical tools such as metaphors are useful, but

Can have a powerful, covert influence on our thinking and analysis of organizing and perhaps even a dangerous influence in making the unfamiliar even less recognizable (Pye, 1993, p. 165).

This thesis offers empirical examples or 'explanations' which can add to the leader's own knowledge and experience built over time, and has implications for the selection, preparation, development and support of leaders. It presents empirical examples of varying levels of success over four case study situations interwoven with a theoretical foundation for how and why the leaders enjoyed (or failed to enjoy) such success, thus offering both academics and practitioners assistance in advancing our understanding of creating and leading adaptive organisations and emergent (human) processes. It is proposed that the results will have implications for both researchers and organisational leaders and managers as there remains a relative paucity of long term empirical studies matched with theory building around the cognitive and operational interplay of leading a CAS. The thesis provides new and enriched understanding of leader cognition and operational practices and the direct association with organisational responses and outcomes at individual, group and organisational level.

Of practical significance is the insight into how the variables that contribute to organisational resilience are interrelated. Researchers into adaptability and leaders will be able to use the information to develop their own approaches to the creation of desirable organisational outcomes such as enabling operational structures, a shared sense of purpose supported by deeply aligned values (Mitleton-Kelly, 2006); (Wheatley, 2006) and the growth of an organisational mind of ever increasing cognitive complexity (Kira & van Eijnatten, 2008). From this foundation there will be a capability to create information for practitioners of a valuable practical nature. Thus the research and extended literature search maintains the focus on presentation of academic theory while flagging practical use for leaders and managers.

## Research objectives and questions

This thesis has the following broad research objectives:

- To observe and explore the translation of how leaders think into what they do in terms of creating and leading an adaptive organisation
- To observe and explore the effect of the leaders actions and operational structures on the emergent process, at both the individual and group level.
- To improve the level of understanding regarding how successful leaders think as they shape and lead an adaptive organisation
- To improve the level of understanding in regard to the effect of the leader's cognitive and emotional interaction on the people of the organisation
- To contribute to the development of theory making in the creation and leading of adaptive organisations and emergent (human) processes
- To create the platform for work that translates theory into practical application concerning leading an adaptive processes and emergent process.

The following research questions are explored in this thesis:

Research question 1: How do leaders of adaptive organisations think? Research

question 2: What do leaders of adaptive organisations do?

## Research methodology summary

Chapter 3 outlines the development of the research design most suitable for the research objectives and questions, which examine how leader's think and what they do in the creation and leading of an adaptive organisation- or the cognitive style and operational actions of a leader who creates and leads an adaptive organisation. The dynamic relationships already existent in complex systems, combined with the cross disciplinary nature of the thesis, are sufficient justification for a qualitative research methodology using a comparative case study approach (House, Javidan, Hanges, & Dorfman, 2002). The original case studies used systematic combining (Dubois & Gadde, 2002) which created, by abductive means, empirical findings and theoretical insights leading to "fruitful cross fertilization" (Dubois & Gadde, 2002, p. 559). This informed the cross-disciplinary literature review and the research questions to address the identified

gaps (listed in the justification for research section). Follow up field work was then carried out to focus on the critical test of a significant theory (Gross, Giacquinta, & Bernstein, 1971).

Abduction is a suitable research process for both moderate constructionism and critical realism, and the underlying ontological and epistemological foundation for this thesis is within the overlap of the two, but on the side of critical realism (Järvensivu & Törnroos, 2010).

Methods for data collection and analysis of theoretical data focused on investigation of current theoretical frameworks for leading a CA(H)S, leader cognition and skill maturation, and included the organisational effects of social neuroscience as useable data became available in this nascent field. Empirical field data provided evidence of practice over a substantial time period from a number of organisational leaders. Data collection from multiple case studies followed a protocol line described by Yin (Yin, 2003) for maximum reliability and is similar to that utilized by the London School of Economics (LSE) Complexity Research Group (Mitleton-Kelly, 2003b). This abductive case study approach provided empirical data and built theory that was then further tested through semi-structured interviews with two of the original case study leaders. Interviews over the period of the case studies were coded and mapped, establishing a data audit trail which, along with many other written artefacts including formal reports, public presentations, specific project plans and ongoing audits of progress, supported research validity and reliability. The empirical findings were regularly compared and contrasted with current theory, and this abductive approach led to theoretical modification as an emergent process. The major outcomes from the multi-phase research process were then collated to address the research problem. Chapter 3 develops and discusses the research methodology and strategy in full detail.

## The context for the empirical research

The context for the empirical research arose from many years working in senior positions in a number of companies and subsequently in targeted engagements to not only shape the organisation to fit its purpose but also to increase the potential for the organisation to adapt and flourish through change. The emergent process that was developed (based on initial theory building) became the basis for the thesis' case studies. Two of the case study's leaders successfully followed the emergent path as described in this thesis. The third case study leader entered the transformation process and remained committed to it throughout, but various cognitive and behavioural factors led to inconsistencies which adversely affected the organisation's emergent path towards adaptability. The fourth case study leader entered keenly into the same process, but within months had reduced scope to a narrow, linear approach which did not achieve successful change or any form of adaptive capability. The study offers a fine grained insight into the differences in the way leaders enable emergence that contribute to failures rather than successes (Lichtenstein & Plowman, 2009), and assists in the more nuanced aspects of theory building. The third

and fourth case studies provide a valuable empirical contrast which has assisted in theory building. The case study research is discussed in detail as part of the methods section in chapter 3.

## Boundaries defining this research

The scope of the research is restricted to the definition of thinking and doing in terms of the leader of an adaptive organisation, as expressed by current theory and as demonstrated by practice in the adaptive organisations presented. The theoretical framework includes models of building enabling structures and leading adaptive systems, and the intertwined factors of leader and organisational cognition and skill maturation, complex decision making, social neuroscience pertaining to organisational interactivity, and the role of intuition and emotion. There are significant related areas of literature which are beyond the scope of this research as it does not cover all aspects of leadership theory, organisational theory and complexity theory (including organisations as complex systems). It is also not focused on quantitative testing of psychological or cognitive parameters of cognitive complexity; complex decision making and choice neurobiology; social cognition and IQ, and scanning for neural activity including cognitive schematic changes and neurogenesis. The research emphasis is on improving our understanding of the effect of the leader's cognitive capacity and operational expertise on organisational adaptability and resilience, and how these facets of leadership are interconnected. The results of this research should be considered in the light of the limitations of case study methods and the interpretive theoretical perspective adopted for this research into shaping and leading adaptive organisations.

## Contributions to knowledge

The research outcomes provide a significant contribution to a theoretical understanding of the linkages across the areas of leader cognition; skill maturation; complex and strategic decision making; organisational cognition; social neuroscience; aspects of organisations as chaordic, holonic and panarchic human systems; and the direct effect of operational structures and processes on the and the resultant adaptability and resilience.

The research contributes new knowledge

- About the shaping of an adaptive organisational capability, and the leadership of such a capability along with the associated emergent processes, from a theoretical perspective. This includes the development of a theory of emergent logic
- Increased understanding of practice in the field for researchers
- A model that attempts to represent the elements of a leaders effect on organisational adaptability

- The foundations for a roadmap for practitioners of the emergent path towards a resilient, adaptive organisational capacity

The proposed theory of emergent logic extends current theory by addressing foundations of practice identified through empirical research, so filling the identified gaps between current theory and practice. It is also readily translatable to action, to assist leaders and managers to improve their capability to build and lead a CAHS in both operational and strategic contexts. It has the potential for further theoretical elaboration through cross disciplinary research and field study.

Other contributions include:

- Synthesis of the literature on what makes an organisation adaptive which extends beyond a contextual role into one of assisting in theory building
- Promising theoretical and practical insights into the role and effect of a number of cognitive aspects of leading, including the increased cognitive complexity in both the leader and the organisation's staff, at individual and group level
- Cases as illustrations of successful and unsuccessful adaptive practice
- Further support for the concepts of systems intelligence and bifocal leadership, intuition and synthetic emergent thinking as a combination of factors critical to organisational success.

## Overview of the thesis

The principle purpose of the present chapter is to provide an overview and introduction to the thesis, summarize research objectives and questions and outline the approach to addressing them.

Chapter 2 reviews the existing literature relevant to the research, specifically the areas of complexity as related to organisations; leader cognition and skill maturation; complex and strategic decision making; organisational cognition; social neuroscience; organisations as CAS (with chaotic, holonic and panarchic human systems elements); and enabling operational structures & processes.

Chapter 3 outlines the research methodology in detail which is based upon the perceived gaps in the literature relating to the research issue.

Chapter 4 presents the findings in relation to research question 1 regarding how leaders think and includes the aspects of cognitive properties; social neuroscience activity; complex decision making; leader skill maturation; intuition and emotion.

Chapter 5 presents the findings in relation to research question 2 regarding what leaders of adaptive organisations do and encompasses the building of an enabling operational structure and infrastructure; fostering a shared mental model of purpose and values; creating a flourishing environment and leading an emergent process. In addition to this chapter 5 presents the findings of the field validation study involving further discussions with the two leaders who created truly adaptive organisations.

Chapter 6, titled “Implications and Theoretical Conclusions”, further analyses the findings including the implications of the contrasting leadership styles presented in the four case studies, as well as the building blocks of theory presented in chapter two - these integrated a number of fields to create new ways of looking at the research literature and findings. These findings are captured in a model of emergent logic; an operational roadmap of the emergent ‘bicycle path’ of adaptability, and a model which captures many of the elements found to be relevant to a leaders effect on organisational adaptability. This chapter also outlines both theoretical and practical contributions of the research, and discusses possible directions for future research.

## Chapter 2 – Literature Review

### Introduction

This study examines how leaders enable their organisations (as complex human systems) to adapt and succeed in complex environments. In pursuing its theory making objective it seeks to integrate a number of fields including leadership, organisational dynamics, complexity and the more recent areas of organisational cognition, systems intelligence and social neuroscience. Thus it is a cross-disciplinary thesis in nature and seeks to bring together insights and findings from the relevant literature from each of these fields. Unlike many literature reviews it is to be read with a view to being a building block of the theory by integrating a number of fields to create new ways of looking at the research literature and areas. As such the literature review makes a major contribution to the thesis.

This chapter will commence with a critical examination of the complex systems literature as a basis for the study of how such organisational systems are shaped and led. Whilst this thesis is not about how an organisation acts as a complex system or what type of complexity label best suits, the literature review covers the relevant areas of complexity theory in order to give the reader a view of how complexity scholars have brought insights from the natural and artificial sciences to the field of management, and the way in which complexity science reframes leadership by focusing on key properties of complex adaptive systems, and the human element of the dynamic interaction between individuals and its effect on emergent outcomes. There has been a shift in emphasis in the last five years regarding the key elements of complex adaptive systems from the more ‘technical’ properties of complex systems towards elements such as ambiguity, flux, diversity, sensitivity to initial conditions and weak signals, multiple equilibrium states and unknown futures (Seijts, Crossan, & Bilou, 2010); (Gupta & Anish, 2011); (van Eijnatten, 2004a).

Of particular interest and relevance is the trend in research, within the timeframe of this thesis, towards concepts such as combining elements of human systems; increasing levels of complexity (both organisational and cognitive); and collective, intelligence-centric mindsets. Such combinations are seen in concepts like Liang’s (2010) ‘raplexity’ (the combination of rapid complexity) and iCAS (intelligent complex adaptive systems). Further additions to the research field have included the nascent area of the organisational mind, and the increase in group cognitive complexity as a requirement for successful adaptation of an organisation. This aligns with the concept of requisite complexity in terms of individual agents having to become more complex in response to the increasing complexity of the environment in which they exist (the exploration of which is a major driver of the thesis research).

Having established this complexity context, the literature review will move to an in depth examination of literature related to research question 1 – How does a leader of an adaptive organisation think? The



study of leader cognition and neuroscience examines how a leader's meta cognitive and leader identity processes mature; the way that leaders conceive of and structure the operational organisation as well as their approach to complex decision making in ambiguous situations, including the use of empathy and expert level intuition. The review analyses how leaders' thought governs the way in which they interact with and influence their staff as individuals and groups, and further investigates the way in which such interaction in turn shapes attitudes, values, and people's ability to cope with change and to trust in their leader and their future.

This chapter then moves to discuss the available literature related to research question 2 – What does a leader of an adaptive organisation do? Leadership theory has focused for decades on the role and relevance of the leader in the process of organisational change and transformation, and a growing body of current theory has moved away from the functionalist, control and command archetypes to those more heavily influenced by organisational cognition, systems and complexity theory, positive psychology and the structural and operational aspects of building an environment that is based on relational interconnectivity. The literature research examines what leaders do in terms of building and leading an organisation that enables connectivity, interdependence, emergence and adaptation in a manner which will lead to resilience and even flourishing (Hämäläinen & Saarinen, 2007). Specific attention is given to the role of the dominant logic style and systems intelligence on the organisations operations (Hämäläinen & Saarinen, 2007).

Major theoretical contributors to the thinking behind this thesis are:

- Hämäläinen and Saarinen's Systems Intelligence theory which offers the concepts of bifocal leadership, realistic hands on optimism, the capability for humans to act in complex situations, the power of small actions and holding back, and the concept of flourishing
- Meadows insightful concepts around the process of dancing with systems, and the practical leverage points offered to move an uncontrollable entity
- Van Eijnatten's work on chaordic systems with the complexity of multiple equilibrium states, diffusion, transformation; the interweaving of holonic and panarchic concepts, and the wonderful metaphor of co-jumping on a trampoline as a way of viewing present day change
- Goleman and Boyatzis shared neural nets, emotional ripple effect and the capacity for positive leaders to elicit neurogenesis
- Mitleton-Kelly's work on complex, coevolving systems, the concept of "intuitive use of the principles of complexity" and her complexity research (London School of Economics) integrated methodology
- Wheatley's view of information as the creative energy and life of the universe, 'information chastity belts', and a need for trust and a commitment to conscious intention of what we want to achieve

## Aspects of complexity and systemic thinking

Whilst this is not a thesis on complexity, a brief look at the basis for considering organisations as complex (adaptive) systems will highlight relevant organisational properties, and why it is important for leaders to have an understanding, even if intuitive, of these properties when shaping and leading an adaptive organisation.

### Complexity

The concept of complexity highlights the importance of interconnections rather than individual elements, and change over time rather than events. Fiksel (2003) terms separateness a “convenient assumption that ignores related systems, boundary conditions, external effects and potential feedback loops”, and Einstein’s quote “Individuality is an illusion created by skin” is a fitting analogy. Research into the interconnected world of complexity theory and its applicability to human systems and their environment can be found as far back as the 1940’s with system dynamics starting to influence cognitivism and computer language. (See Appendix 1 for a history of theory evolution and application to organisations).

The application of complexity theory became firmly established in the 1990’s (Gell-Mann, 1994); (Gleick, 1987); (Holland J. , 1995); (Kauffman, 1989), (1991), (1993), (1995); (Lewin, 1993); (Lewin & Regine, 2000); (Maturana & Varela, 1998); (Mathews, White, & Long, 1999); (Osborn, Hunt, & Jauch, 2002); (Meadows, 2002); (Mitleton-Kelly & Papaefthimiou, 2002); (Pascale, 1999); (Nicolis & Prigogine, 1989); (Prigogine & Stengers, 1984); (Sterman, 2000); (Thiétart & Forgues, 1995); (Waldrop, 1992); (Wheatley, 1994); (Zeleny, 1987).

Views that draw on the natural sciences include looking at organisations as entities (at the edge of Chaos (Gleick, 1987); (Gould, 1989); (Morrison, 1991); (Kauffmann, 1993), (1995), as Dissipative Structures (Prigogine, 1996), as Autopoiesis states of self-generation (Maturana H. R., 1997); (Dooley & Van de Ven, 1999); (Marion, 1999).

Organisations were seen as Complex Adaptive Systems (CAS) as early as 1956 (Boulding) and that view has become well established from that time (Kast & Rosenweig, 1972); (Katz & Kahn, 1978); (Mintzberg, 1979); (Kauffmann, 1993), (1995), (2000); (Baker, Hansen, Joiner, & Traum, 1999); (Wheatley, 1994); (Holland J. , 1995), (Holland J. H., 1998); (Prigogine, 1996); (Marion, 1999); (Sterman, 2000); (Osborn, Hunt, & Jauch, 2002); (Schneider & Somers, 2006); (Uhl-Bien, Marion, & McKelvey, 2007); (Meadows, 2002). There have been some differentiations in terms of the type of adaptive pattern, such as Stacey’s (2000) complex responsive processes of relating; organisations as complex co-evolving systems (Allen, 1997); (Mitleton-Kelly & Papaefthimiou, 2000), (2002); (Mitleton-Kelly, 2003a), (2005), (2006), (2008); (Aaltonen, 2007a).

What is important is not so much the differentiation between these human systems as the similarities in terms of improving our understanding of how organisations work. These similarities include the principles of emergence, connectivity, interdependence and feedback, enriched with additional characteristics such as self-organization, co-evolution, dissipative structures 'far from equilibrium' & historicity, with a major emphasis on the interrelationship and interdependence of the individual agents in the system.

Most of the research in the last decade has accepted organizations as CAS and has begun to look more at the patterns that they follow or that affect them. Examples of this are organisations as Chaordic systems (Hock, 2005); (van Eijnatten, 2004a); (Kira & van Eijnatten, 2008) which combine the states of chaos and order, introducing a rich picture of organisational oscillation due to emergence and diffusion causing multiple equilibrium states and a pattern of holonic growth in complexity and coherence (Peters & Wetzels, 2003); (Kira & van Eijnatten, 2008). Further, Panarchic systems (Holling & Gunderson, 2002) describe multiple time frames which exist across states, with short term changes altering long time frames through a revolt (now renamed innovation) and remember loop.

Even though the idea of complexity and adaptation has become well established over the last two decades, there have been clear changes in focus. In the last decade research has centred more on what the concept means for sense-making and strategy (Aaltonen, 2007a), (2007b), (Aaltonen, 2005); (Aaltonen & Sanders, 2006); (Aaltonen & Barth, 2005); (Groff & Shaffer, 2008); (Higgins & Duane, 2008), and the CAS characteristics investigated have shifted towards those such as instability, ambiguity and lack of controllability. Instability includes flux (Seijts, Crossan, & Bilou, 2010); (Helbing & Lämmer, 2008); sitting at the edge (of chaos) or the paradox of far from equilibrium (Helbing & Lämmer, 2008); (Gupta & Anish, 2011); virtual stability (Voorhees, 2008), dissipative structures (Kira & van Eijnatten, 2008), multiple states / discontinuous growth (Kira & van Eijnatten, 2008); (Helbing & Lämmer, 2008) and increasing levels (Hock, 2005); (van Eijnatten, 2004a) and speed of complexity (termed raplexity) (Liang, 2010). Ambiguity takes in lack of clear causal relationships (Seijts, Crossan, & Bilou, 2010) and unknown futures (Gupta & Anish, 2011). Lack of controllability includes webs of non-linear feedback loops and inability to control the system (Gupta & Anish, 2011); (Mitleton-Kelly, 2008); the chaordic pattern of bifurcation, dissipation and emergence related to discontinuous growth (Kira & van Eijnatten, 2008); and the need for an adaptive system to be in an unpredictable, far from equilibrium state in order to effect change (van Eijnatten, 2004a); (Helbing & Lämmer, 2008).

## Complex adaptive systems

As stated on pg 12, organisations as CAS are no longer seen as metaphor or technique (Gupta & Anish, 2011), but an understanding of the deep nature of organisations. Cilliers (2005) offers a concise summary or how complex systems work and adapt:

Complex systems are comprised of a large number of elemental components, any (or all) of which may be simple. These elements exchange information via interactions, the effects of which propagate throughout the system. Because complex systems – and in particular, systems that are interconnected via a network – contain many direct and indirect feedback loops, interactions are nonlinear with non-proportional effects. This means that seemingly small interactions may have quite substantial effects throughout the system, and what appear to be substantial interactions may have quite insignificant system-wide effects. Complex systems are open with respect to their environment, which means that there are continuous information exchange processes among the system, its components, and their mutual environment. Complex systems also possess memory – a history of interactions, exchanges and effects – that is distributed throughout the system, and influences the behaviour of the system. This memory is significant: the behaviour of the system is determined by the nature (effects) of the interactions, not by the content of the components. Hence, the overall system's behaviour is unpredictable based on an understanding of the components' individual behaviours alone. The resultant patterns of system behaviour are called emergence, and refute models predicated exclusively on deterministic causality. Finally, complex systems are adaptive, and can reorganize their internal structure based on information exchange, as opposed to the action of an external agent (Cilliers, 2005, pp. 8-9)

## Major characteristics of CAS relevant to organisations.

Below is a short explanation of major CAS characteristics which are directly relevant to how an organisation behaves.

### Self organisation

'Self-organisation' is required for emergence. It is the "normal state of driven multi-component systems" such as a crowd, social system or organisation (Schelling, 2006), and is the result of the interactions that take place around the relationships between order and disorder (Aaltonen & Sanders, 2006). It is one of the key capacities, along with self-reference and self-transcendence, which allows emergence of ascending levels of coherence and complexity (van Eijnatten, 2004a); (Gupta & Anish, 2011). The main features of self-organisation are its spontaneity; lack of external guidance; lack of consciousness by constituent entities, and the capability for the organisation as an open system to survive away from states of equilibrium (Gupta & Anish, 2011). Thus agents "interact locally among themselves and it leads to reshaping and renewal of the system as a whole, as a spontaneous adaptation to changes in the external environment" (Gupta & Anish, 2011, p. 1).

The importance of shared values and purpose become evident in shaping such local interactions, especially in human systems, due to the elements of choice and intentionality (van Eijnatten, 2004a); (Wheatley, 2006); (Stacey, Griffin, & Shaw, 2000); (Zhu, 2007). It also means that guided self-organisation is better than control as it is more efficient in terms of expended energy (Helbing & Lämmer, 2008). Helbing and Lämmer present an example of the cell as a biological system which does not contain all of the replication procedures in detail as it is too small to contain all of the construction plans in its genetic code. If it had to do so, a cell would be too large to be viable. Instead biology guides self-organisation, where forceful control would destroy it or make it unviable. In organisations, self-organisation is hampered or destroyed by timeframes that do not allow for adaptation and adjustment to new boundary conditions, by low flexibility and high process driven feedback loops. As in many human systems, controlling self-organisation requires control procedures that are complicated, time consuming, prone to failure, costly, take a lot of energy, and with unanticipated side effects and costs (Helbing & Lämmer, 2008); (Raford, 2009); (Fiksel, 2003). Instead, self organisation is best leveraged by guidance and steering, requiring an understanding of the behaviour of complex adaptive systems (Meadows, 2008); (Helbing & Lämmer, 2008); (Kira & van Eijnatten, 2008); (Wheatley, 2006); (Hämäläinen & Saarinen, 2007).

## Emergence

“Emergence can lead systems and leaders can foster emergence.” (Lichtenstein & Plowman, 2009, p. 628)

‘Emergence’ is the new set of properties displayed by the collective system as a whole, but not apparent from the behaviour of the constituent individuals of the system (Gupta & Anish, 2011). The main conditions identified for emergence to occur are the presence of a disequilibrium state (Mitleton-Kelly, 2006); (van Eijnatten, 2004a); (Lichtenstein & Plowman, 2009); (Fiksel, 2003), amplifying actions, recombination / self-organisation and stabilizing feedback which underlies transformation<sup>2</sup> through connectivity and interdependence, propagating the effects of actions, decisions and behaviours throughout the system / organisation (Lichtenstein & Plowman, 2009); (Mitleton-Kelly, 2003a); (McKelvey, 2004). Emergence in a human system is about generation of knowledge, innovative ideas and novelty through learning, and the new patterns created by interaction of individuals creates emergence at the macro-organisational level (Mitleton-Kelly, 2003a); (Gupta & Anish, 2011); (Lichtenstein & Plowman, 2009); (Uhl-Bien & Marion, 2009). Thus, organizational members or lower level system participants interact, exchange information, and often act without coordination from a central decider (self-

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<sup>2</sup> “In an organizational context, a process of profound and radical change that orients an organization in a new direction and takes it to an entirely different level of effectiveness. Unlike 'turnaround' (which implies incremental progress on the same plane) transformation implies a basic change of character and little or no resemblance with the past configuration or structure” (BusinessDictionary.com, 2011)

organisation), resulting in unintended changes at higher levels within and beyond the focal organization (Lichtenstein & Plowman, 2009); (Gupta & Anish, 2011).

## Learning and adaptive behaviour in human systems

A CAS “learns”, responding actively to events, extracting patterns from their environment and adjusting behaviour. Learning is the key differentiator between an adaptive and non-adaptive system, and between a CAS and other self-organising systems (Gupta & Anish, 2011); (Liang, 2010); (Meadows, 2008); (Wheatley, 2006); (Seijts, Crossan, & Bilou, 2010); (Prigogine, 1996); (Marion, 1999); (Sterman, 2000); (Osborn, Hunt, & Jauch, 2002); (Schneider & Somers, 2006); (Uhl-Bien, Marion, & McKelvey, 2007).

With regard to the human aspect of organisations as complex adaptive human systems (CAHS), the literature has moved on from earlier discussions of human systems as differentiated by choice and intentionality (Mitleton-Kelly, 2003a) which can change the rules of interaction in a complex human system (Waldrop, 1992) and create new order through innovation and adoption of new ideas, artefacts, and methods through choice (Mitleton-Kelly, 2003a) Bringing together concepts from the latest literature there is a now an emphasis on human systems as intelligent corporate beings possessing an orgmind and a collective intelligence of their own (Liang, 2007); (Kira & van Eijnatten, 2008); (Hämäläinen & Saarinen, 2007). Managing human thinking systems and their non-linear characteristics is becoming a major focus, in order to create an effective orgmind (Liang, 2001) required for successful evolution. Intangible or loose networked structures are a basic requirement for this as learning emerges through interaction, and information flows along relationships (Wheatley, 2006); (Schneider & Somers, 2006); (Helbing & Lämmer, 2008); (Seijts, Crossan, & Bilou, 2010). Liang (2007) considers that “all human systems, embedded with sophisticated knowledge structures, information processing and learning capabilities of their interacting agents, and the right connectivity of the system, are intelligent complex adaptive systems (iCAS)” (Liang, 2007, p. 113). Knowledge intensive environments require fast and continuous learning (Liang, 2007); (Uhl-Bien & Marion, 2009); (Lichtenstein & Plowman, 2009) and the concept of the iCAS encompasses “fast learning, adaptation, quality connectivity, innovation, competition, smarter survival and co-evolution with the environment/composite system” (Liang, 2007, p. 113).

## Co-evolution and interdependence

‘Co-evolution’ considers the interactive nature and reciprocal feedback loops of the organisation as a system, both with other organisations that share the same eco-system, and with the (social, cultural, technical, economic, geographic) ecosystem within which it is nested (Gupta & Anish, 2011); (Mitleton-Kelly, 2003a), (Aaltonen, 2007a). Interdependence concerns the mutual reliance which exists due to a reciprocal relationship between interdependent entities (objects, individuals or groups) which makes them dependant on each other. This dependence is often not obvious in complex

systems. Globalization's complexity and interdependence has resulted in what Seijts et al (2010) call "small world" effects, shortening degrees of separation and creating the capability for local events to have global effects. This "intertwining of organizations' value chains, corporate governance, and financial flows results in exposure to shocks at the periphery that can move to the centre of an organization in rapid succession" (Seijts, Crossan, & Bilou, 2010, p. 3). Seijts et al argue that because the business environment is now so complex it brings with it the unpredictability, instability, non-linearity and speed of complex interrelationships and thus poses huge risk management challenges if leaders cannot successfully cope with complexity (Seijts, Crossan, & Bilou, 2010).

## Virtual stability

'Virtual stability' is one of the principles of complex systems, and is defined as "a system's ability to gain in flexibility and maneuverability by using self-monitoring in order to maintain itself in a state that would normally be unstable" (Voorhees, 2008, p. 133). A system is in a virtually stable state when it is in fact maintaining itself in an unstable state through self-monitoring and small (virtual) corrective actions. Although this means that the system expends energy by corrective action, the advantage is an increase in flexibility or maneuverability. Virtually stable states are common in nature, and can be argued as the norm in human systems / society as "human beings consciously monitor their behavior, and can keep different courses of action in mind without making an immediate commitment to any of them - a prime example of the capacity to maintain virtually stable states" (Voorhees, 2008, pp. 133-134). Other examples are conversation order, riding a bicycle and global finance.

It is possible for systems to be too flexible. Voorhees gives an example of experimental fighter plane (the X 29) which gained amazing maneuverability through being aerodynamically unstable – thus even with a triple redundant computer monitoring system it was too dangerous for pilots. This is because in the 1980s the monitoring capacity of such systems was not sensitive enough, and this highlights the importance of self-monitoring for complex systems, a concept closely related to importance of self-monitoring for complex systems, a concept closely related to W. Ross Ashby's law of requisite variety<sup>3</sup> (Voorhees, 2008).

As complex systems have to maintain a virtually stable state there is a balancing act between expending too much or too little energy in correcting the small ongoing perturbations in the system. In organisations too high a level of monitoring leads to monopolization of attention (Voorhees, 2008), buffering and over dampening (Mathews, White, & Long, 1999), and a loss of room to innovate, risk take and other

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<sup>3</sup> Ashby's law of requisite variety says that the variety of control possibilities must match the variety of the external disturbances if the outcome is to be uniquely controlled. Thus, the degree of flexibility required is no greater than what is sufficient to deal with the spectrum of ordinary environmental fluctuations, with a cut-off for very low probability events. (Voorhees, 2008)

behaviours conducive to learning and wisdom (Meadows, 2008). Too low a level of monitoring and the system loses its virtual stability as there is no longer adequate synchronization with external fluctuations that produce destabilizing effects (Voorhees, 2008); (Mitleton-Kelly, 2003a).

Thus the degree of flexibility required in a system is no greater than that which is sufficient to deal with the spectrum of ordinary environmental fluctuations, and Voorhees contends that the basic lesson of virtual stability is that “life is not about stability, it is about managing instability so as to produce the illusion of stability” (Voorhees, 2008, p. 137). Hence the critical part of feedback played in an adaptive complex system.

## Non linearity

In linear systems cause and effect are proportional to each other, whereas in non-linear systems they are not. Linear systems have one stable state (equilibrium) and one optimum solution, whereas non-linear systems have multiple states of equilibrium and multiple solutions (Helbing & Lämmer, 2008); (van Eijnatten, 2004a), (Fiksel, 2003). Organisations are “webs of non-linear feedback loops that connect to other people and organisations by webs of non-linear feedback loops” (Gupta & Anish, 2011, pp. 3-4). Gupta and Anish describe organisations as paradoxes –

Pulled towards stability by control processes, human need for security and stability, and adaptation to the environment. But they are also pulled to the opposite extreme of instability by the pull of organisational divisions and decentralization, human need for excitement and innovation, and remoteness from the environment. (Gupta & Anish, 2011, p. 4)

If pulled too far towards stability the organisation will fail as it cannot adjust and change as required, but if it is pulled into chaos it disintegrates, so a successful CAS lies at the border of stability and instability – the edge of chaos (Gupta & Anish, 2011); (Kira & van Eijnatten, 2008); (Mathews, White, & Long, 1999); (Prigogine, 1996); (Morrison, 1991); (Kauffmann, 2000); (Dooley & Van de Ven, 1999); (Marion, 1999). This has advantages and disadvantages for managing such systems. The advantage is that in order to change a system it has to be at this point to move to a new state (Helbing & Lämmer, 2008); (Fiksel, 2003); (van Eijnatten, 2004a), (2004b); (Kauffman, 1991), because complex systems that are near to, or at, equilibrium counteract even large actions (due to Le Chatelier’s principle)<sup>4</sup>, leading to large efforts having no significant effect. The disadvantage is that a system in far from equilibrium state is unstable resulting in the butterfly effect (p6) of the slightest action having a large and unpredictable impact, as ‘adaptive buffering’ (Kauffmann, 1993) leads to a range of possible responses. This flexibility of outcome is due to factors such as hysteresis (the resulting state is history dependant because different initial

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<sup>4</sup> Le Chatelier’s principle says: “If a chemical system at equilibrium experiences a change in concentration, temperature, or total pressure, the equilibrium will shift in order to minimize that change.”(Helbing and Lammer, 2008)



conditions ending up with different outcomes) (Helbing & Lämmer, 2008); (Prigogine, 1996), and is also a measure of internal heterogeneity<sup>5</sup> (Morel & Ramanujam, 1999); (Helbing & Lämmer, 2008). A system may even have more than one equilibrium point. In chemistry, this is called bi-stability<sup>6</sup> and demonstrates why the behaviour of a complex system cannot be predicted. Arthur (Arthur, 1998) offers an example of bi-stability as the video cassette recorders competing formats of Beta and VHS, both of which were the potential new technology until the interaction of various positive and negative feedback loops led to the dominance VHS through path dependence.

## Resilience and Dissipation

The far from equilibrium state described above is often referred to as a dissipative structure as it is unstable, exchanging high levels of energy with the environment and travelling through multiple transitions to higher levels of complexity and new states rather than back towards equilibrium (Baker & Cullen, 1993); (Mathews, White, & Long, 1999). Adaptive organisations are dissipative structures - over time a stable organisation will become unresponsive and lose creativity until dissipative processes clear space for new learnings and methods that allow it to regain its viability. This is referred to as the dissipation principle of sustainability (Fitzgerald, 2002); (Kira & van Eijnatten, 2008) or the model of adaptive cycles (Holling & Gunderson, 2002). This model states that social systems go through cycles of complexity and connectedness. In terms of organisations, they begin with loose connectedness and low complexity, but as it grows these both increase until inter-connectedness becomes too tight and there is no room to be creative. The space of possibilities has disappeared, leaving no room to take risks or try new ideas (Mitleton-Kelly, 2003a); (Kauffmann, 2000).

Another relevant issue here relates to the dynamic interaction effects of complex systems as they speed and /or tighten up. Complex systems require the spare capacity of redundancy (in negative feedback loops, (Meadows, 2008)) to run smoothly as it allows adjustment and fine tuning at a local level which overcomes the friction and obstructive effects of over-co-ordination, and instead allows a “harmonic and well-co-ordinated overall dynamic” to be maintained (Helbing & Lämmer, 2008) In order to maintain sustainability the adaptive cycle allows dissipation to occur.

Fiksel (2003) describes resilience as “the ability to resist disorder”, and this is done in complex systems by being flexible, and ultimately by maintaining multiple states of flux and stability at any one time (Fiksel, 2003); (van Eijnatten, 2004a); (Hock, 2005); (Holling & Gunderson, 2002). Consider that closed systems decay, going from order to chaos and maximum entropy. Living systems are open systems, drawing external energy in to maintain a “stable” state of low entropy in a far from (thermodynamic) equilibrium

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<sup>5</sup> The greater heterogeneity the greater the innovative capacity as the innovation rate is proportional to the variance of individual solutions (Helbing and Lammer, 2008)

<sup>6</sup> When “two or more simultaneously stable states could coexist under the same boundary conditions, resulting in the possibility of evolving to more than one stable state” (Nicolis and Prigogine, 1989)

state, so that they can expend minimum energy to maintain order and deal with perturbations (Schrödinger, 1944); (Fiksel, 2003). Fiksel proposes three different types of resilience (seen in Figure 1 below), where each system has a stable state representing the lowest potential energy at which it maintains order, and each is subject to agitations that shift it along a trajectory of adjacent states.

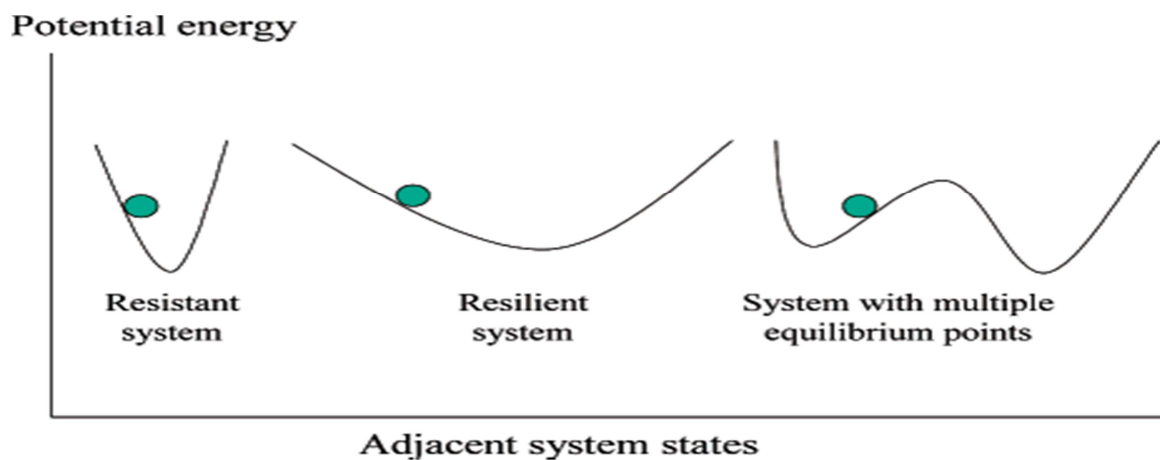


Figure 1: Examples a, b and c of system behaviour. (Fiksel, 2003, p. 5332)

(i) System 1 is a resistant system, typical of engineered highly controlled systems. It operates within a narrow band of possible states and is designed to resist perturbations from its equilibrium state. It recovers rapidly from small perturbations, but it may not survive a large perturbation. (ii) System 2 is a resilient system, typical of social and ecological systems. It can function across a broad spectrum of possible states and gradually tends to return to its equilibrium state. Through adaptation and evolution, it is capable of surviving large perturbations. (iii) System 3 is even more resilient than system b in that it can tolerate larger perturbations. Under certain conditions it may shift to a different equilibrium state, representing a fundamental change in its structure and/or function (Fiksel, 2003, p. 5332)

The general theory of adaptive cycles explains resilience in terms of a system's slow accumulation of resources, increasing connectedness and decreasing resilience, interposed with stages of crisis, transformation and renewal (van Eijnatten, 2004a), (2004b); (Holling & Gunderson, 2002), as shown in Figure 2 below.

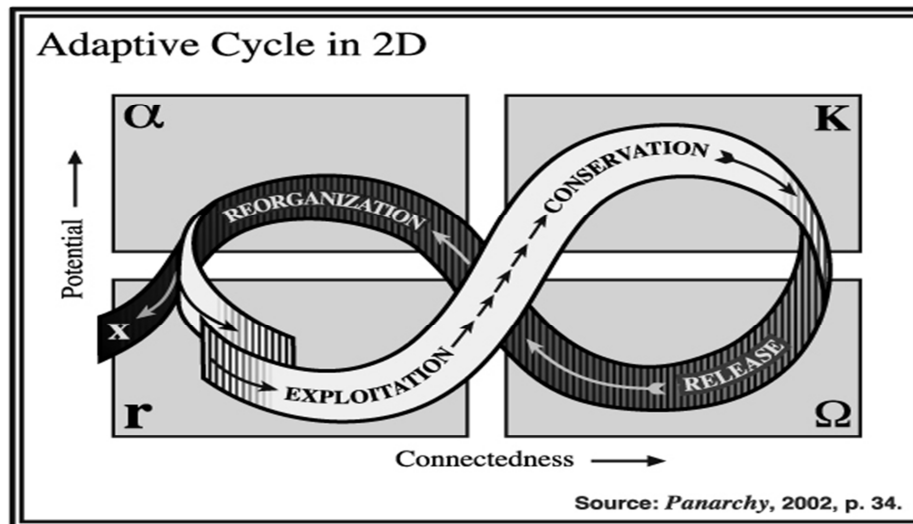


Figure 2: The adaptive cycle. From (Holling & Gunderson, Resilience and Adaptive Cycles, 2002, p. 34)

During the slow, front phase of the cycle, connectedness and stability increase as the system grows and expands. It then starts to become 'over connected' as the back loop begins, and at this point efforts to continue to grow will cause collapse. Instead, growth needs to be slowed to prepare for transition (Holling & Gunderson, 2002). The back loop represents a rapid phase of release and reorganization (towards  $\alpha$ ), which leads once again to a time of exploitation, or growth ( $r$ ).

The relevance of this for organisations and leaders is the ability to intervene in appropriate ways that take advantage of these cycles, or even push the organisation towards a necessary stage rather than resisting. Meadows' (2008) concept of places to intervene is based on such knowledge<sup>7</sup>, especially concerning balancing and reinforcing feedback loops.

A set of nested adaptive cycles is called a Panarchy, which represents evolving interactions across scales of time from short and fast to large and slow (Holling & Gunderson, 2002). This is similar to 'pace layering' as described by Brand (Brand, 2000) and in both cases the combination of fast and slow components makes the system resilient. The 'nested' property of panarchy contains two connections which Holling regards as critical for adaptive capability, as illustrated in Figure 3 below –the first is the revolt loop (renamed innovation, which can also be highly disruptive, (Christensen & Raynor, 2003)). This loop shows how the innovation connection can cause a critical change in a present cycle and cascade up to a vulnerable stage in a larger and slower one. The other is the remember connection which facilitates renewal by drawing on the potential that has been accumulated and stored in a larger, slower cycle (Holling, 2001). In pace layering terms, in a healthy society each level is allowed to operate at its own

<sup>7</sup> This is a list of 12 elements to alter in order to change the behaviour of a system. They are (in increasing order of effectiveness) numbers; buffers; stock and flow structures; delays; balancing feedback loops; reinforcing feedback loops; information flows; rules; self-organisation; goals; paradigms; transcending paradigms (Meadows, 2008).

pace, protected from above by slower, larger levels but invigorated from below by faster, smaller cycles of innovation (Brand, 2000).

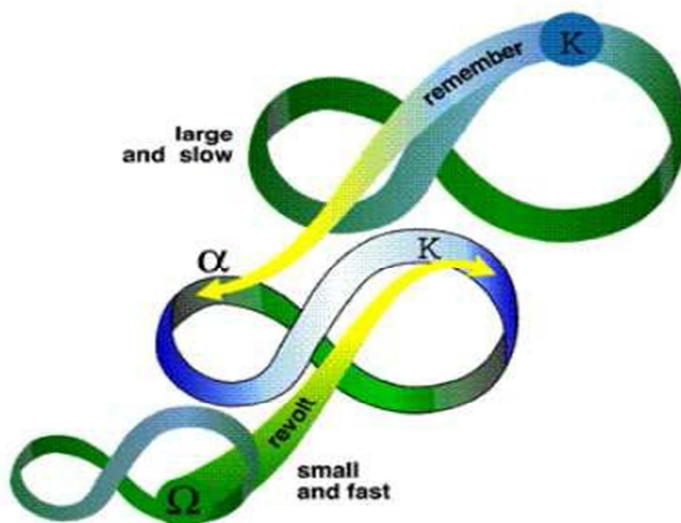


Figure 3: The nested time frames of Panarchy with revolt (innovation) and remember loops (Gunderson & Holling, 2002, p. 75)

## Phase change, bifurcation, discontinuous growth and Chaordic systems

Complex systems have discontinuous patterns of growth (or decline), and they change states, becoming more complex and coherent as they mature (van Eijnatten, 2004a); (Fiksel, 2003); (Holling & Gunderson, 2002); (Kira & van Eijnatten, 2008); (Helbing & Lämmer, 2008); (Mitleton-Kelly, 2003a). Ball (2004), a writer in social physics<sup>8</sup>, describes such chemical phenomena as Phase Transitions (think of water suddenly reforming into ice...or steam) as akin to the way societal change can suddenly emerge, such as the massive and sudden adoption of the internet around 1995 (Ball, 2004).

A useful model to understand the relevance of such scientific terms to organisations is that of Chaordic systems. The term chaord was introduced by Dee Hock (founder of Visa Card International) as an amalgamation of chaos and order (Hock D. W., 1995), (1999) to best suit the way in which he found organizations to act. The formal definition is “a complex and dynamical arrangement of connections between elements forming a unified whole the behavior of which is both unpredictable (chaotic) and patterned (orderly) simultaneously” (Fitzgerald L. , 2002). Fitzgerald and van Eijnatten (2002) describe ‘chaordic’ as:

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<sup>8</sup> Social physics applies the laws of modern physics to the social sciences, which Ball (2004) considers can greatly enrich our understanding of the laws of human behaviour, allowing predictions about society without negating the individual's free will.

An amalgamation of the terms chaos and order signifying the fact that the two seemingly disparate properties of experience are so thoroughly interpenetrated that neither can exist without the other. The complex, dynamical, non-linear, co-creative, far-from-equilibrium system we know of as the organisation is chaordic in its essence, that is both chaotic and orderly at the same time – an entity in which nothing ever happens quite the same twice, yet enough happens in a tidy enough way to preclude complete anarchy (Fitzgerald & van Eijnatten, 2002, p. 414)

A chaordic system develops and grows into maturity, and in this period it is in a state of relative stability, growing in a linear, incremental way (see the rectangular shapes in Figure 4 below). When it approaches its growth limits a chaordic system starts to bifurcate (the act of dividing into two parts or branches), and enters a period of relative instability, in which the system “changes” in a non-linear way (transformative change), and is very susceptible to external variations (Sensitive Dependence on Initial Conditions (SDIC) (van Eijnatten, 2004a); (Aaltonen & Sanders, 2006); (Aaltonen, 2007a). It then hits its limit to growth and either dies or transforms by leaping to the next level of complexity, to start a new cycle.

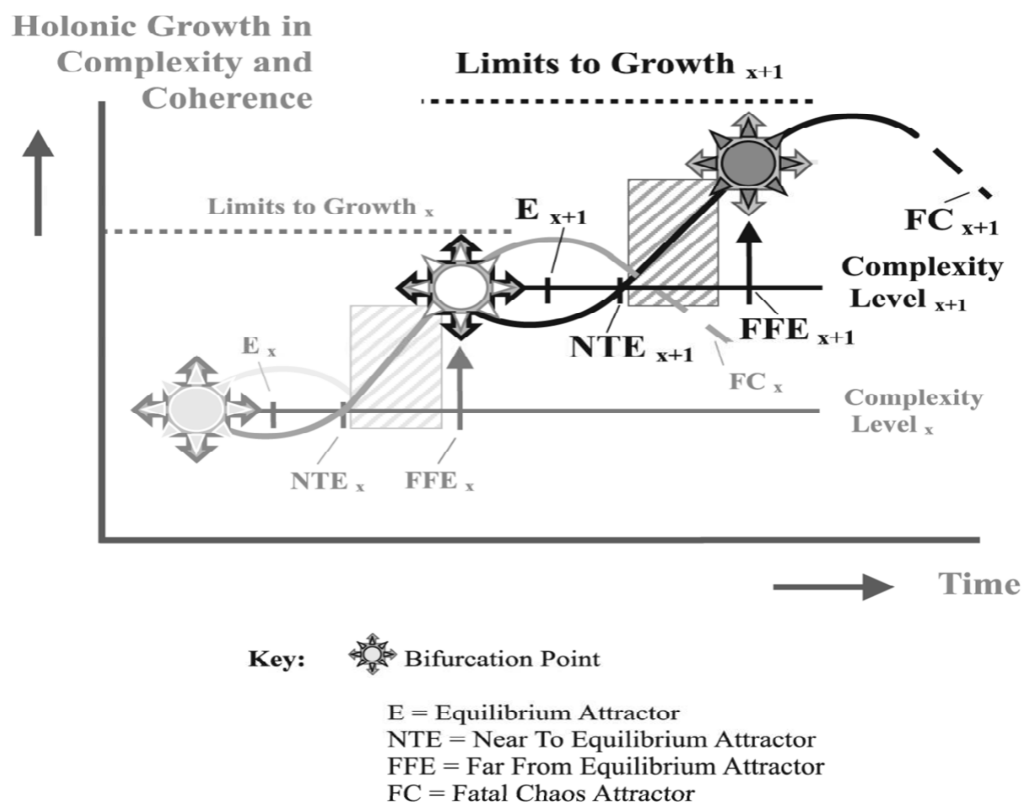


Figure 4: the discontinuous growth of a chaordic system. (van Eijnatten, 2004a, p. 432)

One of the most important aspects of this cycle is its sensitivity to initial conditions, which allows the new and novel ways in which a system may adapt to be identified. (van Eijnatten, 2004a); (Aaltonen, 2007a); (Lorenz, 1993). In chaordic systems thinking these are referred to as ‘weak signals’, and an adaptive system, as noted above, allows for these to be picked up and acted upon in order to change old thinking, old doing into new thinking, new doing, represented as the “cross in the chaos” (van Eijnatten, 2004a, p.

436). If the dominant attractor is 'old doing and old thinking', and the new attractor is 'new doing and new thinking', a successful transformation may be 'qualitative leap' from the old attractor to the new with quick change, or the more common gradual change situation with temporary maladaptive, unstable patterns that paradoxically combine 'old doing / new thinking' or 'new thinking / old doing' (van Eijnatten, 2004a). This state has to be well understood by the leader in order to pick up the weak signals, and also to minimize confusion and establish alignment.

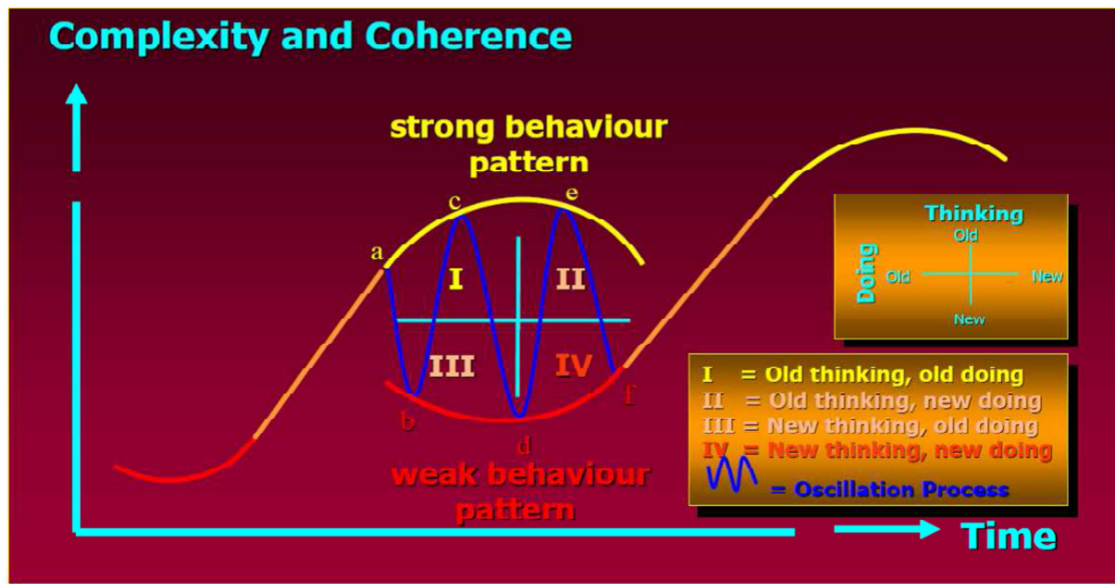


Figure 5: The Edge of Chaos / Eye or Cross in the Chaos. From (van Eijnatten, 2008)

Chaordic Systems Thinking (CST) is characterized by five chaordic properties: consciousness (thinking more than doing); connectivity (a chaordic system is a Holon); indeterminacy (a dynamic present and unknowable future); dissipation (creation and unlearning / dissolution are equally important for novelty) and emergence (higher levels of coherence and complexity through interaction). (Fitzgerald L. , 2002); (van Eijnatten, Putnik, & Sluga, 2007).

The organisational properties of consciousness and connectivity begin to shift the discussion towards the realm of cognition - thinking more than doing is the prime engine of a chaordic system (van Eijnatten, 2004a). In line with the concept of requisite complexity<sup>9</sup> (Uhl-Bien, Marion, & McKelvey, 2007), increasing individual and group cognitive complexity is required as the organization becomes more complex in order for people to understand and apply more complex emergent actions and solutions (Kira & van Eijnatten, 2008). Complex systems growing connection with cognition and consciousness can be

<sup>9</sup> This law states that "it takes complexity to defeat complexity—a system must possess complexity equal to that of its environment in order to function effectively. Requisite complexity enhances a system's capacity to search for solutions to challenges and to innovate because it releases the capacity of a neural network of agents in pursuit of such optimization. That is, it optimizes a system's capacity for learning, creativity, and adaptability" (Uhl-Bien, Marion, & McKelvey, 2007).

seen in the explanation of systems connectivity as holonic rather than holistic in that it differentiates the wholes which are parts of a greater whole at the same time<sup>10</sup> (Koestler, 1978). Holons are autonomous and simultaneously dependant because of the interconnected effect of their nested nature, and although we see this quality in the fractal descriptions of chaos (Gould, 1989); (Gleick, Chaos, 1988); (Kauffman, 1995); (Dooley & Van de Ven, 1999), theories such as CST takes the capacity to be holonic further, as can be seen by Figure 6 below.

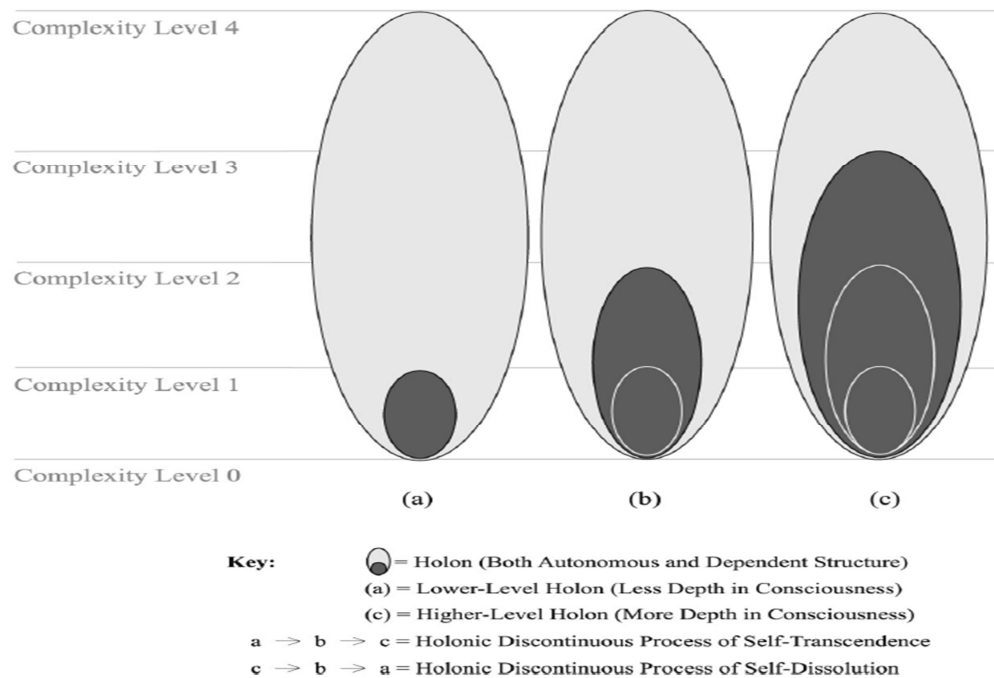


Figure 6: Holonic development at various levels of complexity (van Eijnatten, 2004a, p. 439)

The holonic nature of the chaordic system brings together structural and cognitive aspects of ever increasing complexity as adaption occurs, (Wilber, 1996); (van Eijnatten, 2004a); (Liang, The new Intelligence Leadership Strategy for iCAS, 2007), consistent with Hämäläinen and Saarinen's (2007) increasing levels of systems intelligence, and the levels of leadership skill maturation concerning identity, meta cognitive processes and emotional regulation of Lord and Hall (2005).

Van Eijnatten describes holonic development as follows:

The higher a holon climbs the ladder of knowing or consciousness, the greater its ability to more clearly apprehend a greater portion of the reality at hand. Holonic capacity is the holon's ability to operate with greater mindfulness, expanded awareness, "control and response-ability". Control-ability is the degree to which a holon is able to influence future events, and response-ability is the ability to respond to Far From Equilibrium conditions. Holons are able to generate "emergents" –

<sup>10</sup> A Holon (Greek: ὅλον, holon neuter form of ὅλος, holos "whole") is something that is simultaneously a whole and a part. The word was coined by Arthur Koestler in his book *The Ghost in the Machine* (Koestler, 1967, p. 48)

novel qualities of the whole not present in the parts – because they are inherently self-organizing, self-referencing, self-iterating and self-adapting (van Eijnatten, 2004a, pp. 438-439)

Holonic potential, then, is the ability to attain the “leap to a higher order of coherence ... that is more complex and more effective”, (van Eijnatten, 2004a, p. 441) and it is this capability that stops that organisation having to go into a dissipative state. The organization is a complex, dynamical, nonlinear holonic system - a complex work holarchy that may advance through different phases, ranging from more orderly to more chaotic depending on the different pattern or attractor (van Eijnatten, 2004a), (2004b). This is done via the interconnected beliefs, values and mental models of what van Eijnatten calls the organisational mind - a key theme of this thesis. This theme can be recognized in other theoretical concepts including the complex co-evolution of Mittleton-Kelly (2006), the systems intelligence of Saarinen & Hämäläinen (2007), Wheatley’s (2006) conscious intention of what the organisations people want to achieve; Meadows (2008) intertwined dance with the heart and mind of the system; the intelligent human organisation (iCAS) of Liang (2010) and the shared neural nets and neurogenesis of Boyatzis and Goleman (2006).

Chaordic systems thinking further links connectivity and consciousness and cognition in using Wilber’s quadrants as the organisational development framework which distinguishes interior, exterior, individual, and collective domains (Figure 7). CST prioritizes full interior development (intentional and cultural) over the traditional external organisational development priority (behavioral and social) as the balance which provides the highest potential for full holonic development towards an “inherently self-sustaining and ultimately self-transcending system”, (van Eijnatten & Putnik, 2004, p. 424).

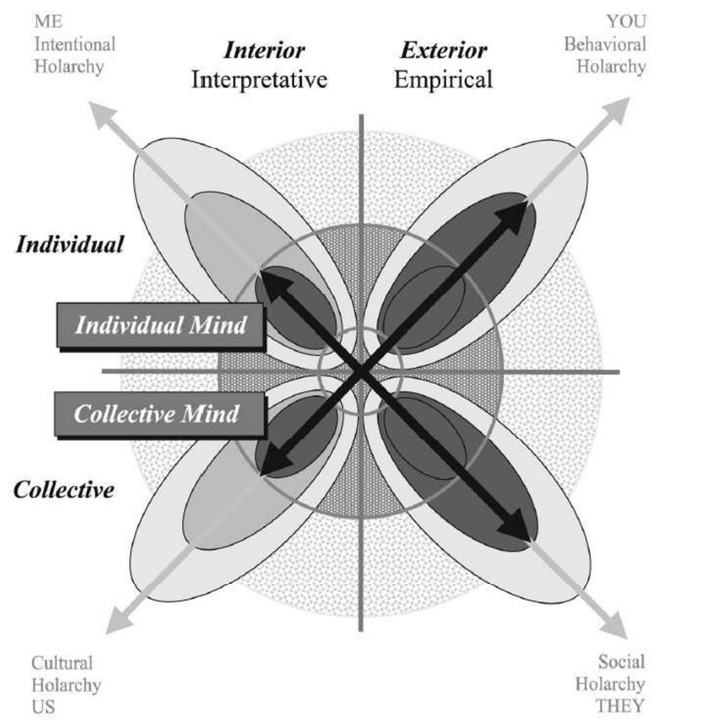


Figure 7: Holonic development in Wilber’s quadrants (van Eijnatten, 2004a, p. 440)



## Raplexity and iCAS

Management and leadership is increasingly seen as “a highly complex and abstract territory involving the cognitive and psychological sub-domains of human thinking and behaviour/feeling” (Liang, 2010, p. 86); (Fayol, 1949); (Katz & Kahn, 1966); (Keen, 1991); (Miller, 1988); (Porter, 1985); (Simon, 1972), (1976); (Patton, 2003); (Lord & Hall, 2005); (Dane & Pratt, 2007); (Schwenk, 1988); (Wenstøp, 2005); (Goodwin & Ziegler, 1998); (Hare, Camerer, Knoepfle, & Rangel, 2009); (Sugrue, Corrado, & Newsome, 2005); (Goleman, Boyatzis, & McKee, 2001); (Druskat, Sala, & Mount, 2006); (Boyatzis, 2008). Liang (2010, p. 86) considers that “a primary reason for the emergence of the above phenomenon is that human thinking systems are CAS that are primarily emotional (amygdala) that can also be logical (prefrontal cortex)”.

The term raplexity combines rapid change and high complexity (Liang, 2010). As this accelerates, increased ambiguity creates higher complexity in all domains, including the cognitive, through the current knowledge intensive environment and mindset. Thus modern organisations need to redesign to an “adaptive biotic organisation structure” with intelligence management and systemic risk monitoring around rapid interaction and the intelligence-centric mindset (Liang, 2010). If all human thinking systems are CAS, and thus all organisations are composite CAS, sustainability will come about by nurturing smarter evolvers and highly intelligent human organisations, and leveraging the non-linear intelligence of innovation in complex adaptive human systems (Liang, 2010); (Kira & van Eijnatten, 2008).

This literature search has shown that some organisational theorists are beginning to shift towards centering organisations around intelligence with strategy and practice which exploits the intrinsic intelligence of the interacting agents and nurtures a higher collective intelligence, in line with Kira and van Eijnatten’s chaordic increase in individual and group cognitive complexity (2008) and Hämäläinen and Saarinen’s Systems Intelligence (2007). The non-linear collective intelligence is balanced by awareness and orgmindfulness, and more widely distributed responsibility (Liang, 2010)

Being driven by a highly iCAS that originates from a highly intelligent biotic structure (that is able to recognise early warning signals supported by its sensory subsystem – self-organisation) it will be able to act and react more swiftly and appropriately during crises. Thus, nurturing a high collective intelligence (orgmind), better connectivity (nervous system), early warning subsystem (sensory subsystem), better organisational learning abilities and more sophisticated knowledge structures/depositories is highly beneficial. (Liang, 2010, p. 94)

The end result will be a higher outward sensitivity to initial conditions through greater observatory and responsive capability due not only to an increase in group cognitive complexity (Kira & van Eijnatten, 2008) but because “an intense intelligence source with the ability of emitting non-linear intelligence is in a better position to observe the surface pattern and early warning signals fast” (Liang, 2010, p. 95). Internally, there will be greater communication, connectivity and collective intelligence, all of which lead to

greater resilience and thus a leader who nurtures the capability for people at all levels to use their judgement, develop the analytic capability to discern relevant information, and act either independently or as a group will optimize the collective intelligence of the system (Hämäläinen & Saarinen, 2007); (Liang, 2010); (Uhl-Bien & Marion, 2009); (Kira & van Eijnatten, 2008).

The study of such complexity theories as raplexity, iCAS, and chaordic and holonic system begins to lead into an investigation of the literature around how leaders of adaptive organisations think, and in turn their effect on the thought processes of others.

## How does a leader of an adaptive organisation think?

### Introduction to Leader Cognition

Neuroscientists and cognitive scientists have recently become intensely interested in social/moral behaviour as techniques have made its empirical exploration possible. What are needed are cross-disciplinary studies that rely on the best research of all the relevant disciplines. (Casebeer & Churchland, 2003, p. 189)

We have seen in the literature presented above that organisations are increasingly seen as complex adaptive human systems. (Schneider & Somers, 2006); (Hunt, Osborn, & Boal, 2009); (Gupta & Anish, 2011); (Kira & van Eijnatten, 2008); (Hock, 2005); Buckley, 2008; (Uhl-Bien, Marion, & McKelvey, 2007). The leader is steering such a system in the holonic context (van Eijnatten, 2004a) of themselves being complex systems (Hämäläinen and Saarinen, 2007), leading an organisation which sits nested within the next system level and thus co-evolves with it over different, panarchic time frames (Mittleton-Kelly, 2003a); (Gunderson & Holling, 2002). What does that have to do with the cognition of the leader and the organisation's people? Further, how do the elements of emotion, problem solving, motivation, values, knowledge and even intuition and optimism fit in?

The complexity discussion above outlines the turbulent environment in which leaders have to deal with complex, ambiguous, dynamic and often novel situations in real time, whilst (and as part of) steering and tending a human system which brings with it choice and intentionality (Mittleton-Kelly, 2003a); (Capra, 1996); (Kauffmann, 1993), (1995), (Kauffmann, 2000); (Dooley & Van de Ven, 1999); (Marion, 1999). Gaining insight into how the leader conceives of the role and tasks involved, and exploring the interdependence of various cognitive and behavioural elements lends vital understanding in terms of how they go about doing this, which entails drawing on a wide range of theory bases including cognitive psychology, social neuroscience, personality, organisational and management theory. These cognitive and behavioural elements include the way leaders identify and process relevant information, make complex decisions and deal with ambiguity and complexity. It incorporates their level of optimism,

empathy and open mindedness as well as their use of intuition and discernment and their capability to interact with others and inspire trust, faith, cognitive capability and a shared understanding of purpose. In short, how leaders of adaptive organisations think.

In the last two decades organisational cognition has gained interest from researchers as they try to understand the capabilities and limitations of managers and their employees when dealing with political, economic, social and technological change confronting modern organisations (Hodgkinson & Healey, 2008). One of the key outcomes of this work is the growing understanding of how cognition affects many aspects of organisational life, and in particular understanding the cognitive (Schwenk, 1988); (Wenstøp, 2005); (Patton, 2003); (Lord & Hall, 2005); (Dane & Pratt, 2007); (Goodwin & Ziegler, 1998); (Hare, Camerer, Knoepfle, & Rangel, 2009) aspects of leading (Sugrue, Corrado, & Newsome, 2005); (Goleman, Boyatzis, & McKee, 2001); (Druskat, Sala, & Mount, 2006); (Boyatzis, 2008). This has been further enhanced in recent years with the theoretical investigation of social neuroscience relevant to leadership (Goleman & Boyatzis, 2008); (Howard, 2006), (Rizzolati & Craighero, 2004).

This literature search brings together and combines a wide range of research relevant to how a leader conceives of and structures the operational organisation (Zwaan & Taylor, 2006); how they make complex decisions (Schwenk, 1988); and how they interact with and influence their staff, both socially and cognitively, and as individuals and groups (Erikson, et al., 1998); (Boyatzis, 2006); (Howard, 2006); (Kira & van Eijnatten, 2008). This is critical as an organisation is a complex human system and as such outcomes are achieved through people (Pfeffer, 1994) and are primarily shaped not by their skills, roles and resources but by their attitudes, shared mental models and values, the ability to both elicit and cope with change (Howard, 2006); (Boyatzis, 2006) and their capacity to trust in their leaders and their future. Thus, how leaders of adaptive organisations think is critical to an understanding of adaptive success and resilience.

In the last ten years the theoretical bases used to look at cognition were grouped into five major theoretical perspectives (Hodgkinson & Healey, 2008), all of which have been applied to the investigation of management style and skills. These are the schema theory of mental models; behavioural decision theory including heuristics and biases (Tversky & Kahneman, 1974); (Hodgkinson & Healey, 2008); attribution theory (Kelley, 1967); social identity (and categorization) theory (Hajfel & Turner, 1979), and enactment (for sense making) (Weick, 1988); (Aaltonen & Sanders, 2006) as well as social cognitive theory and self-efficacy (Wood & Bandura, 1989). Self-efficacy highlights the interaction between personal goals, cognition and environmental factors in the regulation of motivated behaviour, and begins to cross into areas like systems intelligence (Saarinen & Hämäläinen, 2007) and complex systems leadership (Kira & van Eijnatten, 2008).

Some researchers distinguish instead between computational and interpretive perspectives (Lant & Shapira, 2001); the first concentrating on individuals information processing limitations and how people

overcome them (or not) when making decisions and solving problems, and the 'upstream' aspect of sense making by those such as Weick who look at how people extract patterns from ambiguous information and cues to construct reality. With the increased focus on cognition and the richness of information supplied by more sophisticated methodological developments (such as the new HARTI neural network scanner) it is becoming clearer that what may once have been an 'upstream or downstream' argument on how cognition works should be seen instead as an entangled and often iterative dynamic.

As this area is so entangled, debate occurs in regard to the most important aspects of leader cognition and skills maturation. Two themes discernible in the literature of the last decade are how leaders make complex, strategic decisions and choices (Saaty & Shih, 2009); (Sparrow, 1999); (Traüffer, Bekker, Bocârnea, & Winston, 2010); (Wenstøp, 2005); (Schwenk, 1988); (Isen, 2001); (Tom, Fox, Trepel, & Poldrack, 2007); (Hare, Camerer, Knoepfle, & Rangel, 2010); (Gupta, et al., 2009); (Sugrue, Corrado, & Newsome, 2005); (Venkatraman, Payne, Bettman, Luce, & Huettel, 2009); and leading a human system (Goleman & Boyatzis, 2008); (Howard, 2006); (Lord & Hall, 2005); (Hare, Camerer, Knoepfle, & Rangel, 2010); (Wheatley, 2006); (Hämäläinen & Saarinen, 2007); (Mumford, Zaccaro, Harding, Jacobs, & Fleishman, 2000). Theories have begun to reflect a complexity of perspective on the subject with terms such as Self-complexity theory<sup>11</sup> (Hannah, Woolfolk, & Lord, 2009), Complexity leadership theory (Uhl-Bien & Marion, 2009), Systems Intelligent leadership (Hämäläinen & Saarinen, 2006) and Chaordic systems thinking (Kira & van Eijnatten, 2008). Within and across these themes are others reflecting a myriad of individual differences that can moderate or influence cognitive functions of both individuals and teams in organisational settings. Because of the wide and somewhat disparate array of cognitive elements relevant to leading presented in the literature, this literature review offers a relational structure in the form of eight themes which presents the reader with a comprehensive theoretical jigsaw of cognitive research. The themes are social neuroscience; cognitive complexity (cc); social cognition and intelligence; complex decision making; leader skill maturation; intuition and emotion and systems thinking and systems intelligence. These themes are carried over into the empirical findings section in Chapter 4.

## Social neuroscience

A leader's interaction and influence is now known to be not only interpersonal, but research in the last decade has shown that it also has a physical effect on both the leader's brain and the brains of employees. (Erikson, et al., 1998); (Boyatzis, 2006); (Howard, 2006) which has even led to the nascent leadership discipline of 'neuroleadership'.

Leaders who are passionate about their belief in what is possible can effect huge change in the perception and core beliefs of others. Their positive enthusiasm almost pulls their people out of a safe,

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<sup>11</sup> This suggests that leaders can influence followers across complex situations by use of a "rich and multifaceted self-construct" which allows the "calling forth of cognitions, affects, goals and values, expectancies and self-regulated plans to bear on and succeed in the multiple challenges of leadership"

conservative position into the 'space of possibilities' (Mittleton-Kelly, 2008), (2003a), building sufficient respect, hope and trust to allow exploration of new ways to achieve the possibilities being vividly painted. Systems Intelligence describes this as realistic, hands on optimism which is key to positively reframing these core beliefs, and points out that people often adopt 'holding back behaviours and systems that trivialise reciprocity and decrease vitality' (Hämäläinen & Saarinen, 2006, p. 24).

As technology has advanced it has allowed us to observe neural activity of both individuals and multiple brains as people interact, thus informing a new research area of social neuroscience and neural networking, leading to terms such as shared neural nets (Goleman, 2006), organisational mind (van Eijnatten, 2004a); (Liang, 2010), and the poetic "hitherto undreamed of neural duet between brains as people interact' (Goleman, 2006, p. 28). New research indicates that an impassioned leader has a critical neurophysiological effect on neurons isolated in the brain which orchestrate or mirror physical behaviour, and influence trust, empathy, humour and intuition through fast intuitive assessment of complex social situations (Goleman, 2006); (Allman, Watson, Tetreault, & Hakeem, 2005). The major neurons involved are mirror, oscillator and Von Economo Neurons (VENs), known as spindle neurons. Mirror neurons create a direct link between the sender of a message and its receiver and "thanks to this mechanism, actions done by other individuals become messages that are understood by an observer without any cognitive mediation" (Rizzolati & Craighero, 2004, p. 183). There is even a subset of mirror neurons that pick up smiles and laughter, and are fired more when team bonding occurs. (Druskat, Sala, & Mount, 2006).

Oscillator neurons attune physical coordination by regulating how bodies move together in animals including humans. Dynamic resonance is the effect of these oscillator neurons in combination with a leader's upbeat mood. The effect is very powerful - recent studies conclude that top leaders elicit laughter three times more often, and the resultant positive mood helps their people to both take in information and provide a nimble, creative response, but the caveat is that the upbeat mood must be appropriately synchronised to the mood around them, or they will be seen as insensitive. (Goleman, Boyatzis, & McKee, 2001).

Lastly, the capability for finely tuned leaders to trust gut instinct is being borne out by behavioural neuroscience examining the role of VENs (spindle neurons), in intuition. These neurons are larger and have longer branches that may assist the ultra-rapid (1/20<sup>th</sup> of a second) connection of emotions, beliefs and judgements through neural networks triggered in one twentieth of a second regarding how we feel about that person (Goleman & Boyatzis, 2008, p. 77). VENs are associated with positive and negative subjective feelings expressed by subjective ratings of facial trustworthiness, empathy, and the discrimination of the mental states of others, and are thought to have recently evolved to allow the rapid adjustment of behaviour in quickly changing, increasingly complex human social networks (Allman, Watson, Tetreault, & Hakeem, 2005, p. 370). Dubbed the 'trust' neuron, they are critical to establishing

trust and empathy, and these neural systems cannot be fooled by insincerity as this fires another (older) part of the brain.

An obvious requirement of such interaction is that it be face to face. Levinas (1985) calls speech-based culture “the powerhouse of human creativity, magic and uplift that demands a face-to-face interaction” (Levinas, 1985, p. 43) and Ames (1993) notes that it allows “that keenness of hearing and those powers of oral persuasion that will enable one to encourage the most productive harmony out of relevant circumstances” (Ames, 1993, p. 55). The dynamic resonance, trust, empathy, faith and humour set up by neural engagement requires physical presence, as does the ‘ripple effect’ of emotion generated by the positive leader (Barsade, 2002). Personal coaching succeeds as “spending time with a living, breathing model of effective behaviour provides the perfect stimulation for mirror neurons, which allows us to directly experience, internalize and ultimately emulate what we observe” (Goleman & Boyatzis, 2008, p. 80).

The charismatic and inspirational value of being able to create a vision of the future has long been recognised, but upon combining various areas of literature, a picture begins to emerge around how this occurs. Such positive visioning is now understood to create new neural circuits that help to guide future behaviour (Carter, et al., 2000); (Loehr & Schwartz, 2003) through arousing hope (Groopman, 2004) and building synchronised mental models in the interacting parties through neurogenesis (Erikson, et al., 1998); (Boyatzis R. E., 2006). In technical terms, when focusing on possibilities, the parasympathetic nervous system (PSNS) is aroused and the immune system boosted, resulting in the conversion of hippocampal stem cells into new neurons; (Erikson, et al., 1998) and/ or more “spines to grow on the neurons, creating more space for neurotransmitters and neuro-receptors, which are the basis for learning” (Boyatzis R. E., 2008, p. 306).

The new neurons create neural circuits that help to guide future behaviour (Boyatzis, 2006; Roffe, Schmidt & Ernst, 2005). Epstein (1991) considers that such cognitive schematic frameworks are inductively derived and thus are created in such emotionally significant experiences. Various works suggest that changes initiated during this stage are more successful. New behaviour, thoughts, and feelings lead to experimentation and thus the building neural pathways, and this greatly enhances the capability of people to then deal with the anxiety of change (Howard, 2006); (Boyatzis R. E., 2006) and builds new thought action repertoires and attentional focus (Tugade & Fredrickson, 2004). The reason this is so involves the sympathetic nervous system (NEA), which is our ‘fight or flight’ system for dealing with threats, and is thus turned on in threatening situations such as high anxiety change.

In a threatening environment, the NEA pulls a person toward defensive protection. The body shunts blood to the large muscle groups, closes nonessential neural circuits, suspends the immune system, and produces the chemical cortisol (Sapolsky, 2004). Cortisol inhibits

neurogenesis and overexcites older neurons, rendering them useless (Boyatzis R. E., 2008, p. 306)

These findings illustrate two important considerations in regard to leading change, as all change is anxiety provoking at some level (we are cognitive sloths and do not let go of old habits lightly (Schwenk C. R., *The Cognitive Perspective on Strategic Decision Making*, 1988)). Firstly that it is imperative to build a clear picture and a high level of faith and pragmatic optimism right at the start of a change process in order to enable a high immune system response to create neurogenesis. Secondly, if this is not done then not only is there a lack of shared mental models, but if people feel overly stressed they will not be able to access the knowledge they already have in such circumstances, and their resistance to change will be high. Boyatzis (2008, p. 307) points out that the PSNS is only aroused when interacting with trusted others, and they “must spend sufficient time in the PEA (positive emotion attractor) to be ready for their time in the NEA (negative emotion attractor) and the stress of adaptation”. Thus leadership creates not just a sense of purpose and interaction within and across organisational levels, but quite literally a ‘shared brain’ or mental model of the future and this interaction is core to the production of adaptive behaviour (Gunderson & Holling, *Panarchy: Understanding Transformations in Human and Natural Systems*, 2002); (Fiksel, 2003); (Howard, 2006).

Applying adaptive tension without causing anxiety is a key capability of the leader of an adaptive organisation. Houchin and MacLean’s (2005) work suggests that “the underlying dynamic leading to (the) emergent order is the need to reduce anxiety” (Houchin & MacLean, 2005, p. 149). They consider that as order emerges at the boundary between an organisations legitimate and shadow systems, the resultant anxiety causes most organisations not to be CAS but complex recursive systems as people push for equilibrium and self-organise into hierarchy in order to attempt stability and minimise anxiety. To overcome this, a leader must create a purposeful desire which will then drive effort and intent to embrace change, and this ability is a critical factor in Systems Intelligence (Hämäläinen & Saarinen, 2004), (2007); (Saarinen & Hämäläinen, 2010), Intentional Change Theory (Boyatzis R. E., 2008) and the construction of the adaptive capability of organisations.

## Cognitive complexity

Cognitive complexity refers to “the degree to which the entire and/or sub-segment of cognitive semantic space is differentiated and integrated” (Streufert & Streufert, 1978, p. 17). Differentiation is the number of dimensions and the number of categories within dimensions that are used by individuals in the perception of the physical and social environment (Goldstein & Blackman, 1978). Information is laid down cognitively in structures known as schemas, maps or scripts (Goodwin & Ziegler, 1998). These scripts are arranged in patterns (hierarchical and networked) which allow for quick filing and retrieval of information, with the filing rules based on categories (which organise and integrate knowledge, classifying by prototype):

semantic networks (flexible clusters along related concept lines suggesting deductions) and inferences (based on heuristic rules, rationality and expertise) (Stubbart, 1989). Script tracks are built with wide exposure to problem solving, information and experience, and the larger the number of scripts the larger the behavioural repertoire and extrapolative capability (Goodwin & Ziegler, 1998). Scripts are mediated by high general intelligence<sup>12</sup>, through abstracting greater understanding and finer distinctions from experiences resulting in greater breadth and depth (Zaccaro, Gilbert, Thor, & Mumford, 1991).

Cognitive complexity is built through laying information down in neural networks consisting of more, and larger, 'chunks' of specific task domain knowledge (Chase & Simon, 1973) resulting in greater depth and more coherence among conceptual subcategories which are able to be organised more abstractly (Dawson, Zeitz, & Wright, 1989); (Zaccaro, Gilbert, Thor, & Mumford, 1991). Networks allow elements and their connections to be grouped in clusters that do not fit well in defined (hierarchical) levels (Saaty & Shih, 2009) as it allows for maximum cross referencing, combining and re- combining of data, information and knowledge (abstraction).

Cognitively complex leaders, then, are better able to deal with ambiguity and complex issues and problems (which describe most strategic decisions - see complex decision making). Their capability to abstract is enhanced by the ability to deal with a greater number of variables as they use more categories or dimensions to discriminate among stimuli and see more commonalities (patterns) among them (Dane & Pratt, 2007); (Patton J. R., 2003). The lower number of heuristic biases that simplify the models of relationships between variables (see footnote 21), (Schwenk C. R., *The Cognitive Perspective on Strategic Decision Making*, 1988) allows them to search for more information (Tuckman, 1964), and spend more time interpreting it (Dollinger, 1984); (Sieber & Lanzetta, 2006). They are also more capable of discrimination, which defines the extent to which an individual sees shades of gray among dimensions, requiring conceptual depth of relevant scripts (Streufert & Swezey, 1986)

Dealing with ambiguity is also linked to emotional and meta-cognitive maturity in that emotionally regulated and cognitively complex individuals are better able to label situations as opportunities than threats due to a higher level of semantic networks suggesting possible deductions and options to explore (Stubbart 1989). This also reinforces an approach rather than an avoidance orientation in others. (Lord and Hall, 2005).

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<sup>12</sup> "Intelligence" is also a multi-faceted notion. The task Force of the American Psychological Association began their survey by stating: "Individuals differ from one another in their ability to understand complex ideas, to adapt to the environment, to learn from experience, to engage in various forms of reasoning, to overcome obstacles by taking thought. ... Concepts of 'intelligence' are attempts to clarify and organize this complex set of phenomena" (Neisser, et al., 1996, p. 77)



Jaques (1989) called cognitive complexity cognitive power or capacity, and defined it as:

The scale and complexity of the world that one is able to pattern and construe, including the amount and complexity of information that must be processed in doing so. It is the raw mental power enabling a person to sustain increasingly complex mental processes (Jaques, 1989, p. 33)

Jacques' conception of cognitive complexity as an underlying variable that develops across time in maturation bands of ever higher cognitive capacity levels, echoes recent chaordic research twenty years later which highlights the holonic increase in (cognitive) complexity and coherence at each jump in system complexity (Kira & van Eijnatten, *Socially sustainable work organizations: A chaordic systems approach*, 2008). Further, Jaques (1989) held that cognitive complexity band level was moderated by capacity maturation which occurred across a lifetime, supporting current findings in regard to leader cognitive and skill maturation developing at different rates over many years (Lord & Hall, 2005). Both state that many of these skills are not likely to be gained by formal training (see leadership skill maturation).

Cognitive complexity differs from skills or competencies (Lewis & Jacobs, 1992). The former debate concerning the domain specificity (and thus trainability) (Scott W. , 1963), (Vannoy, 1965) versus general trait nature of cognitive complexity (Kelly G. , 1955) is now eclipsed by research emphasising the increase in people's opportunity to build new script tracks as the way to build complex knowledge and minimise functional fixedness grown through a lack of varied exposure in a prolonged job placement or specialist roles (Goodwin & Ziegler, 1998). Thus brainstorming, role variety and distributed decision making will increase cognitive complexity. Interestingly, Goodwin and Zeigler (1998) found that people with lower cognitive complexity often occupy more (complex) senior roles as they get promoted through superior performance in simpler, linear low complexity jobs at junior level - jobs in which high cognitive complexity people are actively disadvantaged<sup>13</sup>. Thus job enrichment at lower levels is imperative to identifying higher level cognitive complexity people and utilizing them accordingly.

Cc is limited by the amount of (simplifying) heuristics and biases (Schwenk C. R., *The Cognitive Perspective on Strategic Decision Making*, 1988) and a person's level of physically constructed cognitive simplicity (Goodwin & Ziegler, 1998) whereby some people do not appear to have the inherent potentials that are able to be shaped by experiences (Mumford, Zaccaro, Harding, Jacobs, & Fleishman, 2000); (Erikson E. , 1959); (Jacobs & Jacques, 1987), (1991), (Lewis & Jacobs, 1992). Technology appears to indicate that while brain plasticity can allow an individual's experiences and learned cognitive habits to rewire the system (Wilson M. , 2010), it has been found that humans routinely map abstract concepts onto similarly structured concepts that are concrete and physical (Barsalou, 2005); (Gallese & Lakoff, 2005); (Zwaan & Taylor, 2006) and thus the brain's representations of the sensory world will constrain

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<sup>13</sup> This is because they do not think in linear terms but look for patterns, etc (Goodwin & Ziegler, 1998)

cognitive retooling as it is not infinite in response to experience and is only possible within the constraints of the brain's ability to adapt its predispositions to new but related uses (Wilson M. , 2010).

While out of the scope of this thesis it may be that those who are strongly linear (simple) in cognitive terms map in hierarchies and would have little capacity to become 'complex thinkers' that map in networks (see footnote 13). This would have major ramifications on strategy and organisational design (as in case study 4), and on the use of complex decision making methods and tools such as the Cynefin framework<sup>14</sup> (Snowden D. J., *New Wine in Old Wineskins: From Organic to Complex Knowledge Management Through the Use of Story*, 2000) as some people will never be complex thinkers with high cognitive complexity.

## Social Cognition and Intelligence

Leading a human system means gaining results with and through other people. (Wheatley M. J., 2006); (Schneider & Somers, *Organizations as complex adaptive systems: Implications of Complexity Theory for leadership research*, 2006); (Stacey, Griffin, & Shaw, *Complexity and Management: Fad or radical challenge to systems thinking?*, 2000); (Uhl-Bien & Marion, *Complexity Leadership in Bureaucratic Forms of Organizing: A Meso Model*, 2009); (Saarinen & Hämäläinen, 2010). The literature has introduced the neural aspect of how cognitive competencies synchronise emotional states to inspire effectiveness, trust, connectivity and empathy. A high level of social cognition allows the leader to make fast, intuitive assessments of complex social situations due to a sophisticated web of conceptual sub categories which allow deep cognitive scripts to finely tune responses with accurate, nuanced action cues (Abelson, 1981). These grow with experience and high social intelligence, and create breadth and depth of 'social knowledge scripts' that allow more subtle action rules to be applied. (Zaccaro, Gilbert, Thor, & Mumford, 1991).

Such social perceptiveness combines with behavioural flexibility as critical components of social intelligence that allow leaders to read multiple aspects of the situation at once and tailor their responses accordingly (Zaccaro, Gilbert, Thor, & Mumford, 1991). Behavioural flexibility leverages the rich range of effective responses and increases creativity and willingness to manipulate, redefine or abandon well used scripts in novel situations<sup>15</sup>, in both the leader and their followers through redefining problems and allowing tacit information flow (Wagner & Sternberg, 1985) to create a creative approach rather than a cautious avoidance orientation (Lord & Hall, 2005) . The most successful leaders combine this with

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<sup>14</sup> This is a useful problem solving tool in terms of categorizing and identifying problems as simple, complicated, complex and chaotic, but the proposal that good managers can 'choose' between applying linear and complex logic depending on the problem, and further, that anyone can learn to do so, is not supported by current research or this empirical study

<sup>15</sup> This is due to a high level of ability to control cognitive processing, and it requires time to mature, and cognitive complexity.

practical intelligence, competence<sup>16</sup> and a strong mental model of the ideal organisation (Zaccaro, Gilbert, Thor, & Mumford, 1991).

Socially intelligent leaders know they are making a long term investment in shaping a socially intelligent culture through both 'neural synchronisation' and the 'emotional ripple effect' (Goleman, 2006). Systems Intelligence aligns with this in terms of the power of small actions resulting in flourishing<sup>17</sup> (Saarinen & Hämäläinen, 2007). The emotional ripple effect can also be negative. Goleman (2000) lists six styles of social IQ, two of which (commander and pace setter) sap energy and are overused by poor leaders, whereas the best (flexible) is firm but fair, puts people first and allows them to meet challenging but achievable goals in their own way (Goleman, 2006).

Emotional empathy plays a role in social cognition in two major ways. It is required to construct the preferences and values assigned to decisions, so that if empathy is not generated a decision is not made in terms of consequences to others (Hare, Camerer, Knoepfle, & Rangel, 2010). Empathy also enables the capability to focus attention on others which is critical to leading them (Hare, Camerer, Knoepfle, & Rangel, 2010). For both reasons a lack of empathy severely limits a leaders capability and it is essential to try and improve it (by changing their neural networks through mirroring, coaching and feedback) if they remain in a leadership role (Goleman, 2006). Formal training does little to alter the neural networks as it rarely creates emotionally significant experiences and thus does not alter the inductively derived cognitive schematic framework (Epstein, 1991)<sup>18</sup>. Another important aspect of social cognition is the leader's group prototypicality which mediates perceived effectiveness in ambiguous situations<sup>19</sup>, especially in those who have a high dispositional need for closure (van Knippenberg & van Knippenberg, 2005). It allows leaders to relate to their social contexts and fosters trust (Denison & Hoojberg, 1995).

## Complex decision making (CDM)

Part of thinking is problem solving<sup>20</sup>, which is done by identifying all the elements of a problem regarding the goal which they affect, the criteria that serve the fulfilment of that goal, the influences, the actors involved and the actions to be taken (Osborn A. , 1963). Those elements are then grouped systematically

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16 This includes problem solving, information gathering, scanning, pattern recognition and solution monitoring (Zaccaro, Gilbert, Thor, & Mumford, 1991)

17 Saarinen and Hämäläinen use this term to describe what happens when the people involved in the system believe in its capacity to change and improve, and this becomes self-fulfilling

18 This is because the "somatic marker" of the emotional representation of the outcome value has not been evoked (Gupta, et al., 2009)

19 The more ambiguous the role or situation the higher the need for group prototypicality of the leader. Uncertainty is reduced and effectiveness rating increased (van Knippenberg & van Knippenberg, 2005)

20 Differentiating between thinking and decision making, not all decision making involves thinking as many of our decisions are automatic reflexes or are made intuitively rather than by explicit and detailed reasoning. However when we think through a decision, we have to structure it, make judgments, choose, and then act accordingly. (Saaty & Shih, 2009)

into components of similar elements and arranged either in levels of a hierarchy or as clusters in a network (Saaty & Shih, 2009, p. 868). In simple decisions elements and connections are easily located in levels of dominance with connections that transmit influence downwards, and thus a hierarchic structure fits the decision best. Complex decision making, however, requires a network structure as the connections are complicated and can only be grouped in clusters that do not fit well in defined levels. Other than an urgent need to obtain a quick answer, it is risky to use a hierarchy in a complex decision because many influences can be lost through not being represented with the necessary connections. An interesting quandary arises in that the more important and complex a decision is the more likely that it needs a network structure form, but the more difficult it is to structure the network, which can involve a considerably greater degree of abstraction than does solving that problem. Thus a substantial amount of human thinking and imagination are needed to create a structure for a complex problem, and this valuable human quality cannot be replaced by a computer (Saaty & Shih, 2009). This networked subjective geometry organises elements and represents them by categorising them in clusters connected with feedback and interdependence loops. This allows the clusters to be examined both forwards and backwards, leading to more flexible analysis and robust understanding. (Saaty & Shih, 2009); (Goodwin & Ziegler, 1998).

From theory already offered, it can be seen that this process includes many steps that are influenced by the programming of the individual in regard to issue diagnosis, problem recognition and formulation (Schwenk C. R., 1988) and how they routinely map concepts (Zwaan & Taylor, 2006). Complex decision making refers not only to cognitively complex maps but also assessment of confidence and assumptions of the relationships between variables. Heuristics and biases<sup>21</sup> are used to frame, diagnose and /or simplify the problem and its variables, and the more biases there are, the simpler the cognitive map will be as less variables are recognised, and the smaller the number of conflicting strategic assumptions on the part of the leader which would cause them to search for disconfirming information (Hsu, Bhatt, Adolphs, Tranel, & Camerer, 2005).

When faced with strategic or complex decisions, one of two approaches are prevalent: the application of known fixes (especially if the person is more influenced by the heuristics of recent success, perceived controllability or over simplistic cognitive maps), or the development of new approaches and schema<sup>22</sup> (Schwenk C. R., 1988). Emotion is required to 'rule break' in order to make a novel decision or update cognitive scripts, whereas rule following (doing the same again) does not (Patton J. R., 2003). A positive emotional atmosphere is critical to rule breaking and thus the creation of novel, innovative ideas (Patton J. R., 2003); (Gupta, et al., 2009).

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21 Major heuristics and biases are hindsight; cognitive availability (hammer and nail); selective perception; illusory correlation; conservatism; law of small numbers; regression bias; wishful thinking; illusion of control & logical reconstruction. They allow us to be 'cognitive misers' and resist disconfirming information (Schwenk C. R., 1988)

22 New schema is built through analysis of data and 'rule breaking' by emotional rationality and use of declarative memory (Gupta, et al., 2009).

Wang and Chan (1995) have identified a number of variables which they consider to affect top manager's ability to process complicated, novel, ambiguous or dynamic strategic information in a turbulent environment. Figure 8 below offers a thorough synopsis of the nine personal attributes and four contextual attributes identified.

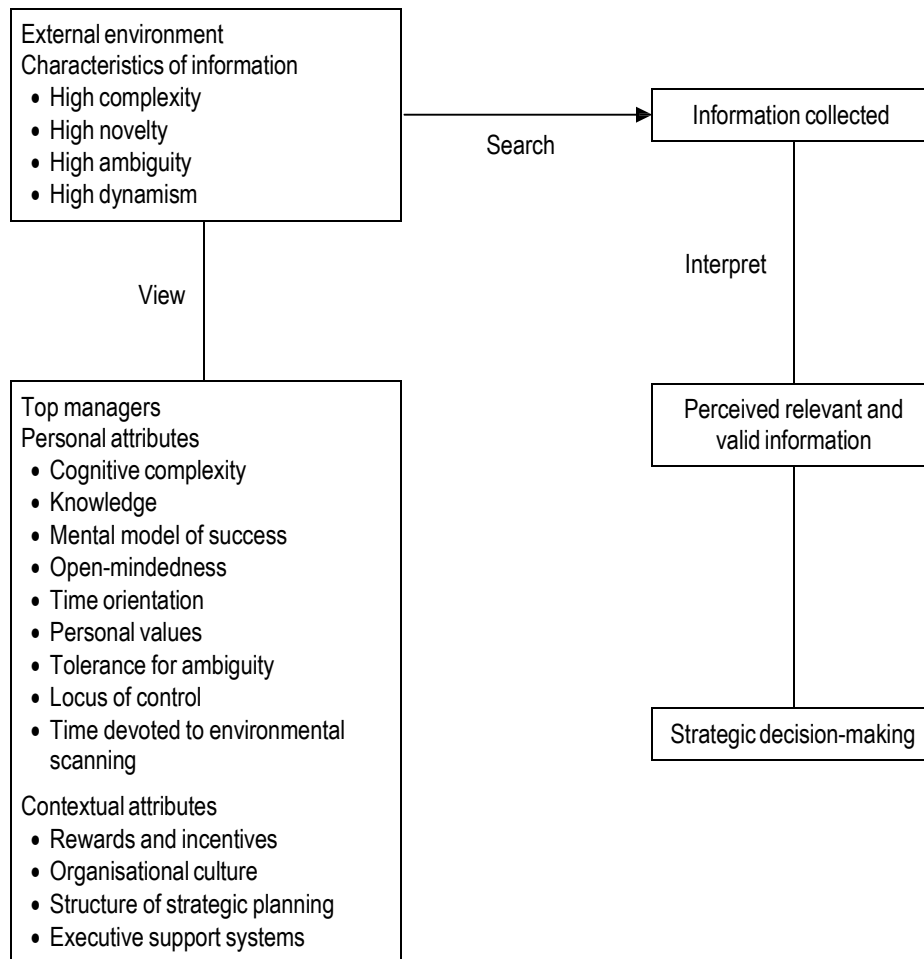


Figure 8: A global model of information processing. Adapted from (Wang & Chan, 1995, p. 34)

The uncertainty and ambiguity entailed in complex or strategic problems alerts the brain to the fact that information is missing and choice carries unknown consequences, which causes cognitive and behavioural resources to mobilize and seek out additional information<sup>23</sup> (Hsu, Bhatt, Adolphs, Tranel, & Camerer, 2005). Behavioural resources include emotion, beliefs and values, all of which increase the rationality in multi-criteria decisions. Emotions attach beliefs (attained through perception and reasoning) and feelings to scenarios and 'tag' them with values to create consequential (forward looking) decisions (Wenstøp, 2005); (Hare, Camerer, Knöpfle, & Rangel, 2010). Thus, contrary to popular belief, emotion is requisite or required in order to make to make good complex decisions.

<sup>23</sup> The amygdala and OFC are alerted under general uncertainty and are key in detecting salient and relevant stimuli of uncertain value through rapid multimodal sensory input (Hsu, Bhatt, Adolphs, Tranel, & Camerer, 2005)

Of equal importance is intuition. The case has been made for two distinct decision-making systems: one intuitive which controls simple behaviours learned through repeated experience, and the other deliberative which is designed to achieve goals in a dynamic environment (Kahneman, 2002). However, not only is there little evidence for these distinct mechanisms in the brain (Sugrue, Corrado, & Newsome, 2005) and mounting evidence of even the simplest sensory-motor decisions being based on deliberative elements (Gold & Shadlen, 2007), but it will be seen below that intuition is particularly well suited to complex and strategic issues as both are unstructured and deal with disparate information and ambiguity. (Patton J. R., 2003); (Dane & Pratt, 2007). This aligns at cognitive level with the larger picture of leaders requiring a deep 'systems awareness' around how the organisation connects and interacts, and how to balance control and emergence when making complex decisions (Meadows D. H., 2008); (Hämäläinen & Saarinen, 2007); (Saarinen & Hämäläinen, 2007); (Hunt, Osborn, & Boal, 2009).

## Leader Skill Maturation

Leader skill maturation includes critical factors in developing deeper cognitive structures associated with leadership expertise ranging across leader identity; meta-cognitive processes and emotional regulation (Lord & Hall, 2005). There is some obvious overlap with other trend factors, but their entangled maturation identifies some unique trends. Performance progresses in skill level from novice to expert and unique skills are developed in "grounding identity and leadership activities in coherent self-relevant, authentic values" (Lord & Hall, 2005, p. 591). These behavioural, cognitive and social skills develop at different rates, cannot be fast-tracked and require different learning experiences (Mumford, Zaccaro, Harding, Jacobs, & Fleishman, 2000); (Zaccaro & Klimoski, 2001).

Each level develops qualitatively and quantitatively different capabilities in knowledge and information processing, and require proactivity and self-motivation rather than formal training in order to build them (summarised below in table 1) (Lord & Hall, 2005). An example is identity as a 'leader' which takes years of development and practice, and requires the self-confidence to attempt leadership activities which will be met with success and reinforce the process (Chan & Drasgow, 2001).

Meta cognitive processes mature from novice through to expert level as more specific skills develop. The end result is cognitively complex, abstractly organised, deep coherent knowledge structures that free up working memory and allow leaders more time for meta-monitoring(interpreting and planning) and less for searching for solutions<sup>24</sup> (Mumford, Zaccaro, Harding, Jacobs, & Fleishman, 2000). These meta-cognitive processes also are linked to the maturation of leader identity, which changes from the novice level which centres on individual uniqueness (the wish to be seen as the leader and as such, unique), through a

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<sup>24</sup> Novices use more simple heuristics and a heavy reliance on working memory. The growth of chunked knowledge and interconnectionist, granular networks results in an experts quantitative shift in the nature of knowledge that underlie skills through perceiving the environment and problems in finely grained, multiple subcategories, (Anderson, 1987); (Lord & Hall, 2005)

relational focus (how the self relates to others) to the expert level of a collective leader identity based around group and organisational identity. Expert leaders also elicit the same change in self-recognition structures in followers from an individual focus to that of the group (Lord & Brown, 2004).

The maturation of underlying values is also necessary for this to occur, as the expert leader shows emotional flexibility depending on the situation (as described in the social cognition section) but remains consistent and authentic in terms of strong, clear values (Lord & Hall, 2005). They combine a group centered approach with an understanding of individual followers and how to lead them<sup>25</sup>. This brings us to emotional regulation which is seen as a challenging leadership requirement that takes considerable time<sup>26</sup> (Lord & Hall, 2005), partly because emotional processing also may function as a leading system that can structure subsequent cognition and motivation (Gray, 2004); (Lord & Harvey, 2002). Both behavioural and emotional flexibility<sup>27</sup>, are key to social intelligence, and mature along with sensitivity to the emotions of others in order to perceive and respond to them with emotional empathy (shown to be a strong predictor of leadership emergence (Kellett, Humphrey, & Sleeth, 2002)). Emotionally mature leaders build increasing collective self-efficacy in their followers (through raising confidence and increasing self-worth and communication) resulting in a positive frame of the future (Shamir, House, & Arthur, 1993).

Maturity also brings the stern resolve required for the fluent, bifocal thinking of systems intelligence<sup>28</sup> (Saarinen & Hämäläinen, 2007), and attainment of the personal integration phase of Gardiner's four phases of bifocal thinking maturity<sup>29</sup> in order to gain the complexity of the nuanced grey (Gardiner M. , 1993).

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25 They shift to a group centered, abstract general understanding of individual followers and how to lead them, assimilating different methods while maintaining consistency (Lord & Hall, 2005).

26 Emotional regulation becomes more automatic, allowing cognitive time to monitor the leaders own behaviour and performance and richer interpretative standards

27 Emotional flexibility is grounded in core values and social justice (procedural and interpersonal) and when evident, leads to higher trust, greater collective follower identity and maximal contributions offered. If behaviour is seen as unjust, distrust will grow, avoidance of exploration will occur with minimal contribution (Lind, 2001)

28 This is the behaviourally complex capability to see systems and operate from a systems perspective, yet retain an identity within the same system and be an 'active actor' to enhance it. This capability creates the highest order of improvement possible in a system (Saarinen & Hämäläinen, 2007).

29 The phases are rigid dualism, fair to a fault, revels in relativism and personal integration. Gardiner estimates at least seven years for each phase as people travel from black and white to grey (1993).

Table 1: Knowledge Content Emphasis of Different Leadership Skill Levels. Adapted from (Lord & Hall, 2005, p. 605)

Skill Domains	Novice	Intermediate	Expert
Task	Technical and task skills; Generic decision-making	Domain-specific task skills; Meta-monitoring capacity	Principled understanding of task and self-regulation
Emotional	Expression	Empathy and understanding of others; Domain-specific emotional regulation techniques	Formal principles of emotional regulation; Principles specifying the effects of situational labelling, change, and social justice on emotions
Social	Fit with implicit leadership theories. Understanding of agentic behaviours and social influence tactics	Integration with dyad or group Communal behaviours; Self-monitoring skill	Capacity to develop others Authentic, principle-based leadership
Identity Level	Individual identity as leader differentiates self from others	Relational or collective identity includes others or group	Value-based identity grounded in abstract principles
Meta-monitoring	Largely based on social reactions and task progress; focused within one's own emotional and motivational orientation	Integrated with identities; greater adjustment to others; flexibility in emotional and motivational orientations	Based on formal principles relating identities to value structures Principled understanding of positive and negative emotions/motivation
Value Orientation	Value orientation learned and applied implicitly	Integration of identities and values	Principled understanding of value structures and their relation to authentic leadership

## Intuition and Emotion

Intuition is a valid part of making high quality complex decisions (Schwenk, 1995); (Clarke & Mackaness, 2001); (Patton, 2003); (Dane & Pratt, 2007) as it is well suited to complex and strategic decisions and specific situations such as crises, all of which possess uncertainties, insufficient facts and complex alternatives (Agor, 1989); (Dane & Pratt, 2007). It is “a holistically associative process... [which] helps to integrate the disparate elements of an ill-defined problem into a coherent perception of how to proceed” (Dane & Pratt, 2007, p. 45). It is more effective than analysis in enabling individuals to develop an understanding of the structure of a complex system (Shapiro & Spence, 1997). Intuition is tied to implicit learning (Reber, 1989) which is stored in the brain differently and forms complex, domain relevant schemas used for managerial decision making. For this reason, intuitive judgments are said to become more effective relative to rational analysis as a problem becomes increasingly unstructured (Shapiro & Spence, 1997). Intuitive decisions are fast (a matter of seconds) and non-conscious (it does not take conscious attention) and thus different from insight, which uses attention of analysis, and guessing, which is baseless and lacks certitude (Dane & Pratt, 2007).

Intuition does all of this by using the ‘chunking’ method of information storage discussed above in script building (Patton, 2003); (Dane & Pratt, 2007). Experience enables chunking of information for easy storage and retrieval, and involves pattern recognition and bundling up ‘like information’ into single packages which take up less working memory and attention, and aids in the speed of retrieval. These



chunks hold a huge amount of information (a chess master can recognise 50,000 configurations on sight<sup>30</sup> (Chase & Simon, 1973)). Once at veteran level, the brain automatically activates related chunks from long term memory for use in working memory (Patton, 2003), thus eliminating information bottlenecks (Kihlstrom, 1987) and greatly increasing speed through schematic knowledge minimising cognitive effort and the exploring of unproductive pathways (Simon, 1997); (Patton, 2003).

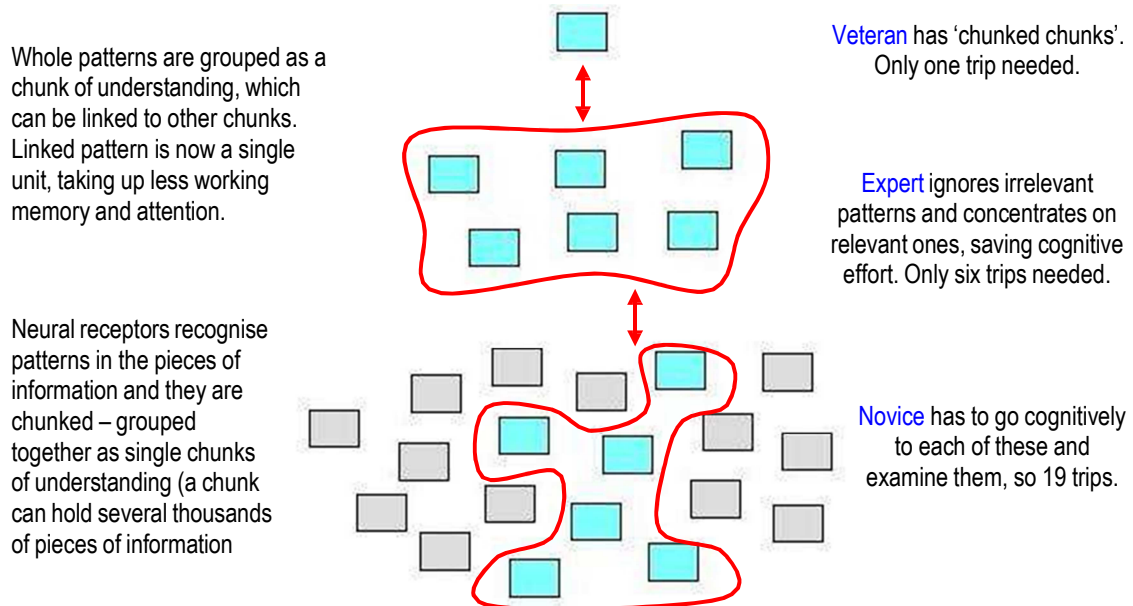


Figure 9: Intuitive chunking

The chunking<sup>31</sup> is patterned, stored and retrieved through both the level of existing cognitive complexity and through heuristic cues which allow experts to ignore irrelevant patterns and concentrate on critical ones. This means that such heuristics need to be accurate; requiring not only the ability to self-monitor as described in leader skill maturation (Lord & Hall, 2005) but accuracy is also influenced by domain knowledge factors and task characteristics, as in Figure 10.

30 The patterns built and recognized by chess masters mean there are few configurations they have not seen, and even then mental structures suggest lines of play. Thus they do not need to make thousands of decisions, but their working memory is freed up to make the few decisions necessary, allowing simultaneous play (Chase & Simon, 1973)

31 Patton (2003) notes 3 limits to chunking / pattern association: limited attention span & multi-tasking ability; limited access to long term memory and limited working memory. Cognitive complexity and experience figure in these.

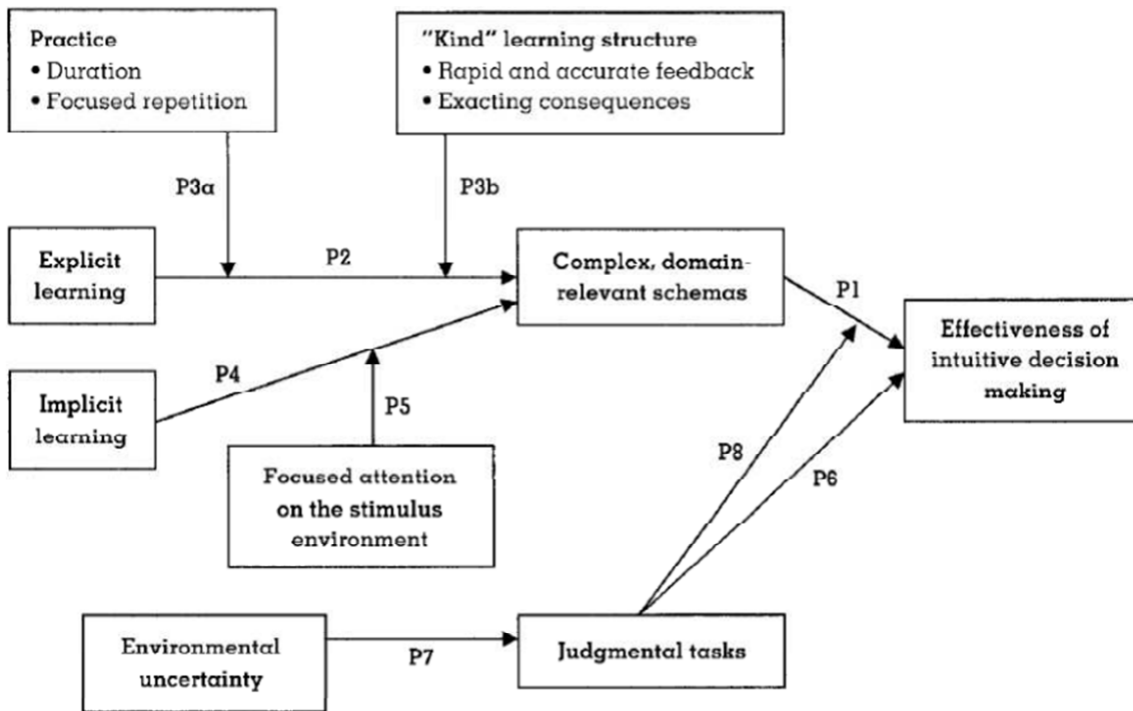


Figure 10: Factors Influencing the Effectiveness of Intuitive Decision Making. (Dane & Pratt, 2007, p. 41)

Weick (2001) calls intuition ‘compressed expertise’ developed through trial and error, long experience and observation. Such scripts also suggest alternatives through sub-goal heuristics, offering flexible guides to action and further enhancing speed and accuracy when integrating disparate information (Patton, 2003); (Dane & Pratt, 2007). Thus intuition is a major part of sense-making for leaders and decision makers (Weick, 2001) as the capability to retrieve the rich chunks which form the domain data base of knowledge frees up working memory to deal with the continuing flow of information in a real time situation. This occurs non-consciously and at great speed (Patton, 2003). The blending of intuited knowledge and analysis makes the most accurate complex and strategic decisions (Dane & Pratt, 2007); (Weick, 2001). Experts allow emergence of intuited answers whereas ‘analytical thinkers’ do not (Patton, 2003), and rational analysis can prevent the holistic linking of disparate information (Epstein, 1990); (Shapiro & Spence, 1997).

Raifa (1968) sees the human brain as “a magnificent synthesizer of disparate pieces of nebulous information, and often formal techniques and procedures thwart and inhibit this mysterious mechanism from operating efficiently”, (Raifa, 1968, p. 272). Complex decision-making is enhanced by intuitive style decision-making methods that use good intuition enhanced and developed from experience (Patton, 2003). It leads to consideration of more of the critical issues, even in those who are not intuitive, as intuitive decisions are even better if conscious decision-making habits are developed to combine analytical techniques and sensitivity to an intuitively recognised continuing flow of information<sup>32</sup>.

<sup>32</sup> Patton (2003) identifies 3 levels of leadership intuition; those naturally able to sense the essential elements of sound decisions, those who can be nurtured to acquire or improve their intuitive ability and those who will never be able to do it.

Discernment is closely linked to intuition as it enables leaders to know when to bet on their intuitive leads, requiring courage and the awareness, perception and compassion to trust in oneself and in the contribution of others (Greenleaf, 2002). Trauffer, Bekker, Bocârnea and Winston (2010) see discernment as:

A significantly more involving kind of approach to decision making for the leader. It does not rely on precedents, best practices, or benchmarking. It is to understand the self and organization in a holistic way, inviting constant self-evaluation and adjustments in order to make good judgments that serve the greater whole (Trauffer, Bekker, Bocârnea, & Winston, 2010, p. 176)

Intuition is affectively charged (involving emotion). The excitement and harmony of 'gut feeling' or 'feelings of knowing' (Shirley & Langan-Fox, 1996) are inductively derived from emotionally significant experiences (Epstein, 2002), and Lieberman (Lieberman, 2000) suggests both intuition and emotion arise through highly similar neurological pathways. However, Patton (2003) argues intuition is driven not by the irrational, narrowed span of attention of a stressed, emotion driven leader, but instead by the emotional rationality of emphasising values and consequentialism (Wenstøp, 2005).

## Systems Thinking and the growth of Systems Intelligence

Systems thinking (ST) is relational in that it emphasises the interconnectivity and interrelatedness between events or agents (Mittleton-Kelly, 2008); (Mittleton-Kelly, 2003a); (Senge P. , 1990); (Capra, 1996); (Bradbury & Lichtenstein, 2000). Systems intelligence (SI) goes beyond explaining the world in systems terms to changing it through ethical and emancipator means (Saarinen & Hämäläinen, 2007).

A systems thinking perspective entails looking at patterns of events and changes over time in order to attempt to understand an issue, rather than concentrating only on the events themselves. It involves recognition of the dynamic nature of change, seeing stability and flux as temporary states (Fiksel, 2003); (van Eijnatten, 2004a); (Kauffmann, 1993); (Wheatley, 1994); (Prigogine, 1996); (Sterman, 2000); (Schneider & Somers, 2006).

Systems thinking grasps the requirement for dissipation, bifurcation and emergence in order for adaption to occur in a way which offers resilience and sustainability (Ettlie, Bridges, & O'Keefe, 1984); (Fiksel, 2003); (Howard, 2006), and manages bifurcation as a more pronounced shift from one complexity level to the next (Fiksel, 2003); (van Eijnatten, 2004a) as the system successfully adapts (in organisational terms, step change or transformation). Similar to chemical bifurcation, transformation includes multiple possible solutions; historicity; symmetry breaking and attempts to stabilize before new order is (coherently) created (Nicolis & Prigogine, 1989); (Mittleton-Kelly, 2003a). Unmanaged, the system may re-stabilize before bifurcation and become recursive and resistant to change, which Houchin and Mclean (2005)

argue is the norm in social systems, unless anxiety is reduced sufficiently to allow people to embrace change.

Systems thinking also entails the holism of nested complexity in which each part is both autonomous and dependant (Koestler, 1978), and has a co-evolving reciprocal effect (Mitleton-Kelly, 2006), (2008); (Aaltonen, 2007b). Further, systems thinking extends this time-frame interconnectivity to the panarchy of change as a set of nested adaptive cycles caused by interaction of large and small scale processes / time frames (Gunderson & Holling, 2002), something which is quite intuitive to human life (Hämäläinen & Saarinen, 2007); (Mitleton-Kelly, 2006); (Senge P. , 2006). Systems thinking, then, allows people to:

Reclaim intuition about whole systems and hone our abilities to understand parts; see interconnections; ask what if questions about possible future behaviours and be creative and courageous about system redesign...in order to use our insights to make a difference in ourselves and our world ( (Meadows, 2008, p. 7)

Systems thinkers see great power in systems archetypes<sup>33</sup>, leverage points and places to intervene as offering immense potential for changing a system when the system is well enough understood. The most obvious fixes are often “the least effective; instead the least obvious part of the system, its function or purpose, is often the most crucial determinant of the system’s behaviour” (Meadows, 2008, p. 188).

Stacey (Stacey, Griffin, & Shaw, 2000) argues against systems thinking and terms organisations as complex responsive processes of relating, stating that ST ignores the critical relational psychological aspect. Upon reviewing ST literature this aspect has become more clearly defined in the last decade, but has always been captured in the concepts of connectivity and interdependence. Stacey further critiques ST as having an ‘interventionist mentality’; separating idea from action; showing too much faith in ‘systemic’ tools and techniques, and a lack of a sensibility towards history (Zhu, 2007). While these insights into systems thinking cannot be dismissed, each of these arguments has a ‘flip side’ evident in systems thinking which Stacey appears to ignore, setting up what Zhu calls ‘straw men’ for his arguments (Zhu, 2007); (Scott, 2003); (Layder, 2006)

Systems Intelligence was introduced by Hämäläinen and Saarinen in 2004 as “intelligent behaviour in the context of complex systems involving interaction and feedback”. Systems intelligent leaders engage successfully and productively with the “holistic feedback mechanism” of their environment, perceiving themselves as both influencing and being influenced by the whole, and acting intelligently through observing their own interdependence. (Hämäläinen & Saarinen, 2004). Thus they are fluent bifocal thinkers<sup>34</sup> who can balance the paradoxical aspects of acting intelligently without knowing the system

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33 Common system structures that produce characteristic patterns of behaviour, used not to constrain thought but guide initial discovery (Meadows, 2008)

34 This means seeing the system and operating from this perspective, whilst at the same time retaining one’s own identity within the system and possessing a capacity to actively act to enhance it. (Hämäläinen & Saarinen, 2007)

completely; balancing control and emergence and demonstrating utmost selflessness with stern resolve (Saarinen & Hämmäläinen, 2007).

One of the bases of systems intelligence is its realistic, hands on optimism<sup>35</sup> which is key to positively reframing people's core beliefs (Kerr, 2010). It argues that there is a willingness to take action without knowing how things might unfold in the future through a readiness to embrace uncertainty and surprises – what Zhu (2007) calls pragmatic sensibility. It also occurs through affirming microbehaviours which affect how we behave, interact and communicate, and are vital for creating a positive culture and maximising performance. Losada's work on high performing teams lists the three critical microbehaviours as acting positively, inquiring of others, and referring to teammates (Losada & Heaphy, 2004). Pragmatic optimism also leverages the 'domain of small actions'<sup>36</sup> to minimise "holding back behaviours and systems that trivialise reciprocity and decrease vitality" (Hämäläinen & Saarinen, 2006, p. 24). A powerful aspect of SI is the acknowledgement of intelligent actions supported by personal responsibility as the backbone of those actions, thus avoiding the cognitive systems trap of believing that once we have cognitively identified the relevant systems, most of the work is done (Saarinen & Hämmäläinen, 2010). Systems intelligence relates to the theory of multiple intelligences (Gardiner, 1983), emotional intelligence (Mayer, Salovey, & Caruso, 2008) and social intelligence (Goleman, 2006), and also elements of the systems thinking literature such as Meadows Dancing with Systems (2002) and Senge's Fifth Discipline (2006). Hämmäläinen and Saarinen use intelligence to mean an ability that enables adaptive and productive action, involving non-symbolic, nonverbal, implicit, procedural and affective dimensions (2004), with regard to dual processing accounts of reasoning (Evans, 2008).

Systems intelligence assumes that people possess an inherent pre-rational and pre-reflective systems thinking capability<sup>37</sup> which the Systems Intelligent Leader can leverage to create flourishing, a capacity for flourishing existent through:

The sensitive, the instinctual, the contextual, the situational, the emotional, and the subjective elements and capabilities (which) reside right there at the centre of human individual and

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35 The systems intelligence perspective emphasizes what we do right, with the hope of generating more of it, as opposed to what we do wrong. Accordingly, in place of "Shifting the Burden", "Fixes that Fail" or "Tragedy of the Commons" as negative systems archetypes, the focus is on "Sharing the Burden", "Fixes that Fire" and "Miracle of the Commons" as systems intelligence archetypes with distinctly positive emphasis (Hämäläinen & Saarinen, 2006)

36 This can be exponential once beliefs or behaviours are changed, and can turn a system generating conservatism and fear into one of faith and optimism. The emergence of exceptional ideas and deeds can occur once it is seen as safe to take a chance or offer information which challenges current practice but may potentially transform it (Hämäläinen & Saarinen, 2006).

37 "Five Levels of Systems Intelligence," -

- Sees herself in the system with a mission to develop a systems-intelligent organization
- Is aware of the human perspective and of the possibilities of human reciprocity
- Operates within the visible system and manages the emotional system simultaneously
- Is not held captive by a mechanistic perspective

collective action, organizational behaviour, and systemic change (Hämäläinen & Saarinen, 2006, p. 26)

Systems Intelligence aligns powerfully with the concept of chaordic systems thinking in which chaordic systems thinkers are “informed by the fundamental principles of consciousness, connectivity, indeterminacy, emergence and dissipation” (van Eijnatten, 2004a, p. 414). Zhu concludes that incorporating complexity into organisational life requires:

A pragmatic sensibility, with its emphasis on the unity of idea and action, on community conversation as the only source of action guidance, on situated utilitarian ends rather than ahistorical logical ends, on grounding knowledge upon practical consequences, on openness to alternatives and differences, on engaging contrasting or conflicting perspectives, is particularly useful for... incorporating complexity insights into organization life in general. (Zhu, 2007, p. 462)

Further, if organisations are accepted as being primarily chaordic systems which combine the two states of order and chaos (change and stability) at any one time (Hock, 1999); (van Eijnatten, 2004a) the bifocal capability of SI is well suited to the successful leadership of such an entity.

## What does the leader of an adaptive organisation do?

The literature review has presented evidence that organisations are complex adaptive (human) systems, able to be steered rather than controlled and affected by adapting to feedback from within and outside it ((Schneider & Somers, 2006); (Hunt, Osborn, & Boal, 2009); (Gupta & Anish, 2011). This means that the leader of an adaptive organisation builds and steers structures and processes which enable such adaptation while still maintaining clear direction and the successful implementation of learnings. The following section will examine how such an enabling environment is built and led.

## Building an enabling environment – Overview

The most abundant, least expensive, most under-utilized and frequently abused resource in the world was human ingenuity; the source of that abuse was archaic, Industrial Age institutions and the management practices they spawned. (Hock, 1999)

Complexity theory describes organisations as co-evolving systems, which are in turn nested within larger co-evolving systems (leading to working with multiple time frames). Such entities grow more complex as they adapt (Kira & van Eijnatten, 2008); (Gunderson & Holling, 2002), and those whom they are leading are also growing more complex over time (Kira & van Eijnatten, 2008), (Liang, 2010); (Patton, 2003); (Goodwin & Ziegler, 1998). Gaining commitment from increasingly highly educated knowledge workers,

especially in global or virtual organizations, is far from the Newtonian management paradigm. Evidence in the last two sections has highlighted the need for staff to be “emotionally inspired to do something” (Calas & Smircich, 1991), guided not by orders but a shared set of values and sense of purpose.

Leaders of adaptive organizations are working in an era which requires them to emphasize and work with the connectivity and self-organization which occurs in a CAS rather than curtail it (Helbing & Lämmer, 2008);(Gupta & Anish, 2011) where there are changing power relations and communication between the staff “in continuous construction of realities—leadership and followership amongst them” (Hosking, 1988) where the leader creates adaptive tension which will cause the system to elaborate and adjust (Uhl-Bien & Marion, 2009) by raising challenges rather than being prescriptive; where they are shaping “connected, distributed systems” (Watts, 2003b) which maintain resilience<sup>38</sup> (Fiksel, 2003), and where self-organization, emergence and co-evolution can be leveraged. The leader is pivotal to the creation of an enabling structure, infrastructure and power differentials which allow such an organization to evolve. In order to craft an emergent capability which embraces diversity, ambiguity, interdependence and flux (Seijts, Crossan, & Bilou, 2010) the leader has to grow an adaptive operational culture which fosters shared mental models of purpose and values, and ensures a capability for ever increasing cognitive complexity and an ability to apply more complex emergent actions in order to feel safe in an unknown future. (Kira & van Eijnatten, 2008); (Seijts, Crossan, & Bilou, 2010); (Fiksel, 2003). People also need to feel safe enough in the present to let go of what they know and step into the space of possibilities (Mittleton-Kelly, 2008). If the adaptive tension creates anxiety then stability will be pushed for and the system will become recursive instead of adaptive (Houchin & MacLean, 2005).

Such an organization requires a minimalist structure (see aspect 1, pg 59) in order to be able to innovate, yet one which has clear steerage rules in order to maintain direction preserving properties, acting as principles of consistency through ongoing dissipation and bifurcation (Seijts, Crossan, & Bilou, 2010); (Helbing & Lämmer, 2008); (Mittleton-Kelly, 2003a); (Nicolis & Prigogine, 1989). Rules also provide steerage in the ongoing process of trying multiple small experiments, reflecting and gradually shifting time and attention to those things that are working best in an emergent process with no right answers (Heifetz, Grashow, & Linsky, 2009); (Snowden, 2002); (Stacey, 1995); (Mittleton-Kelly, 2006).

This minimalist structure allows for self-organization of networks and hierarchies through a loose-tight method of steerage which maintains boundaries and structures but allows conditions in which coordination and real time information flow, assisting novel solutions to occur, and heterogeneity is to be supported (Helbing & Lämmer, 2008); (Denison & Hoojberg, 1995). A critical focus for structural change is the need for coordination to be able to adjust at all levels, which requires the leader to work with the natural change rate and interaction strength of the system (the harmonic dynamic) in order to allow and

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38 The four major systems characteristics for resilience are diversity, efficiency, adaptability and cohesion (Fiksel, 2003)

create adaption that minimizes adjustment problems and is relevant for long time scales (Helbing & Lämmer, 2008); (Seijts, Crossan, & Bilou, 2010).

Formal change processes should integrate planned and emergent change as they will always affect each other, and if integrated they inform each other and create vitality and a comfort with change outcomes being seen as transient rather than fixed (Livne-Tarandach & Bartunek, 2009). Some research points to planned change only being able to create structural changes, whereas cultural change comes about through emergent change processes (Bamford & Daniel, 2005); (Barnes, 2004)

Learning and innovation is fostered at all levels of the organisation, with processes for reflection and surfacing procedures that open inquiry and seek disconfirming information (Shaw & Perkins, 1992) rather than drive closure. In their article dealing with complexity, Seijts et al (Seijts, Crossan, & Bilou, 2010) make reference to the two approaches in practice. They cite the NASA Columbia tragedy where the engineers who had misgivings regarding the effects of a foam strike on the spacecraft were reluctant to share their views, as many felt that the work environment was hostile to differing opinions. Lacking the psychological safety to speak candidly without fear of repercussions, dissenting engineers kept silent, setting the course for the tragedy to unfold. In sharp contrast is the Search engine giant Google, which creates the right balance between psychological safety and accountability for high performance. For example, engineers are allowed to devote 20 percent of their time to projects of their own choosing, with no approval needed by upper management. If these projects turn out to be unviable, there are no negative repercussions for the employee. Google has developed several successful products as a result this policy, including Google Suggest, AdSense for Content and Orkut.

(Heifetz, Grashow, & Linsky, 2009); (Choudrie & Selamat, 2005). This creates an inquiring organisation which can leverage the increasing complexity that leads to what Courtney (2001) calls “wickedness interconnectivity”. This level of interdependence is fundamental to increasing complex adaptive behavior (Uhl-Bien & Marion, 2009), and in such an organisation expertise, shared responsibility and independent judgment is valued (Seijts, Crossan, & Bilou, 2010); (Heifetz, Grashow, & Linsky, 2009) and decision making is distributed appropriately. (Ashmos, Duchon, McDaniel, & Huonker, 2002); (Seijts, Crossan, & Bilou, 2010); (Meadows, 2008); (Heifetz, Grashow, & Linsky, 2009); (Uhl-Bien & Marion, 2009) as the critical elements of judgment, ethics, insight and creativity can be put into action which then increases their accuracy and interconnectedness (McKenna, Rooney, & Boal, 2009). Ashmos and Duchon’s work in hospitals found that:

Environmentally sensitive hospitals were much more complex internally. Participation in particular was greater and the patterns of participation were more complex (more connections) than those in the environmentally insensitive hospitals. The environmentally sensitive hospitals also had more complex sets of goals, more complicated strategies and more structural complexity (Ashmos et al, 2002)..



The strategic element of steering an uncontrollable system in an unpredictable environment requires methods which leverage a CAS's sensitivity to initial conditions by identifying points of influence, weak signals and developments taking place 'below the surface' (Aaltonen & Sanders, 2006); (Sanders, 1998); (van Eijnatten, 2004a); (Helbing & Lämmer, 2008). "Strategic adaption is more important than strategic planning" (Fiksel, 2003), and analysis / planning methods need to maintain ambiguity, incorporate spontaneous and self-organized processes and consider parallel situations for future directions in a non-orderly environment (Aaltonen & Sanders, 2006); (Gupta & Anish, 2011). This creates the ability to discover threats and generate responses or solutions to them spontaneously (Artigiani, 2005).

## Building enabling structures

"Leaders are to a social system, what properly shaped lens is to light - they must disturb social system and focus" (Pascale, 1999)

The literature search will now examine particular aspects of building and leading an enabling environment. This includes its structures, steering and strategic capability in an unknowable future. The physical structure(s) of an organization directly affect many aspects of the organization that are not initially obvious. Structural uniformity is over simplistic, and in practice restricts self-organisation and connectivity, minimizes learning and emergence, makes building feedback and reward processes problematic and inaccurate, and minimizes the capability to tailor local structures to specific requirements (Kerr, 2010); (Seijts, Crossan, & Bilou, 2010); (Mitleton-Kelly, 2003a); (Helbing & Lämmer, 2008). Instead flexible structures such as Goretex's lattice organization and Buckman's influence web (Groysberg & Lee, 2009) try to mirror flexible structural requirements that allow the interweaving of processes so new capacities can emerge, often through "fluid and permeable boundaries" (Mitleton-Kelly, 2003a) which manifest if necessary into temporary structure. Structures can shape how power is used and action coordinated, and can block or facilitate the decision to decide and act, whether this is termed decision making capability (Ashmos, Duchon, McDaniel, & Huonker, 2002) or distributed leadership (Heifetz, Grashow, & Linsky, 2009); (Seijts, Crossan, & Bilou, 2010); (Uhl-Bien & Marion, 2009).

The capacity for exposure to diverse scripts and decision making increases both individual and group cognitive complexity which directly affects the capability to cope with the anxiety of change, dissipation and bifurcation (Kira & van Eijnatten, 2008) and the pragmatic optimism which builds a state of flourishing (Hämäläinen & Saarinen, 2007). The flow and accessibility of information is critical to a learning organization and has to be honored and protected (Meadows, 2008); (Zohar, 1990) sees organisations as information neural nets that cannot be managed, and considers that handling the 'mess' of multifaceted information is where learning, innovation and wisdom occur. Self-organised human networks are structured horizontally instead of vertically (hierarchically), ad hoc rather than unified, and better resemble constellations than organisms which lends them resilience through redundant node

capacity (Wheatley, 2006). Wheatley further considers that human networks primarily begin with the circulation of information, and organise around shared meaning which emerges from coordinated rather than controlled behaviours. Thus the adaptive organisation is shaped by a leader who is comfortable with structures and systems that are messy, open, relational and non-linear (Kerr, 2010).

A capable technical infrastructure ensures information and knowledge is able to be stored, combined and accessed as required (Gold & Malhotra, 2001). Knowledge infrastructures must enable acquisition, conversion (through coordination, combination and transfer) and application of knowledge as this enables pragmatic action when and where required (Zeleny, 2006); (Meadows, 2008); (Wheatley, 2006). Both tacit and explicit knowledge need to be captured in the way most suited to their different nature (Wilson, 2002) as this augments the creation of new knowledge and the capability for ethical action (Courtney, 2001); (Choudrie & Selamat, 2005); (Wilson, 2002). The design of feedback loops and regulations which steer and monitor organisational activity should support and guide natural self-organisation rather than trying to control what happens through “artificial constructs that need continuous forcing”, as these are inefficient, expensive (Helbing & Lämmer, 2008) and minimise learning and emergence (Morrison, 2010). Instead, organising around self-organisation and human intelligence is both more practical and nimble, and is the best option for nurturing intelligent organizations (Liang, 2001); (Kira & van Eijnatten, 2008). Liang considers that:

The primary focus of managing human organizations is... managing human thinking systems and their nonlinear characteristic. An effective orgmind and intangible structure are new significant domains that determine the successful evolution of all human setups (Liang, 2001, p. 288)

The key principles for building enabling structures are examined more closely below.

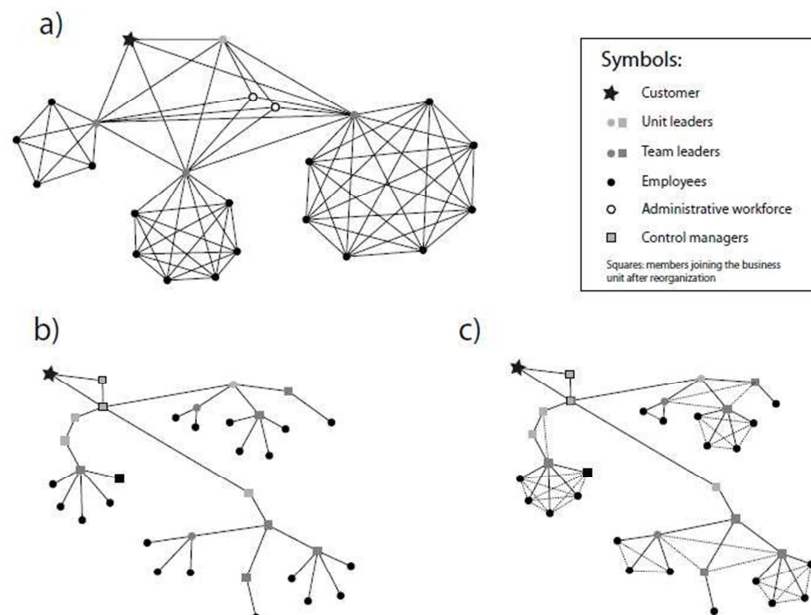
## Aspect 1 - Minimal structures

Structures in a CAS should be minimal in order to allow self-organisation and emergence to occur, driven by defining those structures which inform the strategy and the organisational processes of the organisation (Seijts, Crossan, & Bilou, 2010). These can be worked out by what Seijts (2010, p. 6) calls “yes-anding” where improvisers are trained to “build and develop ideas rather than block them with “buts” or “offers” that shut down the development of the scene” – in Meadows (2008) terms studying the beat of the system and watching it work. To design adaptive structures there is a need to understand the flow and interface between active elements of the system and how the coupling function works, as well as the dynamics in terms of time cycles, buffers, delays, queues, bottlenecks and feedback loops (Gharajedaghi, 1999). In the times of Taylor and Fayol, structure used to be about strict control regimes of procedures and methods on individuated jobs in a product chain which increased productivity. The post-industrialist knowledge society requires exploitation of creative potential of individuals in order to adopt processes faster, and has introduced the need to balance control (of the dynamics of the system)

with the modern core value of autonomy (including self-governance and self-organization) (Christen, Bongard, Pausits, Stoop, & Stoop, 2008).

The tools of control in an organization are constraint of interaction of employees (organisation chart); control of resources (input control); real time control (process rules, type of supervision); and output control (measure results). (Christen, Bongard, Pausits, Stoop, & Stoop, 2008); (Morrison, 2010). An organization is put together by way of an organizational structure which combines the parts in order to perform business processes, and the operational structure which defines the “co-action” needed to carry out the processes - reorganization adapts organizational structures to new operational structures, which results in a new set of constraints on the interaction of employees (Christen, Bongard, Pausits, Stoop, & Stoop, 2008). In socio-cultural systems such as knowledge based companies this interaction is in the form of information transfer along social networks (Wheatley, 2006); (Christen, Bongard, Pausits, Stoop, & Stoop, 2008) which maintain bonds among individuals and between individuals and the organization, and largely shape its culture (Gharajedaghi, 1999).

Christen and others (2008) point out that knowledge organisations are critically dependant on such connectivity and autonomy of informal interaction as individual relationships lead to implicit optimization not seen by senior decision makers. When formal restructures break these relationships, robustness and capability drops through the ‘invisible’ effects of destroying “small world social networks”; lengthening the information path lengths and dissolving the “high clustering coefficient” of the subunits. Christen presents a pertinent example of restructuring a Swiss Telco to increase efficiency and clarify and separate processes. The information flow is mapped before and after the restructure (which was reversed).



**Fig. 4.** Information flow network of a business unit before (a) and after (b/c) reorganization. Quadratic nodes in b) and c) indicate new members joining the business unit after reorganization. Dashed lines in c) indicate informal information transfer emerging within the teams

Figure 11: Information Flow Network. From (Christen, Bongard, Pausits, Stoop, & Stoop, 2008, p. 48)

Adaptive structures also need 'relational coordination', a concept which states that effective coordinated collective action requires not only shared knowledge and understanding, but also shared goals and mutual respect. Further, these must be created by the business across occupational groups (networks) in order to create interdisciplinary identity and a hyper-connected occupational network inside the organisation to coordinate work that often spans different occupational groups and is highly interdependent, uncertain and time-constrained (Gittell, Cameron, Lim, & Rivas, 2006).

## Aspect 2 - Control rules

Control rules should be simple, and not touch interaction autonomy or the self-organisation of a complex system. However, many organisations do the opposite by imposing complicated, time consuming rules which are increasingly difficult to enforce. (Christen, Bongard, Pausits, Stoop, & Stoop, 2008); (Helbing & Lämmer, 2008); (Bedau, et al., 2000); (Morrison, 2010), (Meadows D. H., 2008); (Mittleton-Kelly, 2003a). The result is increasing costs, high expenditure of energy around compliance, systems sensitive to gaps, process failure as people cannot take corrective action, and measurement of the wrong effects (which are usually quantitative, not qualitative). Morrison (2010) differentiates between rule based and knowledge based responses, indicating that the former are driven by risk management and compliance which oversimplify complex issues and rush to quick fix solutions (often to avoid blame), resulting in regressive learning based on defence instead of progressive learning which produces adaptive change. Thus simple control mechanisms that allow maximum autonomy within the control's boundaries should be implemented (Christen, Bongard, Pausits, Stoop, & Stoop, 2008), once the appropriate goals have been decided and rules formulated.

Rules are necessary as they provide steerage and preserve direction, acting as principles of consistency which allow, but guide, self-organisation (Seijts, Crossan, & Bilou, 2010); (Helbing & Lämmer, 2008); (Mittleton-Kelly, 2003a). They maintain purpose and focus through dissipative and bifurcating processes (Nicolis & Prigogine, 1989), orient experiments, clarify success and alter the emergence of infrastructure depending on the rules of interaction (Meadows D. H., 2008); (Furneaux, Brown, & Gudmundsson, 2008); (Dubois & Gadde, 2002). In addition rules shape positive and negative feedback loops (Meadows D. H., 2008); (Siemieniuch & Sinclair, 2002), allow for (short term) planning and decision making in an emergent situation (Heifetz, Grashow, & Linsky, 2009); (Kurtz & Snowden, 2003); (Stacey, 1992); (Mittleton-Kelly, 2006), and create boundaries and structures that "prevent organisational chaos" (Marion & Uhl-Bien, 2001). It is critical to get them right.

In regard to basing rules on the minimal structures that inform the strategy and organizational processes (Seijts, Crossan, & Bilou, 2010); (Eisenhardt & Sull, 2001) suggest rules be focused on a few strategically important processes, and include how-to-rules (delineating key features); boundary rules (which type of opportunities to pursue); priority rules (ranking); timing rules (pace of opportunity exploration) and exit rules (when to abandon opportunities). The rules need to complement the minimal structure and set up

feedback loops that allow and facilitate non-linear interaction and self-organization to reshape the system adaptively (Eisenhardt & Sull, 2001); (Helbing & Lämmer, 2008).

### Aspect 3 - Feedback loops

Feedback is the adaptive organization's reaction to activity and as such is critical to shaping behavior as what is reinforced is strengthened, and what is ignored or dampened is minimized. Interdependence and the degree of connectivity determine the strength of feedback loops (Meadows D. , 1999) that encourage or dampen behaviors and actions. Feedback shapes change and transformation, and should include not only quantitative measures but also qualitative ones (such as values and perceived truths), as these often appear in the mission statement but are rarely measured, rewarded or positively reinforced (Meadows D. H., 2008). Values driven feedback loops reward and align values driven behavior more than HR practitioners trying to create ways to change people's core values (Cowan & Darsoe, 2008).

Adaptive organizations balance positive feedback which reinforces and amplifies change with regulators which dampen or control activity so that things do not get out of hand. They ensure regulators (regulations) are not too numerous strong as this causes the organisation to become static and limits reactive capability (e.g. government bureaucracies) (Mitleton-Kelly, 2006); (Meadows D. H., 2008). Regulators are interventions and interfere with the intricate nature of inter-connectivity and learning, stifling emergence or even creating undesirable emergence (Meadows D. H., 2008). Results include an imbalance of centralised and distributed leadership, the hampering of local decision-making; inappropriate levels of accountability and choice, unsuitable quality measures and misjudged timing requirements. Policies and procedures become overcomplicated and can stop activities instead of facilitating them. Over regulation commonly includes limited decision making capability and the creation of a large number of regulatory rather than values driven procedures which reinforce the lowest common denominator and limit flexibility and innovation (Mitleton-Kelly, 2006); (Morrison, 2010).

Strong positive feedback loops optimise operational success but they need to be based on reinforcing the interaction of constituents or activities rather than the parts or activities themselves. (Meadows D. H., 2008); (Christen, Bongard, Pausits, Stoop, & Stoop, 2008). Business tools such as value streams and balanced score cards do not address feedback loops and behaviour over time. Feedback loops can be difficult to see if time delays or separation of cause and effect occur, so adaptive infrastructures and processes are aimed at monitoring such interaction, and in this way reading warning signs as well as long term effects. Feedback loops and time delays critically affect system behaviour so it is essential to assist managers and all staff to recognise and incorporate them (Meadows D. H., 2008). A crucial unrecognised feedback loop is constructive conflict, which is vital for growth and change (Seijts, Crossan, & Bilou, 2010); (Wheatley, 2006).

## Aspect 4 - Self-organization, connectivity networks and rate of change

Guided self-organization is the basis of successful biological and social systems as it allows for the most efficient forms of adaptation, learning and emergence (Helbing & Lämmer, 2008). Minimal structures allow for innovation by giving people room to take risks, try new ideas and step into (and out of) the space of possibilities to experiment (Mitleton-Kelly, 2003a); (Seijts, Crossan, & Bilou, 2010). Connectivity remains high and the result is dynamic connected, distributed systems which are resilient through being both more fragile and more robust than populations of isolated entities (Watts, 2003a). Self-organized networks leverage the capability for small groups to problem solve faster than individuals or hierarchical groups through their capability to manage multidirectional communication and information flow. Hierarchies filter and slow down information by sorting, bundling and compressing it whereas networks allow “differentiated bundling” so that people are not swamped by continual communication cascade, but the flow is dynamic and suits local need for speed and detail ((Helbing & Lämmer, 2008); (Wheatley, 2006).

Another major aspect of self-organized structures (such as CAHS) is the natural change rate governed by the ability to coordinate different levels of the system as well as their interaction strength which is always stronger within levels than between them (through their greater connectivity and interdependence). This means that in a natural emergence process there are slower change dynamics between levels than within them, and so coordination and adjustment across the various boundaries is an important governor of successful, long term, adaptive change (Helbing & Lämmer, 2008). Unfortunately today’s method of restructuring from above or outside the organization ignores the natural change rate, interaction strength and adjustment rate:

The management of organizations, production processes, companies, and political changes seems to be quite different today: The highest hierarchy levels appear to wield a strong influence on the system over a relatively short time scale. This does not only require a large amount of resources (administrative overhead). It also makes it difficult for the lower, less central levels of an organisation to adjust themselves to a changing environment. This complicates large-scale coordination in the system and makes it more costly. Strong interference in the system may even destroy self-organization in the system instead of using its potentials. Therefore, the re-structuring of companies can easily fail, in particularly if it is applied too often. (Helbing & Lämmer, 2008, p. 9)

Formal large scale coordination is complicated and costly. It immediately lowers flexibility and increases process inefficiency, duration, expense and complications. Guided self-organisation is faster, cheaper and more efficient (Christen, Bongard, Pausits, Stoop, & Stoop, 2008); (Helbing & Lämmer, 2008).

The other time related aspect of imposing change on a self-organising system is the faster is slower effect which occurs if spare capacity is taken out of the system in an attempt to increase efficiency without understanding how that capacity is buffering the process, and what dynamic interaction effects will be set up by pushing the system towards its limits (Helbing, Seidel, Lämmer, & Peters, 2006). Meadows (1998) notes that “an important indicator of the resilience of a system is the redundancy of its controlling negative feedback loops”, (Meadows D. , 1998, p. ix). Taking such resilience away does not have an immediate cost, (indeed it initially saves money which is why it is done), and does not affect normal running of the system, but under a crisis this resilience is demanded, and when it is not there the cost is huge. Similarly, sub-optimisation occurs when changes are put in to ensure each individual works at their optimal capacity due to removing the ability to adjust to other activities and processes which “reach a well-coordinated overall dynamic” (Helbing & Lämmer, 2008, p. 10); (Ackoff, 2006). Too often what is “optimised” is conflicts, inefficiencies and mistakes.

Changes, rules and structures should only be introduced once there is an understanding of how the system is working, and what is causing the system’s behaviour. Leaders and managers should:

Aid and encourage the forces and structures that help the system run itself. Don’t be an unthinking intervener and destroy the system’s own self-maintenance capacities. Before you charge in to make things better, pay attention to the value of what’s already there.(Meadows D. H., 2008, p. 3)

## Aspect 5 - Emergence and loose-tight hold

Lichtenstein and Plowman (2009) consider that there are four sequential conditions which exist in the organisation for emergence to occur: a disequilibrium state; amplifying actions; recombination/self-organisation and stabilizing feedback. The fourth condition (stabilization and negative feedback) was demonstrated by Sastry (1997) to be “a critical element in sustaining successful transformations”, and Lichtenstein and Plowman (2009) consider it is an extra condition to add to the first three emergence conditions as identified by Nicolis and Prigogine (1989)<sup>39</sup>. Leaders create the capability for emergence by engaging in nine specific activities (which Lichtenstein and Plowman label behaviours) which combine into the following: disrupting existing patterns (through embracing uncertainty, surfacing conflict and creating controversy), encouraging novelty (by allowing experiments, encouraging rich interactions and supporting collective action), providing sense-making and sense-giving (through the artful use of language and symbols) and recombining resources, and stabilizing the system (with feedback which integrates local constraints)(Lichtenstein & Plowman, 2009). They consider that a “new emergent order occurs when there is a dramatic increase in the capacity of the system to achieve its goals” (Lichtenstein

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<sup>39</sup> These are far from equilibrium conditions; perturbations/fluctuations that get amplified near a threshold and the self organization of structure composed of existing elements (Nicolis & Prigogine, 1989)

& Plowman, 2009, p. 621) which can be seen in such examples as a significant company turnaround or a new social value offer.

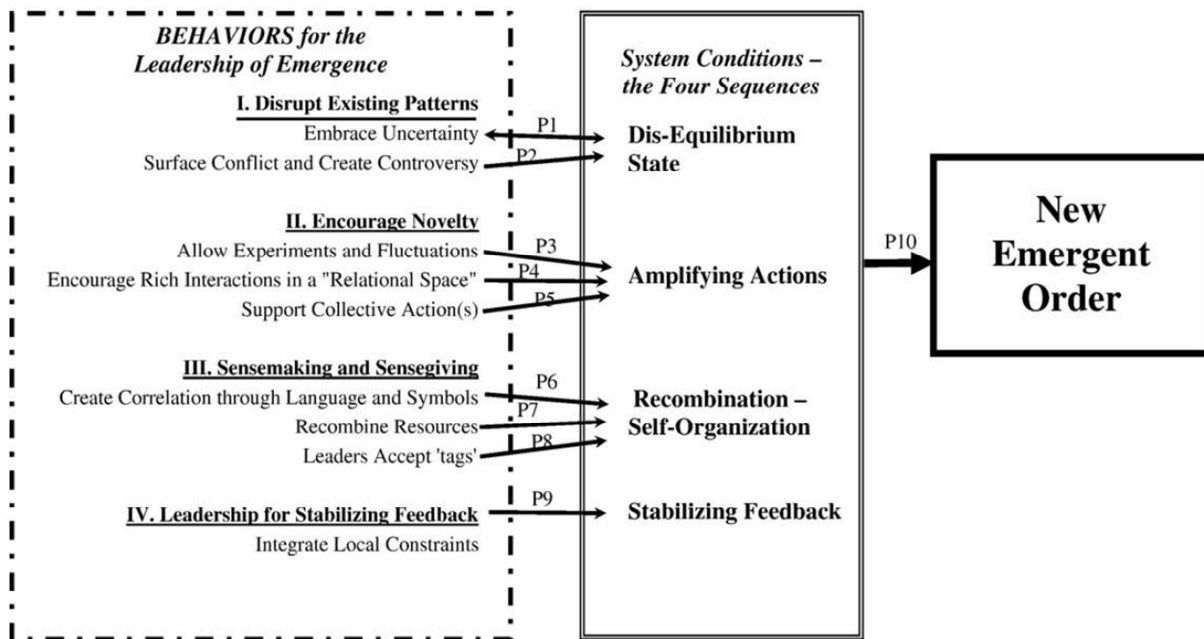


Figure 12: Behaviours that co-generate the conditions for new emergent order (Lichtenstein & Plowman, 2009, p. 621)

In organisations, emergent outcomes occur at all levels of CAS if there is an enabling structural capability (including distributed decision making) (Meadows D. H., 2008); (Wheatley, 2006); (Mittleton-Kelly, 2003a), but they look different, and have varying impact across hierarchical levels (Hunt & Ropo, 2003); (Phillips & JG, 1992). The upper level offers the highest requisite frame of reference for both external and internal complexity and uncertainty, as well as visibility across the organization in terms of the different levels of flux, stability and effective adaption across units of the organization (Jacobs & Jacques, 1987). Those at executive level can see the whole landscape, and know when one part of the organisation is in a change mode and others are stable. Change and flux tends to be driven by changes in technology, environment or structure, and this leads to some parts of the organisation being impacted more than others at any one time (a technological change, for instance, may lead to large changes in operations or IT while sections such as legal or HR remain stable). At this level, leaders can also be pro-active and push or hold sections (or the whole organisation) in a change state to create necessary emergence in the organisation. Thus they either stimulate emergence in order to create rule breaking change, or channel emergence in order to create rule enhancing change (Hunt, Osborn, & Boal, 2009). The first includes promote experimentation, change, innovation and invention without specifying what is to be altered and precisely how it will be evaluated. Channelling includes clear articulation of values and purpose, and balancing the present skill sets with encouraging new ones that make sense in terms of possible growth and evolution. Outcomes relate to emergent planning, resource acquisition, alteration of formal structure and infrastructure and management style, and strategic relationships with the environment (Marion & Uhl-Bien, 2001).



Adaptive outputs for the middle hierarchical levels (middle management, or what Jaques (1989) calls the organizational level) relate to emergence of focused planning and resource allocation (Uhl-Bien, Marion, & McKelvey, 2007). At this level managers channel emergence to enhance stability and stimulate emergence to enhance adaptation as the organization needs both to function (Hunt, Osborn, & Boal, 2009). Emergence is channelled formally at this level by allocation of resources, jobs, rewards, etc. This is often done after informal channelling has occurred via storytelling which points to a desired future direction and set of values, addressing the when, where and how of evolving change.

Stimulating 'targeted' emergence can be done by patterning of attention, which often involves dialogue, with questions like why and how something is being, or should be, done, thus drawing attention to specific areas, challenges or outcome requirements. Hunt offers the example of Intel's strategy making process for the i860 chip where two groups of senior managers competed for their choice of architecture, with top executives refereeing and re-articulating the strategy, matching evolving skills from the two competing groups with evolving opportunities.

At the lower level of the organization, emergence relates to the development of the core products of the organization. For knowledge-producing organizations, this includes knowledge development, innovation, and adaptation (Osborn & Hunt, 2007) if there is an enabling environment to allow this to occur.

In a complexity based computational study of more than 300 companies written up by McKelvey and Lichtenstein (2007), maximally only four levels of internal structuring can ever be developed solely from the bottom up. Much of the literature points to this reach only being possible when there is an appropriately enabling structure to support such emergence which is built and resourced by the leader. These are leaders who steer rather than control, apply adaptive tension while supporting and tending, and then trust and foster emergence. They display a loose-tight style, operationalising tight values and clear purpose which creates necessary boundaries and structures combined with a gentle grip in order to allow individuals and groups to create novel solutions and sponsor change (Hannah & Lester, 2009) (Marion & Uhl-Bien, 2001). The loose tight dichotomy can be found in many forms across the literature including the biological systems explanation of principles guiding self-organisation (Helbing & Lämmer, 2008), the bifocal capability of Systems Intelligence (Hämäläinen & Saarinen, 2007); the behavioural complexity of balancing creative and routine roles in leading (Denison & Hoojberg, 1995); the chaordic view of sustainable organisations which ensure a dynamic ability to both repeat accustomed solutions and devise innovative solutions as well as ensuring processes for both emergence and dissipation (Kira & van Eijnatten, 2008), and Mittleton-Kelly's (2003a) picture of emergence created by top down clear direction and deeply held values, and bottom-up interaction of activity and decision making. Trusting and tending requires a high level of cognitive skill in order to ensure a keen sense of timing around when to step into the process, and to spot critical points of innovation and potential phase change (van Eijnatten, 2004a)(2004b); (Mittleton-Kelly, 2003a). Such an approach allows decision makers to embrace rather

than eliminate uncertainty and take advantage of the inherent resilience of the organisation through balancing the properties of adaptability, diversity, efficiency and cohesion (Fiksel, 2003).

## Aspect 6 - Resilience

Another requirement of adaptive organisational structures is that they are resilient. A CAS is resilient if allowed to be, with a self-repairing capability that is blocked by structural aspects such as the wrong rules, goals and feedback loops (Meadows, 2008). A minimal structure allows for the ability to survive large changes and room to handle multiple states of equilibrium (Fiksel, 2003); (van Eijnatten, 2004a). A highly resilient organisation can cope with changes in structure or function (shifting equilibrium states), and builds processes that allow for dissipation of old learnings and methods which cause the organisation to become 'over-connected' and too tight for creativity or risk taking (Mitleton-Kelly, 2003a). The way to allow dissipation is to ensure that the dominant behaviours and solutions are questioned and new, novel ideas are listened to (Holling & Gunderson, 2002); (Kira & van Eijnatten, 2008). In this way, such organisations make the space to acquire new, emergent properties and learnings, and maintain resilience.

Fiksel (2003) notes four major system characteristics for resilience: diversity (encouragement of diverse business strategies with multiple forms and behaviours); efficiency (efficient decision processes and modest resource consumption); adaptability (organizational learning so that flexible change occurs in response to new pressures; cash reserves are ensured for this) and cohesion (existence of unifying forces and linkages such as distinctive corporate culture, strong purpose and partnerships). These characteristics allow the system to resist disorder, and to interact with and draw upon external sources to maintain stable low entropy by continuously acquiring new emergent properties as an open system (Fiksel, 2003); (Mitleton-Kelly, 2003a). This is primarily achieved through relationships (interconnectivity) and feedback loops. Understanding what drives the system allows accurate feedback loops and interventions which take advantage of the way the system works instead of resisting it (Helbing & Lämmer, 2008); (Gunderson & Holling, 2002). This results in avoiding mistakes such as imposing structures that break valuable connections, elongating or blocking information chains, removing too much slack from the system, decreasing managerial diversity and increasing inertia. Instead, accurate system performance and deployment means looking at life cycle assessment and quantifying not just economic costs, but environmental and societal costs of resilient adaptation, including direct, potentially hidden, contingent, relationship and external costs (Fiksel, 2003). In a ten year study of 160 companies the main determinants of resilience / sustainability were not traits based on profit, performance or technology but were organic and systems traits of being achievement oriented, flexible and responsive, clear and focused in their strategy, flawless in their execution, and encouraging recognition that the future will not resemble the past. (Nohria, Joyce, & Roberson, 2003). This is supported by the findings of a Royal Dutch Shell study (De Geus, 1997) which suggested that most companies 'die early' (under 50 years), and identified four factors that "distinguished long-lived companies: (i) sensitivity and adaptability to the

business environment (ii) cohesion and sense of identity (iii) tolerance of diversity (decentralization) (iv) conservative use of capital”, (Fiksel, 2003, p. 5331). Once again profitability was an outcome, not a driver or predictor.

Finally, resilience is created through the shared and strong sense of purpose and identity and clear guiding values which inform both the individual and the ‘org mind’ (Goleman, 2006); (van Eijnatten, 2004a). Once established, this state allows the complex present to be manageable, the anxiety of dissipation and change to be acceptable and the unknown future to be seen as safe. All of these lead to the positivity of flourishing (Hämäläinen & Saarinen, 2008).

## Aspect 7 - Dealing with flux

Heterogeneity concerns the uniformity of elements, and a group (or material) which is heterogeneous is made up of diverse or dissimilar elements or parts. Flux refers to the state created by the fluctuation of continuous change, passage, or movement. Both Heterogeneity and flux allows resilience and flexibility to be maintained and innovation maximised, and it can have positive and negative effects. While large fluctuations disrupt largely and include bifurcation and step change within an organisation, minimum or medium fluctuations and changes are needed to escape the frustrated states of ever increasing order which tighten up the organisation and stop flexibility. They allow for the development of different behavioural roles, multiple perspectives, ideas and approaches and thereby minimise the ‘herding effect’ of monocultures (Schelling, 2006). They also maximise the capability for innovation, adaption, and the speed of evolution (Helbing & Lämmer, 2008). Thus the adaptive organisational leader has to balance a system which can rapidly adjust while still maintaining sufficient stability to learn by allowing time for innovation to occur and knowledge to accumulate (Marion, 1999). Otherwise the organisation “would be in a constant state of flux never being able to move any distance from a random state because improvement would vaporize at every new fad” (Hunt, Osborn, & Boal, 2009, p. 508). The culture needs to be supportive of educated risk taking and multiple experiments, developing a mindset that the easy answer is not always the right one (Heifetz, Grashow, & Linsky, 2009); (Meadows, 2008) instead of rushing to closure to maintain stability and present order, or being so close to chaos that there is no time for experimentation, reflection and learning.

At the organisational level flux occurs, both across different parts of the organisation at the same time, and in terms of the organisation as a whole. This means that different parts are in varying states of stability or change, and the leader can channel or stimulate emergence accordingly as they are at the requisite level to integrate and align such varying states (Hunt, Osborn, & Boal, 2009). Some researchers represent whole organisations ‘sitting in’ one state or another (stability, dynamic equilibrium, edge of chaos or chaos-crisis) such as Osborn et al.’s (2002) example of global high tech organisations’ sitting in an edge of chaos state’, and Hunt et al.’s (2009) suggestion that more firms are now moving towards this as a state.

However, there would appear to be more compelling evidence for seeing states of flux as that which organisations pass through such as a chaordic pattern of holonic growth (van Eijnatten, 2004a); (Hock D. , 1999) or adaptive cycles and panarchy (Gunderson & Holling, 2002); (Mittleton-Kelly, 2003a). This aligns with organisations gaining more complexity over time, and the leader's role of steering or even actively pushing it further out of stability and towards the edge of chaos (the natural space for a CAS (Gupta & Anish, 2011); (Kira & van Eijnatten, 2008); (Mathews, White, & Long, 1999); (Prigogine, 1996); (Morrison, 1991); (Kauffmann, 2000); (Dooley & Van de Ven, 1999); (Marion, 1999), in order to encourage people to embrace change, take risks, let go of old thinking and doing, and maximise their capability for innovation by "stepping into the space of possibilities" (Kira & van Eijnatten, 2006); (Mittleton-Kelly, 2003a); (Gupta & Anish, 2011). Otherwise the ever increasing connectedness 'tightens up' the organisation which becomes inflexible and not able to adapt. (In systems terms this is described as stimulating new patterns of behaviour around new attractors, and thus 'managing the emergence of beneficial coherence within attractors, within (flexible) boundaries' (Snowden, 2009), or the 'co-jumping on a trampoline' of van Eijnatten (2004b) which he sees as a good metaphor for organisational change and transformation in the 21<sup>st</sup> century:

With other players jumping on the same unstable surface it becomes highly unpredictable whether or not you will ever succeed in your highly-desired leap-frogging mega-jump. It will depend on the kind of interaction patterns or rhythms that accidentally might emerge among the players.... that makes it difficult for individual holons to predict the effects of their change initiatives since organisations have many different agents acting at the same time. (van Eijnatten, 2004b, p. 2)

Regarding flux and heterogeneity at an individual level, the people within an organisation also grow more complex over time (Kira & van Eijnatten, 2008); (Liang, 2010); (Patton, 2003); (Goodwin & Ziegler, 1998) in line with requisite complexity (Uhl-Bien, Marion, & McKelvey, 2007). A system is holonic, and as such an organisation can only develop when its members grow at the same pace (van Eijnatten, 2004a); (Gunderson & Holling, 2002). This means ensuring an environment which builds and utilizes expertise (Seijts, Crossan, & Bilou, 2010), including exposure to complex problems and script building opportunities such as distributed decision making and job enrichment, as the jobs in increasingly complex organisations should also be increasing in complexity. The organisations structures must have enough slack to allow for choice and the testing of viable options (Helbing & Lämmer, 2008). Leaders, processes and the culture should encourage co-creation of the organization with those directly affected, thus increasing people's tolerance for ambiguity and feelings of safety regarding the unknown (Kira & van Eijnatten, 2008); (Goleman & Boyatzis, 2008); (Hämäläinen & Saarinen, 2007), and minimizing the possibility of becoming recursive (Houchin & MacLean, 2005). Personal and professional complexity development of employees increases functional capacity and acts as a "sustainable heritage" of a work-organizational unit (Wilhelmson & Doos, 2009). Adaptive organization's embrace the "dissipation principle of sustainability" (Fitzgerald, 2002) accepting that a sustainable, resilient work organization is not an eternal structure, and framing functional capability as increasing complexity and dissipation.

Holling (2004) notes two forces contributing to emergence and dissipation – fast paced innovation, and ‘large-and-slow change forces’ which provide boundaries through values, norms and practices that then balance flux and stability (Kira & van Eijnatten, 2008), (Holling, 2004), as well as co-evolution within the changing environment (Mitleton-Kelly, 2003a).

## Change and steerage

Change in organisations is always emergent, but in addition it can also be planned. In a CAS emergent conditions for change take shape continuously just below the surface and are often not visible (Sanders, 1998). Such conditions occur with a planned change as well, (and can push it off course), but they are more easily identifiable as at least some of the change dynamics are being actively monitored or measured. The most effective change processes integrate planned and emergent change, allowing them to inform each other iteratively, and leveraging emergent change as the norm which is a consequence of local interaction between people at a local level. Being able to see how planned and emergent changes integrate allows people to conceive of change as ongoing and iterative, with transient rather than fixed end points (Bamford & Daniel, 2005). Another reason to integrate the two is the evidence that planned change is only able to achieve structural changes whereas cultural change comes through the emergent change process (Bamford & Daniel, 2005); (Burnes, 2004).

“Legitimate” formal change processes try to pull the organisation towards new order, whereas anxiety and resistance emerges in the shadow system of local interaction and tacit processes, and these are the source of instability. Strategy theorists and formal change management processes only look at the formal systems as they are the ones being quantified (Schneider & Somers, 2006). A related issue here is that of external or top down change design - the more that new order is designed from outside the self-organising system, the more the self-organising capability is curtailed, and the greater the dependency on those imposing the framework. This leads to less predictable outcomes (Mitleton-Kelly, 2003a); (Schneider & Somers, 2006) because of a higher level of unknown interconnections.

A leader of an adaptive environment ensures that blame is minimised, and risk / experimentation is encouraged -steered by a shared mental model of purpose and values, and coupled with an acceptance of transient outcomes creates a vitality to try things, to step into the ‘space of possibilities’ (Mitleton-Kelly, 2003a) and to let go of what Hämäläinen and Saarinen (2007) call ‘systems of holding back’, investing instead in “the power of small actions” which have an exponential effect over time and create flourishing through trusting the outcome will be good (Hämäläinen & Saarinen, 2008). It allows for the letting go of the ‘old thinking, old doing’ and enables dissipation to occur in order to learn and grow (Kira & van Eijnatten, 2008).

## Framing

Formal change is made by way of steering the system, and the least obvious part of the system (function or purpose) is both the most crucial factor in the system's behaviour and the most powerful place to change its direction, reinforced by shaping elements such as feedback loops, information flows and organisational structure (Meadows, 2008). A good example of the power of clear, shared purpose is Hewlett Packard's 'reframing' of the awareness and values operating in their company by changing their research goal from "being the best IN the world" to "being the best FOR the world". In so doing they shifted both the meaning of the work and the values underpinning it from that of self-interest and competition to inclusiveness and integration (Cowan & Darsoe, 2008). Re-framing shifts and aligns perceptions and creates a feeling of "constructive meaning around people's work" (Wind, Crook, & Gunther, 2005). There is a cultural shift when people are able to see how their work interconnects with others and with the mission of the organisation (Katzenbach, 1996). Such clarity assists in the shaping of problem solving as it allows people to navigate many aspects of problem identification and solution as well as decision making. It frees up the leader to 'tend' from a higher level, holding the boundary and providing space for coherence and chance taking (Eflin, 2003). Steerage through deeply understood values also create a focus that allows for minimal regulations, creating flexibility in both structure and systems which supports increased connectivity and the capability for emergence of high quality solutions (Cowan & Darsoe, 2008). Organisations are not steered or changed by altering elements such as numbers and people if the underlying system remains untouched and reinforced. The wrong indicators are consistently measured as those designing the measures do not observe the organisation's behaviour over time. This behaviour, not the rhetoric, indicates purpose; Meadows (2008) calls this 'listening to the system'.

## Learning, reflection and improvisation

"Much can flow into an empty vessel, but if it is full nothing else fits". (Confucius)

Learning and improvisation are vital to dealing with the ambiguity, diversity, interconnectedness and flux of complexity (Seijts, Crossan, & Bilou, 2010). A CAS learns, and thus adapts through self-organised response to events. Leaders of adaptive organisations need to approach organizational learning by setting the conditions and creating structures for learning to occur, while limiting direct interference in the creative processes themselves. Learning emerges through interaction and information flow along relationships (Wheatley, 2006); (Schneider & Somers, 2006). Social systems have control over their structure and they balance the parts and the whole to gain consensus of purpose and activity. Each part also has a purpose and displays choice and thus agreement is required between them (Leddick & Gharajedaghi, 2001). Effective management therefore requires management of interactions between

parts and the individuals within them, as well as interaction with the environment, to enable adaptive learning.

At an individual level, leaders can increase developmental readiness of individual followers, and thus their motivation and ability to approach learning experiences and adapt their mental models (Hannah & Lester, 2009). Exposure to learning opportunities and complex decision making increases cognitive scripts and leads to greater cognitive complexity at individual and group level, which is critical for organisations to be able to adapt in a chaotic, holonic manner (Kira & van Eijnatten, 2008); (Gunderson & Holling, 2002); (Hock D. W., 2005); (Hannah S. , 2006). Leaders ensure that roles are enriched and allowed to grow in sync with the increasing complexity of the organisation (Kira & van Eijnatten, 2008). Knowledge is created and diffused in order to improve organisational effectiveness and innovative capability (Wilson, 2002), including not only infrastructure and process, but the promotion of knowledge diffusion within and between knowledge catalysts who catalyse learning within and across social networks (Rogers, 2003); (Hannah & Lester, 2009).

Utilizing social networks is vital to influencing the creation of knowledge networks because though new knowledge may initially flow from the source through information channels such as newsletters or email, it requires interpersonal channels and 'opinion leaders' to persuade individuals to adopt or reject the new knowledge. This may be because emotion is engaged through face to face neuronal activity and trust activation (Goleman & Boyatzis, 2008); (Denison & Hoojberg, 1995); (Lord & Hall, 2005). Key knowledge catalysts are "gatekeepers" who are strongly networked to both internal and external sources of critical information (Katz, Tushman, & Allen, 1995) and act as focal points in 'radial networks' which are important for innovation (Rogers, 2003). They can diffuse knowledge best as they provide meaning through understanding the intent of learning initiatives (Hannah & Lester, 2009). One model that describes such a network is Hannah and Lester's semi-autonomous knowledge network cluster. Their model depicting the role and intervention of a leader at micro-, meso- and macro-level in the organisation in order to enable learning captures many of the elements outlined in the literature (though they use the term interventions for the activities of an adaptive leader which may be argued to have a more controlling connotation). Apart from the specific activities listed in the interventions boxes, the ability to influence both down and up at the micro level is represented, as is the capacity for self-organisation in terms of semi-autonomous groups, and critically there is a clear understanding of the leader's role in diffusing shared mental models across the organisation.

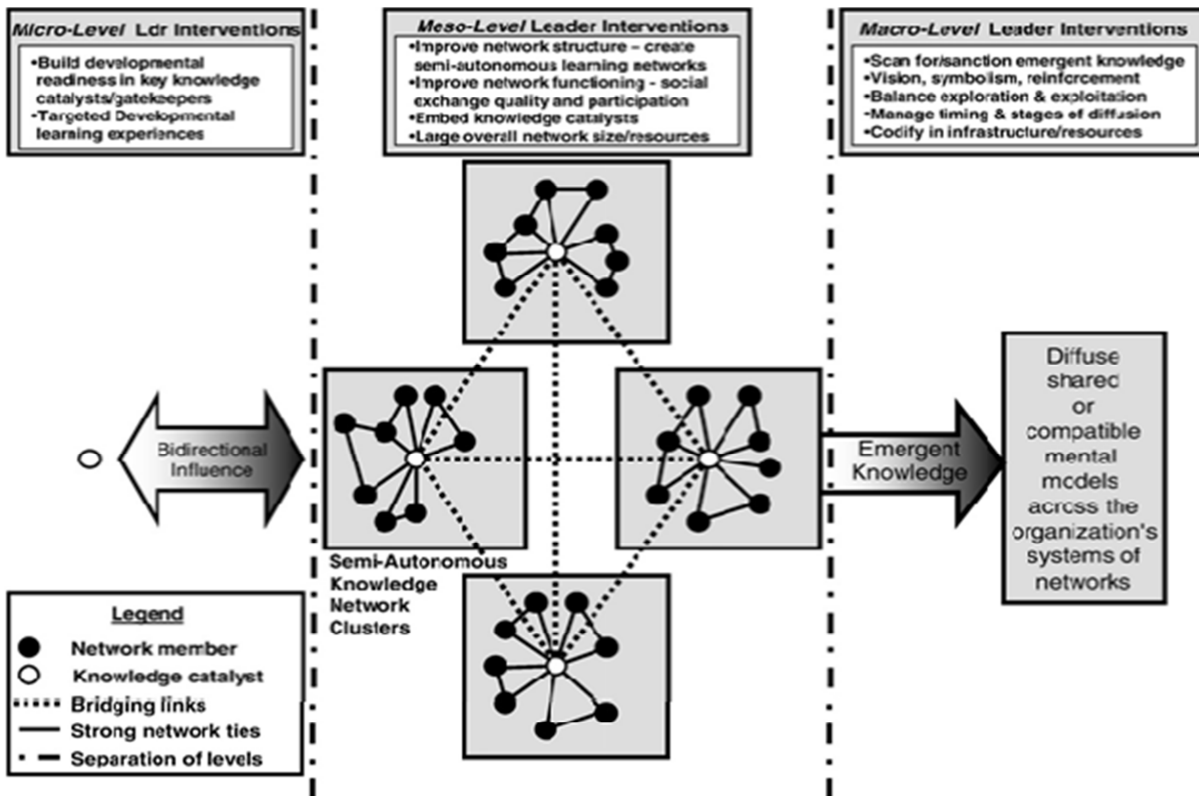


Figure 13: Model of individual, network and systems level leader interventions (Hannah & Lester, 2009, p. 36)

At organisational macro level, leaders enable improvisation by making individuals feel comfortable enough with ambiguity to let go of “the 5Cs – the need to be consistent, comfortable, competent, confident and in control” (Seijts, Crossan, & Bilou, 2010). They can do this in a number of ways, including enabling group activity which creates the interaction needed for learning by creating a culture of experimentation which gives “psychological safety” (Edmondson, 2008) through differentiating worthwhile and honest mistakes made when taking calculated risks while maintaining accountability for demanding goals, and showing trust (Seijts, Crossan, & Bilou, 2010); (Edmondson, 2008); by visibly encouraging, rewarding and incorporating knowledge creation and innovation through showing an organisational intention to facilitate knowledge sharing and cross functional collaboration and trust (Lin, 2007); by ensuring that power dynamics encourage and reward learning rather than information control (Lin, 2007); by implementing processes that ‘open up’ enquiry such as emphasising creativity above execution and efficiency (which rewards closure), allowing adequate flow of both supportive and disconfirming information to allow new patterns to emerge which create shared learning (Wheatley, 2006) and ensuring processes give permission, time and physical space for reflection and cross-functional group collaboration (Stajkovic, Lee, & Nyberg, 2009); (Bueno, Anton, & Salmador, 2008). Fostering collaborative capability is necessary not only between obviously ‘different’ groups such as scientists and accountants, but across each area of the workplace as areas create group identities.



Reflection on knowledge, along with action, is critical for the fostering of learning, change, wisdom and innovation (Schön, 1995). Action is the way people put their learning into practice, and grow wisdom through exercising judgement, ethics, insight and creativity in order to increase their accuracy and interconnectedness, learning from mistakes and observing ramifications (McKenna, Rooney, & Boal, 2009). Overt practices in reflection and mindfulness counteract the rewarding of ready-fire-aim confidence based actions, surface and air mental models and reinforce mental flexibility and willingness to redraw boundaries, which is critical to learning (Meadows, 2008); (Shaw & Perkins, 1992); (Kerr, 2010).

Tacit and explicit knowledge are different in how they are acquired, captured and converted to learning, and this needs to be reflected in both formal knowledge capture systems, and in the way they can be mined for information and used for collaboration and creativity (Gold & Malhotra, 2001); (Choudrie & Selamat, 2005). Tacit knowledge is critical for organisational learning, as aesthetic experience (Wilson, 2002) works through growing meta-abilities by externalisation and sharing. Thus processes should not only enable collaborative activity, but pro-actively create skills in those with tacit knowledge to influence others by way of idea transfer, actions, and reflection (Choudrie & Selamat, 2005). If tacit knowledge is 'captured' in a data base it requires a web-like mining process and unrestricted input methods due to its nebulous nature and lack of capability to classify (Bradburn & Coakes, 2001). Explicit knowledge can be captured and codified into searchable knowledge which, though it can be more linearly searched, should be flexible enough to allow and encourage various interactions, with processes which facilitate easy acquisition, conversion, application (and if needed protection) of data and information (Gold & Malhotra, 2001).

A learning culture thrives by encouraging independent judgement and expertise to be utilized when and where needed, assisted by an infrastructure which assists people to rely on and build maps of other's expertise (Logan, Majchrzak, Kirchmer, & McCurdy, 2006) and the capability to decide and act. Liang (2001, p. 288) proposes the position that human organizations may have to tap the innovation and creativity embedded at the edge of chaos at all times in order to survive, and that "Intelligence-associated entities such as knowledge structures and theories (will) rapidly supersede the importance of basic economic resources" with "new entities such as human capital and intellectual property being allocated higher priority". He observes that "both the human mind and organisations are CAS where order and disorder coexist, and organisations that are intelligent are better able to structure around and exploit these characteristics collectively and effectively" (Liang, 2001, p. 281). They take taking advantage of the innovative and creative energy that sits in this space of possibilities at the edge of chaos (Liang, Nurturing Intelligent Human Systems: The Nonlinear Perspective of the Human Minds, 2001); (Kira & van Eijnatten, 2008); (Mitleton-Kelly, 2003a); (Schneider & Somers, 2006); (Kauffmann, 2000).

## Distributed decision making, action and Real Time Information

Distributing the capability to decide and act is one of the major ways in which a leader of an adaptive system enables emergence. The adaptive tension created by the responsibility to make accurate, aligned decisions causes the system to elaborate and adjust (Uhl-Bien & Marion, 2009), raising challenges which create a need for connected, distributed systems (Watts, 2003a) and surfacing any lack of alignment in the shared sense of purpose. There are a number of reasons to distribute decision making to the individual(s) with the critical skill set and/or capabilities to make the decision, apart from the obvious one of gaining a quality outcome. Exposure to complex decision making increases cognitive scripts and problem solving capability and thus raising cognitive complexity at all levels of the organisation (Kira & van Eijnatten, 2008); (Liang, 2010); (Mumford, Zaccaro, Harding, Jacobs, & Fleishman, 2000); (Goodwin & Ziegler, 1998). The over-centralisation of power by restricting decision making blocks flexibility and nimbleness in local situations<sup>40</sup> (Mitleton-Kelly, 2008). Restricting permission to decide and act limits the fostering of wisdom in individuals and therefore the organisation by minimising the opportunity to effectively choose and apply relevant knowledge in given situations and learn from it (Cowan & Darsoe, 2008). Distributed decision making allows people to build up and exercise expertise (Goodwin & Ziegler, 1998) and individuals to rely on and build maps of others' expertise (Logan, Majchrzak, Kirchmer, & McCurdy, 2006), fostering both independent judgement and shared responsibility (Heifetz, Grashow, & Linsky, 2009). Appropriate delegation will simplify manager's roles, as:

Although the behaviour that emerges is complex, the rules that guide it are necessarily simple. In fact, it is their simplicity that creates the freedom to behave in complicated, adaptive, and surprising ways (Brown & Eisenhardt, 1998, p. 18)

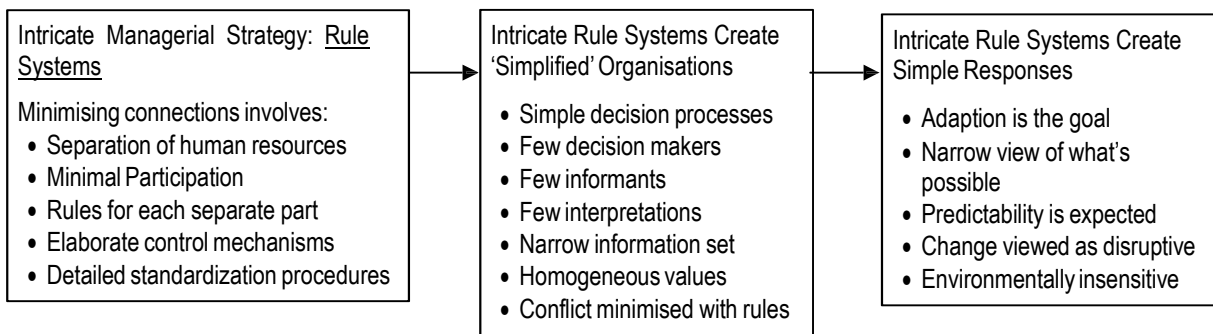
Thus, rather than relying on a complex rule system to reduce the complexity of the external environment, organizations can better absorb that complexity by rigorously applying the simple rule of participative decision making, which allows for the creation of complex responses through increasing the density of the organization's web of relationships, while allowing a broad range of ideas and strategies which can lead to the organization developing a larger behavioral repertoire (Ashmos, Duchon, McDaniel, & Huonker, 2002), as summarized in

Figure 14 below:

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<sup>40</sup> An example of over-centralisation of decision making is where international companies require branches in different countries to apply the same rules even though they are in different settings with different demands; customers; supply chain mechanisms and requirements; and levels of integration (both vertical and horizontal). This restricts their capability to respond effectively to local needs and opportunities, often to a 'dis-enabling' extent through control and uniformity (Mitleton-Kelly, 2008)

Machine model view of organisations: complexity reduction



Complex adaptive systems view of organisations: complexity absorption

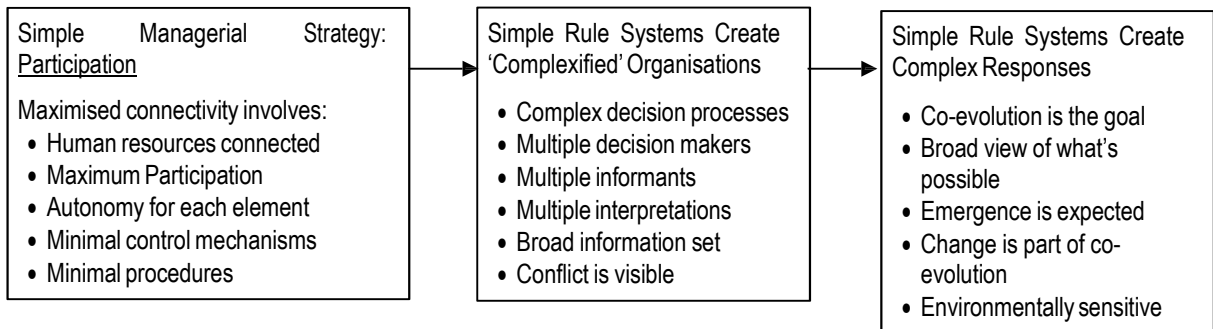


Figure 14: Contrasting view of organisations. (Ashmos, Duchon, McDaniel, & Huonker, 2002, p. 195)

Thus participative systems set up a cycle which absorbs complexity and overcomes the inertia which leads to rigid behavior in a fluid, and dynamic world (Ashmos, Duchon, McDaniel, & Huonker, 2002). They do this by growing rich connections that then help to develop sensitivity to the environment, and this in turn helps to overcome the organization's predisposition to maintain inertia, fostering instead self-organization, co-evolution and the ability to re-energize (Ashmos, Duchon, McDaniel, & Huonker, 2002). Increasing participation is a powerful entry point for changing the organization, and although it will initially seem to make things 'messier' by surfacing conflict and increasing confusion (which traditional organizations stabilize), such 'airing of mental models' (Meadows, *Thinking in Systems: A Primer*, 2008) is precisely what leaders of adaptive organizations attempt to achieve through enquiry and discourse in order to gain agreement on where people are going and how to get there (Hannah & Lester, 2009). It can be seen that the capability for a leader to create a shared mental model of purpose and deeply embedded values to guide behavior is critical to successful distribution of decision making (Kira & van Eijnatten, 2008); (Mitleton-Kelly, 2008); (Seijts, Crossan, & Bilou, 2010); (Fiksel, 2003); (Ashmos, Duchon, McDaniel, & Huonker, 2002).

Indeed, in line with this, Seijts et al (2010) suggest a practical way of re-thinking the designation of leadership and assignment of responsibilities from that of top (resource allocation); middle (controllers) and operational (implementers) to the top role of prime promoters of trust and purpose with middle (coaches) and operational (entrepreneurs). The culture would reinforce not hierarchical authority but an acceptance that managers cannot know everything, and listening and accepting expertise can allow them

to act as enablers of spontaneous action and catalysts for bottom-up interaction (Seijts, Crossan, & Bilou, 2010); (Heifetz, Grashow, & Linsky, 2009); (Uhl-Bien & Marion, 2009). Thus managers still 'manage' (prioritize, allocate resources, integrate from the next level of visibility) but they can create what Handy (1992) calls subsidiarity which is the inverse of empowerment - it assumes that the power to make decisions rests at the lowest point in the organisation and is delegated upwards only where the higher level is better placed for that particular decision. The principle is that you let people make decisions where they can do so effectively – that stealing people's decisions is wrong (Handy, 1992).

## Real time Information

There should be an eleventh commandment: thou shall not distort, delay, or sequester information... as a decision maker cannot respond to information they do not have; respond accurately to inaccurate information, or respond in a timely way to late information (Meadows, 2002, p. 4)

Accurate and real time information is critical to good decision making. Seijts et al (2010) notes that in regard to improvisation in organisations, the greater the level of expertise the better the improvisation (the caveat is that real time information is essential to ensuring that expertise does not drive out improvisation through pattern reversion or functional fixedness) (Goodwin & Ziegler, 1998). Decision making requires people to have the right information when they need it (Meadows, 2002), (2008); (Seijts, Crossan, & Bilou, 2010); (Wheatley, 2006). Attention should be paid to how quickly and widely information travels, and to ensuring forms that are useable - accurate, timely and meaningful. It requires a shared context to maximize fertility rather than being rounded off or blocked by a 'need to know' culture with managers acting as information chastity belts (Wheatley, 2006). Information distribution structures should be built as networks as this structure maximizes non-linear bonds, information flow and speed of decision making whereas hierarchies create filtering and compression of information which destroys self-organisation (Helbing & Lämmer, 2008); (Seijts, Crossan, & Bilou, 2010).

Another key part of effective information flow for accurate decision making is efficient feedback mechanisms as they supply information on what is driving the system and offer relevant interventions or reinforcements (Meadows, 2008); (Helbing & Lämmer, 2008); (Gunderson & Holling, 2002). Feedback needs to come from relevant sources, including mechanisms which not only allow people at the coalface to feed back into the information system, but actively draws up the information in order to increase the 'collective forms of referencing and knowing' (Morrison T. , 2010). Feedback mechanisms which supply clear, comprehensible information allow for accurate, relevant decisions, whereas over regulation of feedback limits decision making capability, increases the length of permission chains, and invests in regulatory rather than values driven procedures which limit flexibility and innovation (Mitleton-Kelly, 2006); (Morrison T. , 2010); (Christen, Bongard, Pausits, Stoop, & Stoop, 2008).

There are many models and frameworks for management decision making (e.g. Cynefin framework (Snowden, 2002); Magic Quadrant (Gartner, 2005)) which may inform the decision maker of variables to consider or methods to apply. The Cynefin framework for executive decision making allocates problems to their respective quadrant of simple, complicated, complex or chaotic and notes the appropriate response order (Snowden, 2002). Whilst it cannot be assumed that (linear) non-complex thinkers can adopt complex responses (Barsalou, 2005); (Gallese & Lakoff, 2005); (Zwaan & Taylor, 2006); (Wilson, 2010) it is a useful tool.

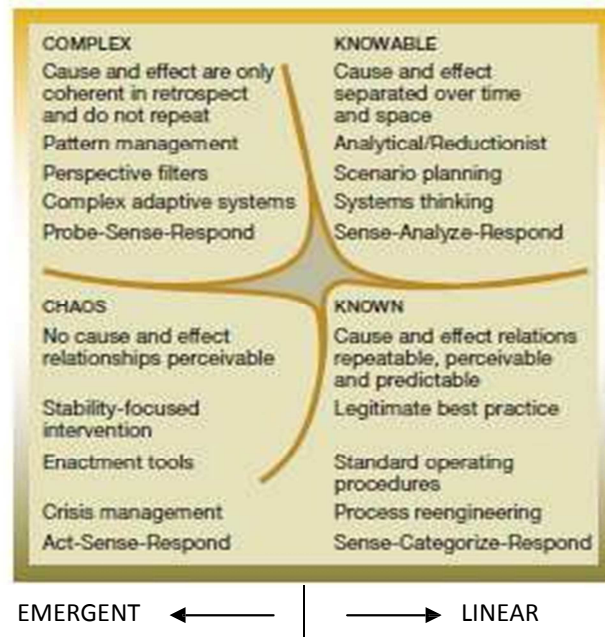


Figure 15: Cynefin framework for executive decision making. Adapted from (Tibby, 2008)

Noah Raftord from the London School of Economics has created a new diagram which takes this framework and turns it sideways, adding the adaptive cycle over it and pointing out that at the strategy level problems sit in either the complex or chaotic quadrants. The other interesting addition is the number of hours of experience it takes on average to deal with complex problems, and the literature reviewed in the cognition section suggests that even then a truly linear thinker may not acquire or apply complex thinking skills (Schwenk, 1988); (Goodwin & Ziegler, 1998); (Mumford, Zaccaro, Harding, Jacobs, & Fleishman, 2000); (Erikson, 1959); (Jacobs & Jacques, 1987), (1991); (Lewis & Jacobs, 1992); (Wilson, 2010); (Barsalou, 2005); (Gallese & Lakoff, 2005); (Zwaan & Taylor, 2006).

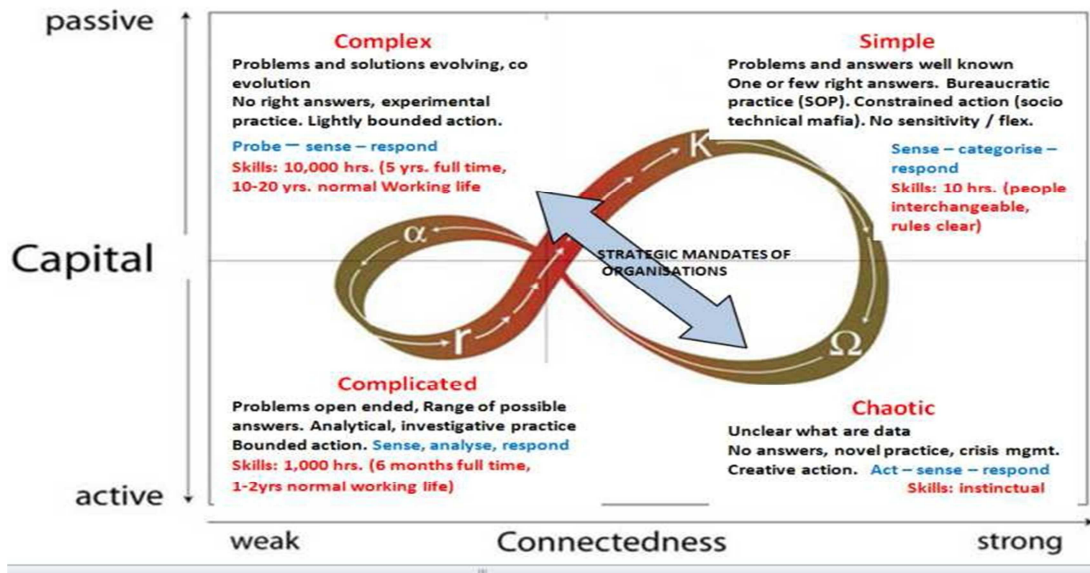


Figure 16: Adapting the Cynefin framework to Encompass Systemic Organisational Change. Adapted from (Raford, 2009)

## Inertia

Inertia can take many forms, including enduring organizational myths and ideologies (Metcalf, 1979); (Mitroff & Kilmann, 1976); (Starbuck, 1982), activity programs (Hedberg, Nystrom, & Starbuck, 1976); (Nystrom & Starbuck, 1984), and vested interests of political coalitions (Morrison & Hong, 2006); (Pettigrew, 1973); (Watson, 1969). The archetype trap of initial success (Meadows, 2008) causes non-adaptive organizations to stick to programs that repeat earlier success and entrenches inertia by directing attention to these past activities, thus generating commitment to such programs (Nystrom & Starbuck, 1984) and locking people into them instead of taking risks and trying new ideas (Mittleton-Kelly, 2003a). This also increases inertia by reducing perceptual sensitivity to new initial conditions within the organisation (Yasai-Ardekani, 1986); (Aaltonen & Sanders, 2006); weakening the links between organisations and their environments (Hedberg, Nystrom, & Starbuck, 1976); (Starbuck, Greve, & Hedberg, 1978) and reinforcing past organizational ideologies and myths (Clark, 1972), traditional beliefs and worldviews (Hedberg, Nystrom, & Starbuck, 1976) instead of making people feel comfortable with the idea that tomorrow is going to be different from today (Kira & van Eijnatten, 2008).

In organisations subject to inertia contrary evidence and disconfirming information are minimised (Nystrom & Starbuck, 1984), and weak signals are not picked up, dismissed or even actively skewed. The culture may frame a change of plan or strategy as evidence of inadequacy or incompetence (Starbuck & Dutton, 1973), or they may potentially erode or shift organizational power structures and bias distribution of resources (Yasai-Ardekani, 1986); (Normann, 1971). Individual members and groups will vigorously resist changes that threaten their economic interests and prestige (Watson, 1969) and this is one of the factors in recursive organisations, as more anxiety is generated in regard to overcoming inertia

than maintaining it (Houchin & MacLean, 2005). Further, any discretion given to managers to alter organizational structures to match the environmental requirements will not be acted upon. Those organisations either stay in the 'old thinking, old doing' paradigm of van Eijnatten's (2004a) cross in the chaos, or potentially worse for those involved, various individuals enter the schizophrenic space of either old thinking new doing, or old doing, new thinking (van Eijnatten, 2010).



Figure 17: Transition from the lower into the Higher Level of Complexity and Coherence, (van Eijnatten, Putnik, & Sluga, Chaordic Systems Thinking for Novelty in Contemporary Manufacturing, 2007, p. 448)

Thus inertia is one of the major blocks to dissipative or bifurcative activities, and this may go beyond the boundary of the single organisation if coalitions have vested interests in existing practices and distributions of resources (Yasai-Ardekani, 1986); (Kira & van Eijnatten, 2008).

The surfacing of mental models, reflective processes and the active seeking out of disconfirming information are also powerful ways to ensure that inertia is minimised. At an organisational level, many of the aspects covered in the literature search dampen inertia, including processes such as generating faith and energy through individual neurogenesis (Boyatzis, 2008), and an increased cognitive capability to cope with complex issues and situations (Kira & van Eijnatten, 2008) which assist by leading to the pragmatic optimism of organisational flourishing (Saarinen & Hämäläinen, 2007).

## Creating and enhancing strategic capability in organisations.

The real world which models simulate, after all, evolves by surprising. It feeds some slight variation through an incompletely known environment laced with non-linear relations and amplifies results unexpectedly. Planning has traditionally sought to avoid surprises by controlling events and suppressing variations. (Artigiani, 2005, p. 586)

Creating strategic capability can be tackled in various ways and at different levels of the organisation. At an organisational level strategic capacity can be increased by not only giving permission but requiring all levels of people to become more strategic through enhancing their ability to question present practice, exercise independent judgement wherever appropriate at all levels, share responsibility and apply

learning (Heifetz, Grashow, & Linsky, 2009). This means giving permission to act, enhancing connectivity, self-organisation and co-evolution (Ashmos, Duchon, McDaniel, & Huonker, 2002), as well as freeing up leaders and executives to better execute their roles.

At the level of the organisation's strategy group, shared mental models, experience and exposure to complex decision making are critical (as outlined in the literature review on leadership cognition section above). Individual mental models are influenced by each strategic thinker's previous experiences and exposure to strategy development and they need to be 'aired' (Meadows, 2008) to align mental models and improve understanding of the organisation and its environment. Shared mental models also need to be built through multiple, efficient communication channels within and between strategy groups for exchange of information and learning (Malan, Erwee, & Rose, 2009). Such shared mental models feature in Artigiani's (2005) study of battle success as an underlying reason for the most successful battles being those which did not apply 'rules of engagement'. Artigiani notes that "shared goals and clear duty constrain how people act but not what they do"; meaning that the specific actions taken to achieve an agreed goal can be very flexible, but the shared goal and values that inform those specific actions will remain clear and will bound and shape the actions. Thus it allowed local commanders to read the immediate environment and respond by changing their structure faster than the environment. His study shows that planners do not need to know the future, but instead should build systems that read the environment, detect threats and quickly respond with local initiatives. If fear of failure remains low planners will not feel pressured to match future forces to specific threats (with zero tolerance for deviations). Off the battlefield successful commanders were what Allen (1992) calls Stochasts - people who embrace change consciously. They backed multiple options and saw error making as vital as it led to the 'accidents' of new technologies, ships and planes through experimentation.

The environment in which strategy building takes place is an unpredictable and uncontrollable organization (Helbing & Lämmer, 2008); (Mitleton-Kelly, 2003a); (Gunderson & Holling, 2002) shaped by irregular cycles and discontinuous trends. Analytical controls and planning methods can only be used in the short term, and long term planning and development methods need to become spontaneous, self-organizing process out of which new strategic directions can arise (Gupta & Anish, 2011); (Helbing & Lämmer, 2008). In practical terms this means that "instead of a mission statement, it is a shared set of values that guides the process of self-organisation and emergent properties in an organization" (Gupta & Anish, 2011, p. 4). It also means that strategic planning is replaced with strategic adaption (Fiksel, 2003). A key method of doing so is utilizing the CAS's characteristic of sensitivity to new initial conditions which then provide opportunities for influencing the future of the system (van Eijnatten, 2004a); (Mitleton-Kelly, 2003a). Foresight and strategy methods should have the ability to identify these points of influence. Perking is the term used by Aaltonen and Sanders (Aaltonen & Sanders, 2006) to describe such new and initial conditions to which the system may be sensitive. Perking information refers to emerging conditions, changes and developments that are already taking shape just below the surface, but are not yet visible (Sanders, 1998).



These are especially difficult to see in emergent rather than planned change, as they are a consequence of local interaction between people at a local level, and are not as easily identifiable as in planned change (Bamford & Daniel, 2005), yet they are the norm in a CAS. As local interaction is based on local principles, rules and logic rather than a plan imposed by a CEO or a director (Sanders, 1998); (Aaltonen, 2005); (Aaltonen & Barth, 2005), this reinforces the need for the leader to have created a shared mental model of purpose, goals and values to align and guide rather than attempt to control local action.

In an irregular, spontaneous strategic environment ontologically linear foresight methods are doomed to failure (Aaltonen, 2007c). Aaltonen's research of futures methodology since the 1940's shows only two relatively new methods – SOFI (2001) and causal layered analysis (1999). He categorized the methods into qualitative, quantitative, normative or exploratory and plotted them on the dimensions of possible understanding of the system, and control or direction of the system.

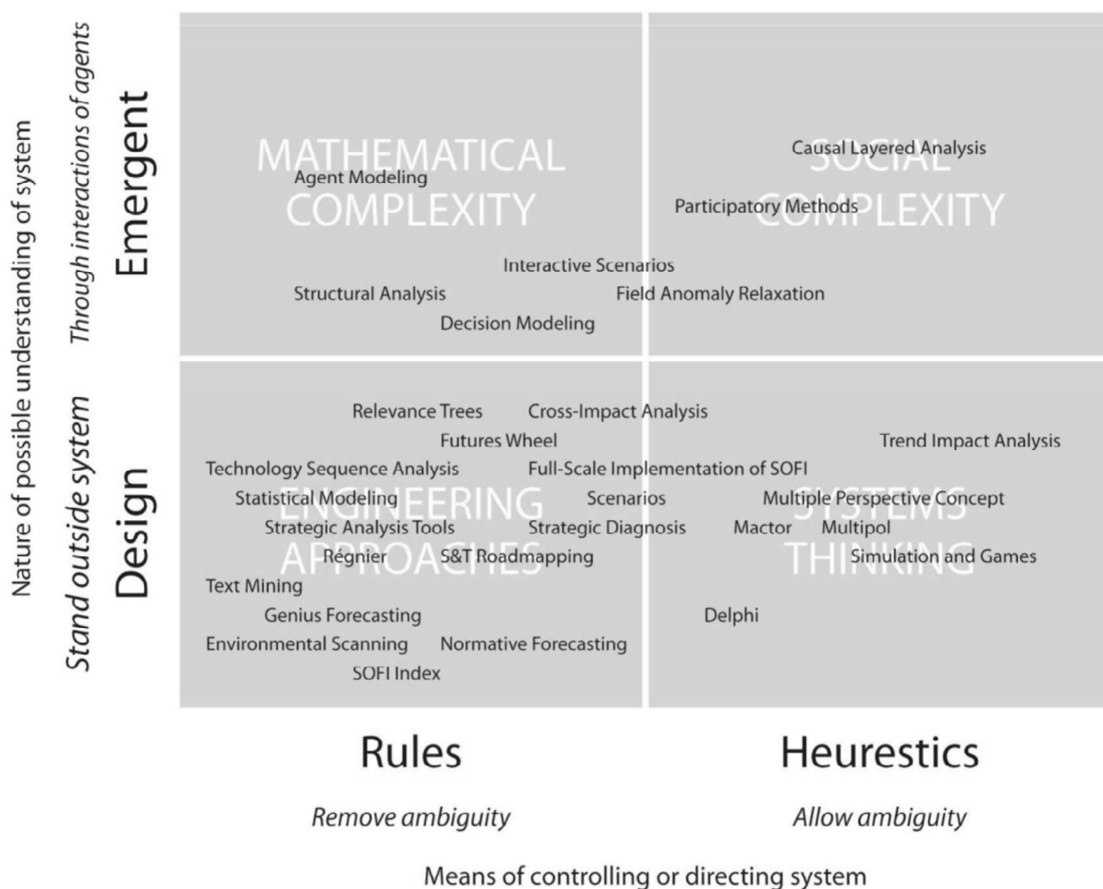


Figure 18: the Re-analysis of futures research methodology. From (Aaltonen & Sanders, 2006, p. 31)

The result shows that few methods are designed to maintain ambiguity and identify a future direction in a non-orderly environment. Only the social complexity methods have initial phases which are different from the final phases. "In other words, they begin an exercise that will finish in a place different from its point of origin" (Aaltonen & Sanders, 2006, p. 32); (Cilliers, 1998); (Juarrero, 1999); (Stacey, Griffin, & Shaw, 2000); (Shaw, 2002); (Barabási, 2002). Aaltonen then plotted a number of new methods (in capitals on the figure below) which aim at understanding the complexities, interdependencies, connections and

patterns of interaction and relationships between order and disorder from which self-organising change occurs. Such change can be tremendous when a new building block is discovered (e.g. LAN-based networks, increasingly powerful microchips, the internet, JAVA programming language) (Holland, 1995); (Bogner & Barr, 2000).

Can confuse simulation and foresight

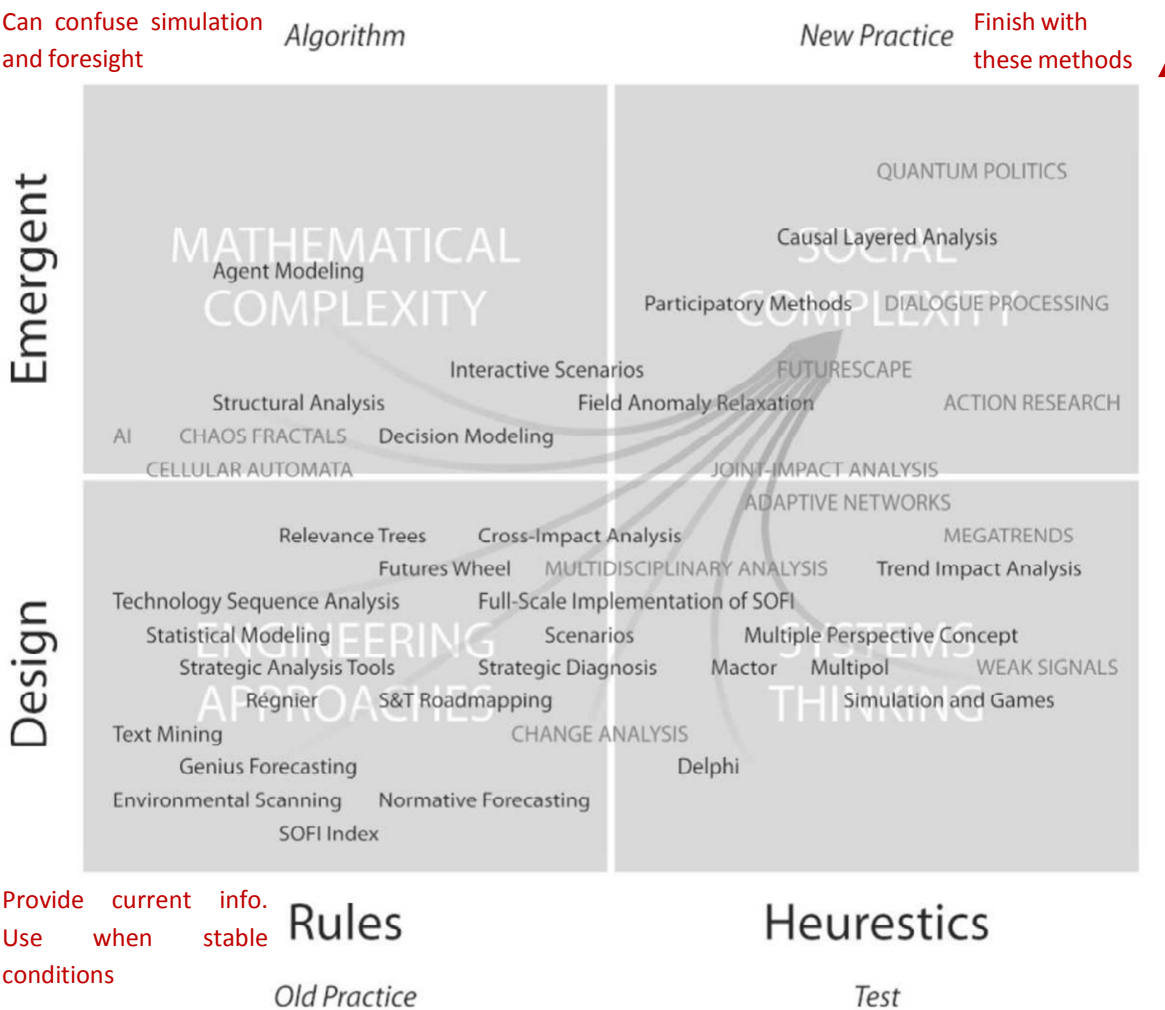


Figure 19: Futures Research Methodology with complex systems concept – tools map. Adapted from (Aaltonen & Sanders, 2006, p. 33)

Thus tools involved in foresight and strategic analysis need to foster non-linear thinking as strategists are dealing with the perking information which can assist in identifying weak signals (van Eijnatten, 2004a) and small events which will cause turbulence (Aaltonen & Sanders, 2006); scanning across whole systems and industries in order to discover emerging conditions and innovative opportunities (Sanders, 1998); (Aaltonen, 2007c); (Gupta & Anish, 2011). As long term predictions will be wrong, the most useful thing is to prepare systems that can discover threats and generate solutions to them spontaneously (Artigiani, 2005).

Geared to preserving an open future, the ethics of complexity suggest that we need not legislate for perfection and eternity but only for fair play and participation. If we are free to correct mistakes we can live with limited knowledge. (Artigiani, 2005, p. 602)

## The Effect of Virtuality

Virtual environments are increasingly seen as flexible, cost efficient, and able to adapt to rapid innovation and product development (Jackson, 1999) as they theoretically facilitate collaboration across geographical borders and time zones (Gibson & Cohen, 2003). Researchers such as Davis (2004) and Ziguers (2003) consider that virtual teams are well suited to modern, post-structuralist ideas of leadership and concentrate on the most suitable methods of role and task definition for virtual leaders. Post structuralism describes a growing importance of followership and follower identity for understanding leadership processes, emphasising the need for perspective leaders to make greater efforts to work effectively with increasingly heterogeneous and diverse staff members (Collinson, 2005) post structuralism intertwines leaders and followers identities and considers them to be mutually reinforcing and contextual.

. A high level of trust and commitment is seen as a key enabler for virtual success (Duarte & Snyder, 2001); (Jarvenpaa & Leidner, 1999); (Lähteenmäki, Saarinen, & Fischlmayr, 2007), and as noted in the social neuroscience literature review above, neural engagement through direct face to face interaction is critical in order to ensure the establishment of dynamic resonance, trust, empathy, faith and humour is set up (Barsade, 2002); (Levinas, 1985). Further, we have seen that an important aspect of commitment is the creation of new neural circuits that help to guide future behaviour (Carter, et al., 2000); (Loehr & Schwartz, 2003) through arousing hope (Groopman, 2004) and building synchronised mental models in the interacting parties through neurogenesis (Erikson, et al., 1998); (Boyatzis, 2006) which occurs within close physical proximity.

Work by Saarinen and Lähteenmäki (2008) suggests that virtuality has both a direct and a mediating or contextual effect on leadership behavioural requirements and success. Virtuality directly affects the acceptance of leadership behaviour (which is also affected bicultural expectations and task complexity), and it has an additional mediating effect in terms of increasing the significance of cultural differences in relation to task complexity. The literature has established that addressing a complex task or problem is greatly aided by the dynamic resonance which occurs during face to face contact, which and increases the ability to take in information and provide nimble, creative responses through local mood synchronisation (Goleman, Boyatzis, & McKee, 2001). This is absent in a virtual situation. Thus the building, leading and tasking of virtual structures would appear to require knowledge and insight that is not evident in organisations that see virtuality as perfect for innovative collaboration (especially cross cultural or cross specialist) and expect it to deliver the advantages of flexibility, cost efficiency, adaptability and cross-collaborative creativity. This is further hampered by then using a traditional leadership model as this is based on regular face to face interaction which is absent in the virtual situation. The need for leader relationship building, communication and interaction is captured in Saarinen and Lähteenmäki's (2008) table below as well as the problem of lack of face to face contact.

Table 2: Traditional / virtual organization. (Saarinen, Lainema, & Lähteenmäki, 2008)

TRADITIONAL	VIRTUAL
<b>STRUCTURE</b>	
Organized	Fluid & flexible
Long term goal oriented	Contingent, loosely-coupled
Physical presence	Telepresence
Physical premises	ICT
Face-to-face contact	Lack of face-to-face contact, dispersion
Fixed geographical location	Open and changing network
Homogeneous	Heterogeneous
<b>LEADERSHIP</b>	
Leader	Leadership
Power centered	Relationships, knots, linkages
Importance of authority	Importance of knowledge
Hierarchical structure	Intensity of relationships
Chain of command	Communication, interaction
<b>MEMBERSHIP</b>	
Subordination	Membership
Commitment to organization	Commitment to professional network and competence building
Relatively stable	Dynamic and changing
Role defined by terms of employment	Role based on contribution, knowledge, personality

Thus it would appear that designing, leading and tasking virtual organizations is much more complex, nuanced and problematic than most present organizational theory represents.

In this context it is interesting to note Malone and Laubacher's (1997) proposition that with the instant sharing of information through technological information channels, the dominant business culture of centralised decision making and bureaucracies could be replaced by elastic networks with unclear boundaries that may sometimes exist for no more than a day or two, with ever shifting coalitions that decide on their shape and form for particular projects, then disband. This is a different way to look at self-organisation and self-referencing, but it would appear from the literature search, theory building and empirical data in this thesis that such fluid and temporary organisations may not only face the same challenges as virtual organisations in general (Saarinen, Lainema, & Lähteenmäki, 2008), but the outcome of flourishing through a shared organisational mind and values set, and the building of connectivity, interdependence and trust might well remain elusive.

## Summary and Conclusion

As this study examines how leaders enable their organisations (as complex human systems) to adapt and succeed in complex environments, a comprehensive literature review was required. This has been cross disciplinary in nature and spans a number of fields including leadership, organisational dynamics, complexity, organisational cognition, systems intelligence and social neuroscience. As part of an abductive process over a number of years, the literature search goes beyond content and background building to become a major building block in theory development. It integrates a number of fields and creates new ways to look at the research literature and research findings.

The review has been presented in three major sections, the first of which introduced the notions of complexity as relevant to organisations as CAS; the second part presented current research findings on leader cognition and skills maturation in terms of exploring research question one on how leaders of adaptive organisations appear to think (and impact on others thinking); and the third part examined research pertaining to the building and steering of enabling structures and processes to create and lead an adaptive organisation, in terms of exploring research question two on what leaders of adaptive organisations do.

The complexity literature has moved past framing complexity as a technique or metaphor for understanding organisation's characteristics, to an agreement that organisations, and their people, are complex adaptive systems (CAS). Thus the leader cannot control but rather steers a system which learns, and is shaped by self-organisation, emergence, non-linearity and co-evolution. In order to create a resilient, adaptive capability the organisational structures should be built to enable diversity, ambiguity, interdependence, flux, dissipation and multiple equilibrium states, with linear and complicated aspects of operations existing in the complex system, as opposed to resistant structures which try to contain and control such emergent properties. Organisations as CAS are seen to sit at the edge of chaos, or far from equilibrium, which is a necessary state for change but which makes them unpredictable. This instability is furthered by the paradox of being pulled towards both stability and security, and instability and innovation, yet sustaining this border state ensures adaptability. This results in the dynamic of discontinuous change trends represented by structures such as the chaordic pattern of chaos and order both over time and across the organisation at any one time which grows holonically in complexity and coherence. Such systems sit within the nested time frames of panarchy, creating the pace layering of the healthy organisation operating at its own pace, within larger, stabilising, historical time frames, yet invigorated by fast, small cycles of innovation. Leaders steer such systems in the holonic context of being themselves complex adaptive systems.

With regard to how the leaders of adaptive organisations appear to think, the literature review has stressed the importance of a shared mental model of purpose and deeply held values as a guide for behaviour and for shaping emergent phenomena. It has detailed the reasons why a cognitively complex

leader is vital to adaption and sustainability because of their direct and indirect impact on individuals and the organisation as a whole. Specifically, the review highlights the significance of neural interaction, cognitive complexity, leader skill maturation, empathy, intuition and systems intelligence in the leaders' ability to create and lead an adaptive organisation, and has given supporting evidence of the high level of integration which each of these elements may have in producing the resultant behaviour and dominant logic approach of such a leader. Whilst these elements are supported by empirical evidence, examined in literature on an individual basis, this thesis attempts to show that they are strongly intertwined, and suggests ways in which they may have both a direct and indirect impact on each other and on the creation and leading or adaptive capability.

The literature review also collects together and combines a wide range of previously independent findings and theory in regard to the way in which many of these cognitive capabilities appear to increase within all of the people in the organisation, consistent with the concept of requisite complexity, increasing both individual and group level cognitive complexity and skills. This then allows for an adaptive capacity at all levels through a greater ability to understand and apply more complex emergent actions and solutions, and to cope with the (normal) anxiety and dissipation of a change process instead of exhibiting recursive behaviour. A vital part of coping with this anxiety is revealed to be the clear mental model and map laid down through neurogenesis which acts as a guide through the change process, and fosters trust. This can be closely linked with findings outlined regarding shared neural nets and the orgmind, resulting in a high degree of systems intelligence and the collective pragmatic optimism of 'flourishment' as a state of the truly adaptive organisation. The bifocal capability of leaders to balance control and emergence is noted, allowing them to operate within the visible system whilst managing the emotional system simultaneously through interaction and feedback.

This chapter has provided a comprehensive understanding of the building of an adaptive organisation through combining theoretical findings on many of the key elements of complexity including self-organisation, emergence, diversity, ambiguity, interdependence, flux, dissipation and discontinuous growth. It presents evidence of how to support and guide natural self-organisation rather than attempting to create static artificial constructs that require constant control through ever increasing artificial regulators, which are costly, time consuming, prone to failure and which block emergence and adaption, driving the organisation to the lowest level of potential. Instead the literature search has established consensus across various research areas on the need for minimal structures which allow for self-organisation, learning and improvisation, the use of expertise and judgement at all levels, with the concomitant distributed ability to make decisions, reflect and take action. It has also verified that adaptive structures balance stability with such dynamic capacity in order to allow for learning, expertise and knowledge to be generated and utilized, and for reflection to occur. This allows for attention to disconfirming information and the reinforcement of the process of dialogue and enquiry which ensures that adaptive tension is maintained. Such a state is critical to people embracing new concepts through growing new scripts and adopting new mental models. A rich picture has been painted of the structures

and processes which allow the leader to both channel and stimulate emergence dependent on the level of flux or stability in areas of the organisation, or on the organisation as a whole. The structures and processes gathered together in this literature search are shown to be vital for adaptive organisations. These include ensuring that resource allocation and flow increases network capability of all types including information, knowledge, coordination and cooperation, as all of these increase dynamic resonance and foster educated risk taking and multiple experimentation, enabling the emergence of progressive outcomes. The literature search examined those elements as a whole and attempted to show that this combination is especially important in a human system, which is influenced strongly by human choice and intentionality.

The literature search presents methods for dealing with unknown futures and the multiple scenarios of complex outcomes, highlighting the value of strategic innovation rather than planning, and the need for any long term planning activities to allow for spontaneity in approach, due to the potentially rapid rate of change which can occur in edge of chaos conditions. Consistent across many areas of complex strategy is the need for methods and systems that enhance sensitivity to initial conditions, identifying perking information, interaction and feedback which enables planners to read the environment, detect threats and quickly respond with local initiatives.

Concepts such as chaordic systems thinking, raplexity and systems intelligence were combined in the literature search in an effort to establish an appreciation of the interdependence and entanglement of the elements of cognition and neural connectivity, complexity and organisational dynamics.

The literature review in this chapter further confirms the need for empirical investigation into how such interdependence operates, and what the outcomes look like in terms of the building and leading of enabling structures and adaptive operational cultures in adaptive, resilient organisations. Chapter 4 reports the findings of field research which explores and elaborates on the nature and dynamic of this interdependence.

## Chapter 3 – Research Methodology

### Introduction

Chapter 2 provided both a contextual background and the integration of a number of fields of literature as building blocks for theory development. These fields include organisations as complex adaptive (human, chaotic) systems, the role of social and neural cognition in both leading and being a part of the organisation, and the building of an enabling environment for adaptivity, and indeed, flourishing to occur. (Hämäläinen & Saarinen, 2007). Chapter 3 will discuss the research methodology used in this thesis. The justification is presented for the research method which addresses the research objectives and questions outlined in chapter 1.

The research methodology that will be used in this research study is an abductive case study approach with the research design of systematic combining in order to both build and test theory, as well as building new knowledge. Triangulation of inquiry on the same constructs is carried out through both primary and secondary data sources, and the modified theory is further tested through a process of semi-structured interviews with two of the original case study members to focus on the critical test of a significant theory (Gross, Giacquinta, & Bernstein, 1971), leading to the substantive theory of emergent logic. The ongoing review of progress is set against and informed by an (ongoing) review of current literature.

The research design section sets out the process and flow of activity that rendered the data, as shown below in figure 1. Data collection methods are described, such as the London School of Economics integrated methodology for complexity research tools and process (Mittleton-Kelly, 2003b), as are the data analysis procedures. Reliability, validity and generalisability are addressed.



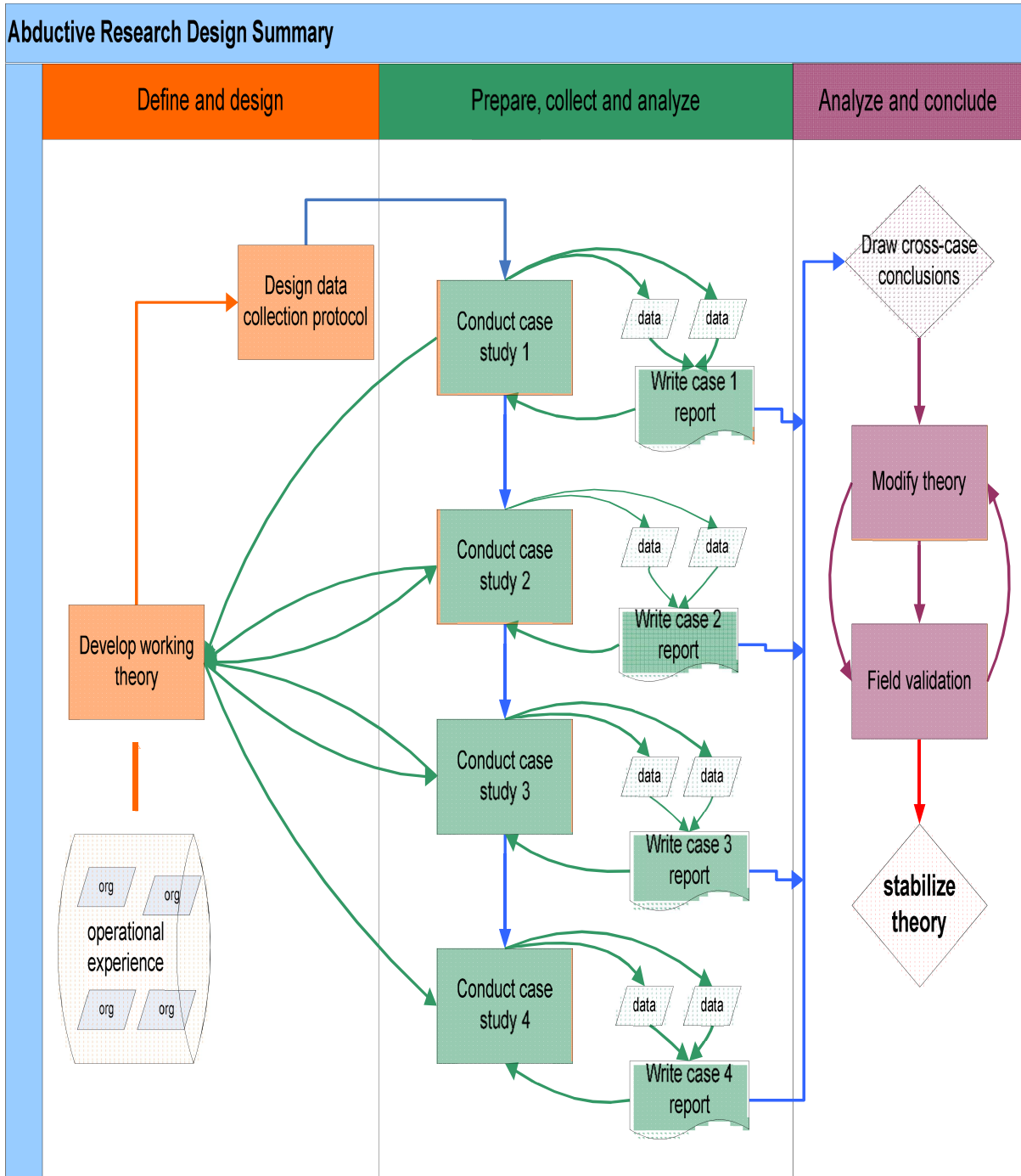


Figure 20: Abductive Research Design Summary

## Establishing the research approach

### Epistemology

Epistemology is about the origin, structure, methods and validity of knowledge (Runes, 1942). Patton (1990) sees epistemology as “how do we know what we know” regarding the possibilities and desirability for objectivity, subjectivity, causality, validity and generalisability (Patton, 1990, p. 134). In this section I

will outline the appropriate approach for researching complex adaptive human systems, and in particular the aspects of choosing the appropriate research approach to answer the research questions, dealing with complexity research methods; abductive case study methods and theory testing processes.

When deciding on the appropriate epistemology to frame the research, the research focus should be clear. The focus of this study is the creation and leading of adaptive organisations; the context is the leader's capability (cognitive and technical) and approach, and the effect this has on the organisation's ability to build resilience and be adaptive.

The research objective is to add to theoretical knowledge and improve researchers' understanding of what happens in the field, and to build an empirical and theoretical base from which to assist leaders to create and maintain adaptability and 'flourishment' (Hämäläinen & Saarinen, 2007); Complexity Theory (CT) is an underlying theoretical perspective of this study in terms of organisations and people as complex systems, and cognitive complexity at individual and organisational level. CT requires new methodologies that capture the range of dynamic relationships that underpin its various theories. For areas that span social science fields, there is an emphasis on the study of process effects through a longitudinal approach and it includes a broad array of perspectives and methodologies including simulations or computer modelling, field studies and naturalistic approaches such as comparative case studies, experimental simulations and verbal theory (Yin, 1981) (2003).

Various writers note that while simulation is of assistance in understanding the dynamics of complex systems, there is a great need to use other models, in particular comparative case studies as the virtual world needs to be continuously informed by these other methods (House, Javidan, Hanges, & Dorfman, 2002); (Hofer & Kerr, 2000). Law (2004) argues for a complexity approach to understanding processes in the real world. He contends that:

Methods, their rules and even more methods' practices, not only describe but also help to produce the reality that they understand...thus imposing an arbitrary order via one theoretical model or other imposes limitations and restrictions that may constrain the world to behave in a particular way the model suggests (Law, 2004, p. 5)

Drucker (2001) also argues for a complexity approach as social disciplines such as management deal not with the behaviour of objects as in a natural science, but instead with the behaviour of people and human institutions. Thus there are no natural, fixed laws and instead one should choose to interpret "through the lens of complexity the multifaceted societal and cultural interactions that propagate through a multiplicity of human feedback and feedforward networks", (Federman, 2010, p. 41)

As stated in chapter 1, the dynamic relationships already existent in complex systems, combined with the cross disciplinary nature of the thesis, are sufficient justification for a qualitative research methodology

using a comparative case study approach ((House, Javidan, Hanges, & Dorfman, 2002). In particular, the existing need for empirical observation of the theory around complex system leadership is best met faced with in depth long term case study data so as to make valid abstractions and generalisations, generate new concepts and reveal contingencies that have not yet been investigated (Yin, 2003). This study is particularly rich as the case studies run over years, and it presents not only examples of leaders who built adaptive capability, but also contrasts the behaviour in terms of a leader who's capability was inconsistent and domain specific, and another who was markedly linear (non-emergent) in approach.

Case studies capture the dynamics of the studied phenomenon and provide a multidimensional view of the situation in a specific context (Järvensivu & Törnroos, 2010). They involve multiple perspectives consisting of differing ontological, epistemological and methodological views which Lincoln and Guba (2000) place on a continuum from realism to relativism, as in Figure 21 below.

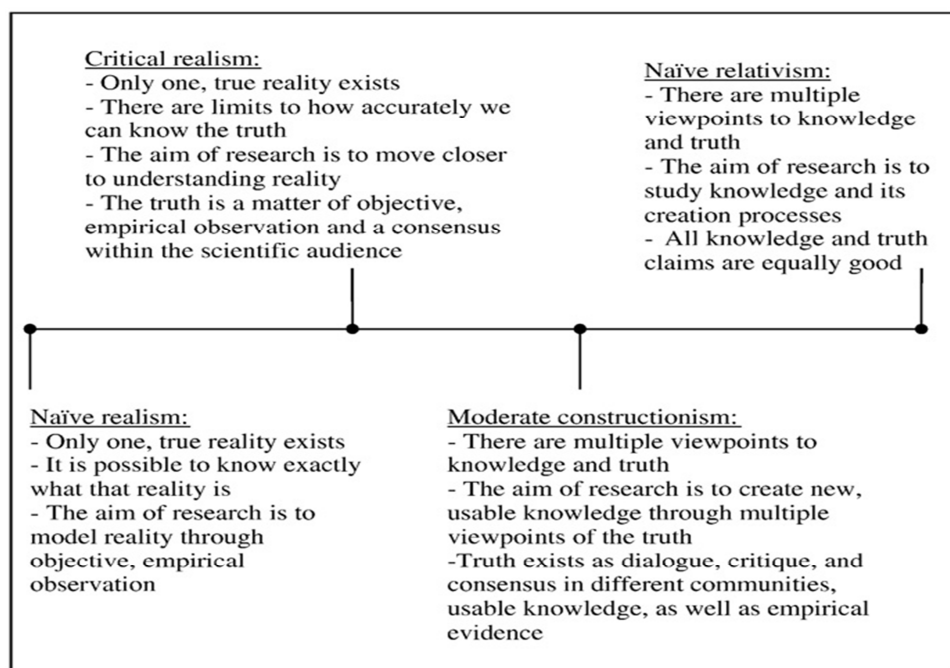


Figure 21: Continuum of ontological and epistemological worldviews. From (Järvensivu & Törnroos, 2010), originally (Lincoln & Guba, 2000); (Easton, 2002).

Roy Bhaskar is the sociological philosopher who developed the model of critical realism. The underlying principles of his work suggest that reality exists independently of knowledge, that all knowledge is socially constructed and there are rational grounds for preferring some beliefs over others. Bhaskar looks at reality on three levels: the empirical level (the level of experiences); the actual level (the level of events and states of affairs) and the real level (the level of underlying structures, causal laws, and “generative mechanisms”), with true knowledge being knowledge of this underlying level. Realism says that there are features of the world that are as they are independently of how we think about them,

Radical constructionists, however, see no such features. Constructionism frames reality as not 'given' but socially constructed, and this becomes a central part of their study – i.e. how reality is socially constructed. Social constructionists such as Berger and Luckmann, however, differentiate between reality in general and social reality which is what they consider to be socially constructed. They held that:

Common-sense 'knowledge' rather than 'ideas' must be the central focus for the sociology of knowledge. It is precisely this 'knowledge' that constitutes the fabric of meanings without which no society could exist. The sociology of knowledge, therefore, must concern itself with the social construction of reality. (Berger & Luckmann, 1966).

Gergen is one of the more modern constructionists, and considers that knowledge is never abstract, objective and absolute, but always concrete; that it is situated and tied to human practice, and that there is no Truth, only local truths. Gergen strongly advocates qualitative methods, which he believes have often been marginalized in favour of quantitative methods. He emphasizes the importance of a reflexive dialogue to set in motion hardened taken-for-granted assumptions which have emerged through collective processes of knowledge.

Latour (the inventor of actor network theory, or ANT), considers that there are problems with the term and concept of 'social constructionism'. For him 'social' does not mean that the constructions are made by, or consist of, something but that the construction process itself is social, with several actants participating and co-constructing. Also, construction includes the participation of several, even non-human, actants, and is real.

Elder-Vass, in his 2012 book "The Reality of Social Construction" presents the idea that there is moderate (social) constructionists and realists align on some important perspectives that radical constructionists do not – that realists divide the world into that which depends on how we think about it and that which does not, and that for them and for moderate constructionists only the former can be socially constructed and that latter cannot, whereas radical constructionists claim everything depends on the ways in which we think about it. He argues for a socially constructed realism, and considers that theorists such as Roy Bhaskar challenges constructionists such as Shotter who say that realism and social constructionism is incompatible, pointing out that "Bhaskar's work on concept dependence of social structure makes it eminently clear that critical realism implies some kind of social constructionism" (Elder-Vass, 2012, p. 7). Both stress the importance of dialogue, be it in different ways.

Järvensivu & Törnroos (2010) also state that over the years there has been a movement away from the supremacy of either realism or relativism, and consider that now most researchers argue in favour of ontological, epistemological and methodological pluralism (Kavanagh, 1994); (Kwan & Tsang, 2001). They consider that critical realism is a well accepted and powerful perspective for theory generation (Yin, 2003) and that moderate constructionism is "epistemologically and methodologically close to critical

realism, but ...has the power to take better into account the multiple constructed, community-bounded realities that all case studies inevitably involve” (Järvensivu & Törnroos, 2010, p. 100). They further argue that Longino sees scientific knowledge as partly the product of social negotiation, and that:

Moderate constructionism is similar to Longino's (2002) idea of what constitutes scientific knowledge. She bridges the dichotomy between a rational and a social epistemology of knowledge and advocates a middle-ground approach that acknowledges both the rational and social aspects of knowledge” (Järvensivu & Törnroos, 2010, p. 101).

Järvensivu & Törnroos consider that critical realism and moderate constructionism both acknowledge that research should proceed towards finding “local, community-bounded, interacting forms of truth that are created and validated through dialogue in different communities”. Figure 22 (below) shows how the realism to relativism span is positioned relative to the ontological and epistemological nature of each, and the overlap between critical realism and moderate constructionism.

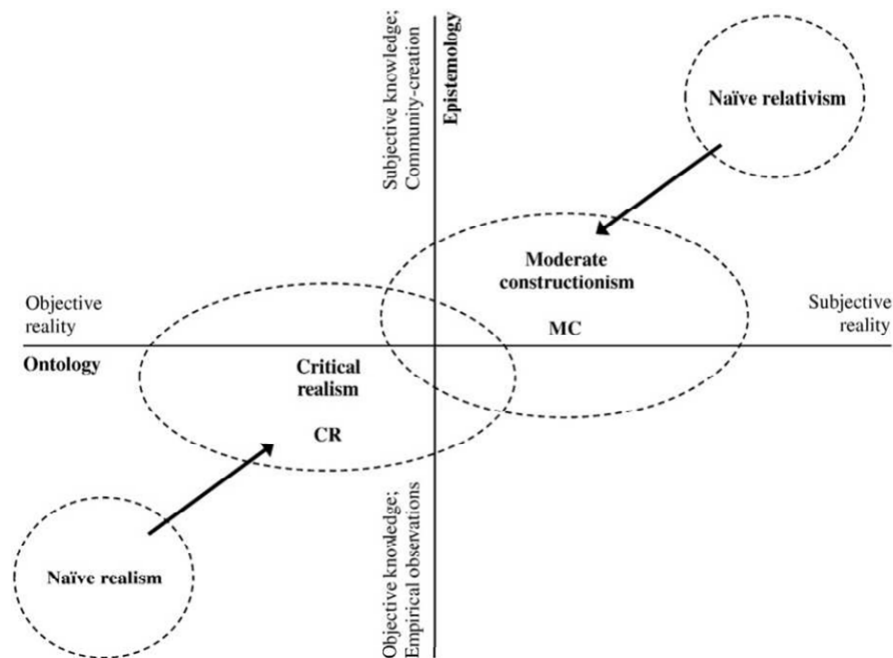


Figure 22: Ontological and epistemological dimensions of realism, CR, MC, and relativism (Järvensivu & Törnroos, 2010, p. 102)

They argue that both critical realism and moderate constructionism follow the logic of abduction rather than induction or deduction, and this method is especially suitable for business network research and case study analysis (Dubois & Gadde, 2002).

## Abductive approach

The objective of a qualitative method is to explore and understand a phenomenon, explore the mechanisms behind it and generate concepts and hypotheses about it (Davidsson, Achtenhagen, & Naldi, 2005). Due to the heterogeneity of the phenomenon and broad range of disciplines that are relevant to this area, including aspects of complexity theory, systems theory, organisational theory, cognitive theory, and the more recent area of social neuroscience, case study techniques are one of the most suitable for use. They allow for the understanding, discovery and observation of such heterogeneous phenomenon through in-depth information gathering so as to make valid abstractions and generalisations, generate new concepts and reveal contingencies that have not yet been investigated (Davidsson, Achtenhagen, & Naldi, 2005); (Yin, 2003).

Järvensivu & Törnroos (2010) consider that abduction is considered a suitable research process for both critical realism and moderate constructivism, and describe it as;

An approach to knowledge production that occupies the middle ground between induction and deduction (Peirce, 1903; Kirkeby, 1990; Coffey & Atkinson, 1996). Unlike induction, abduction accepts existing theory, which might improve the theoretical strength of case analysis. Abduction also allows for a less theory-driven research process than deduction, thereby enabling data-driven theory generation (Järvensivu & Törnroos, 2010, p. 102)

Abduction allows for assessment of prior and original theories and the generation of new knowledge through constant dialogue between theoretical conceptualisation and empirical investigation in a real life context. An abductive case study approach is ideal for the case study profile of this thesis, and the time frame and opportunity afforded to this body of research allowed for a research design of systematic combining, which is an abductive approach to case research. In their so titled article, Dubois and Gadde (2002) explain that with an abductive approach:

The original framework is successively modified, partly as a result of unanticipated empirical findings, but also of theoretical insights gained during the process. This approach creates fruitful cross-fertilization where new combinations are developed through a mixture of established theoretical models and new concepts derived from the confrontation with reality (Dubois & Gadde, 2002, p. 559)

As can be seen in Figure 23 below, the four areas of theory, framework, the empirical world and the specific case is systematically combined through a process of regular matching, direction and redirection. Dubois and Gadde point out that an important consequence of systematic combining is that the case evolving during a study be regarded as a tool as well as a product, and that theory is used differently in this situation as such studies are theory generating studies which are different from theory confirmation

studies. The same approach has been taken to the literature review which fills not only the role of providing a context for the empirical case study research, but has evolved abductively over time to become a building block in theory development through combining previously independent areas of research.

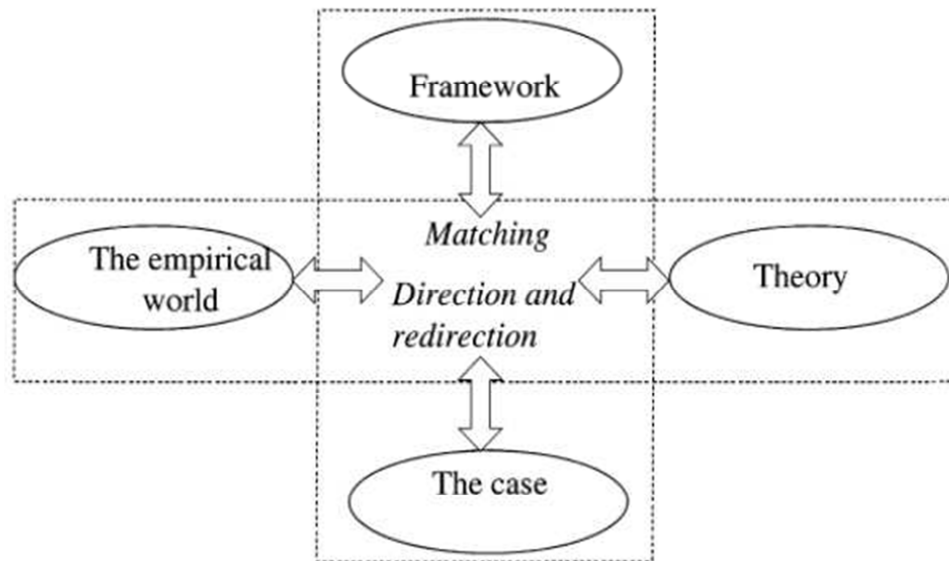


Figure 23: Systematic combining (Dubois & Gadde, 2002, p. 555)

This is an important distinction as part of the researcher's objective is to discover new things (variables and relationships) and as such though there is a need to have some background in the technical literature (Strauss & Corbin, 1990), it is impossible to identify all of the (potentially) relevant literature in an emergent process "since the empirical fieldwork parallels the theoretical conceptualization. Hence, the 'need' for theory is created in the process", (Dubois & Gadde, 2002, p. 559). It is suggested that in fact it would be potentially negative to the desired process of discovery to try to review all relevant literature beforehand.

The abductive approach of systematic combining is seen to address three case study credibility issues. The first is that of case studies trying to rely on statistical inference rather than analytical inference. Sampling becomes critical and systematic combining allows an appropriate match between theory and reality as it is a continuous process rather than a distinct stage of research. Thus sampling and analysis become "overlapping and interwoven tasks with mutual impact", (Brito, 1999, p. 99).

The second issue listed by Dubois and Gadde is the 'quasi-deductive theory testing' that can happen in case studies, a problem in complex structures as relationships and patterns cannot be tested. They attest that in deep probing case studies, theory generation and confirmation are inseparable, and this can add to their logical coherence (Pfeffer, 1982), which is an important criterion for quality in case research as a foundation for analytical generalization (Dubois & Gadde, 2002). The third cited issue with case

research is that in order not to try to be all things to all people, “good theory should be parsimonious” (Pfeffer, 1982). The necessary selectivity for this is a natural part of systematic combining as the research issue is honed and redefined iteratively.

An overarching advantage of this methodology is the learning it offers as an emergent process, allowing for an interplay between search and discovery as each new learning is fed back into the prevailing framework and guides the new direction (Dubois & Gadde, 2002).

Järvensivu & Törnroos (2010) further differentiate by breaking the research process up into different phases which contain abductive differences. In some phases,

The researcher's logic may follow abduction in a pure sense; in other stages, the reasoning may lean more toward deduction or induction. The whole process, however, can be identified as being abductive in general (Järvensivu & Törnroos, 2010, p. 102)

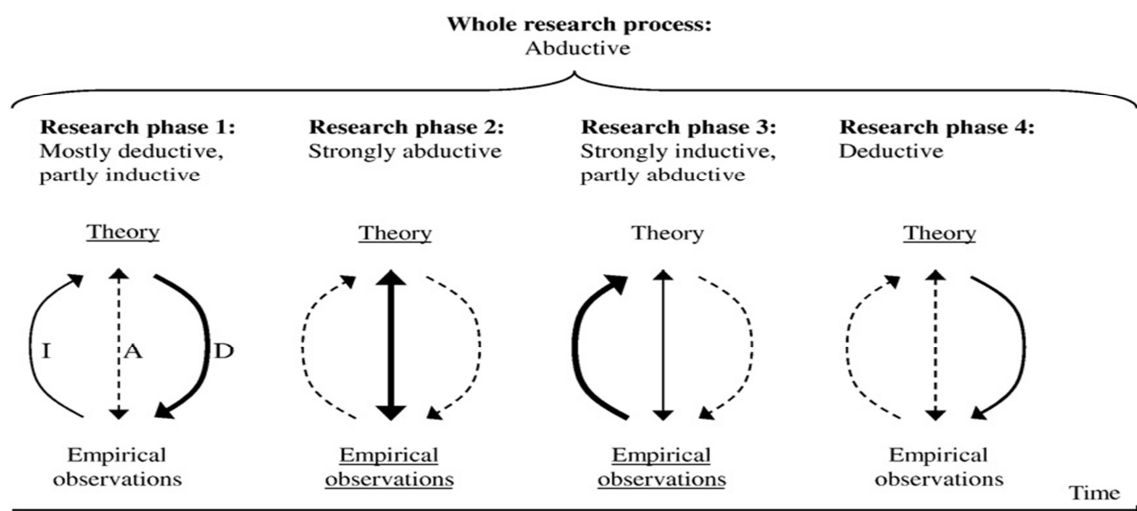


Figure 24: Abductive research process as a mix of inductive, abductive, and deductive sub-processes (illustrative example, different phases may apply to different studies). From (Järvensivu & Törnroos, 2010, p. 103)

The situation shifts from phase 1 where there is only a preliminary idea of what to study, through a process of theoretical thinking being influenced by the case study, which in turn influenced empirical investigation and further literature research, to phase 3 of collecting and analysing in depth empirical data and finally phase 4 which assesses the validity and analytical generalisability of the results, deduced from generated theory.



## The Strategy for relevant Field Research

Miller, Dingwall and Murphy (2004) state that “the complex and contextual nature of all human activity is a central issue for organisational research”, (Miller, Dingwall, & Murphy, 2004, p. 332). Quantitative researchers try to minimize or eliminate contextual factors as potentially threatening contaminants by “context stripping” (Mishler, 1979). In qualitative research, however, such factors are stressed, not stripped, as shown in Bosk’s (1979) study of surgeons where the credibility of his recommendations is based on ethnographic knowledge of complex organisational settings and practices.

Miller, Dingwall and Murphy (2004) point out that qualitative research can clarify social, cultural and structural contexts associated with organisational problems and dilemmas. They note that social science researchers are governed by fair dealing - not judging but dispassionately representing contributions as well as “best practices”. The aspect of observing best practice is interesting as it highlights the researcher’s vantage point. This can range from cases of observing solutions often present but hidden by dominant problematic patterns (Brack, Brack, & Orr, 1996) through to watching the application of best practices which are unofficially discouraged or unrecognized but ‘done anyway’ by individuals or work groups for the good of the organisation.

Stacey, Griffin and Shaw (2000) consider that this can be explained by the shift from formative to transformative teleology in a human system which allows people to do a good job despite the organisation.

Sacks (1992) points out that social activities are observable, and if they can be clearly seen and written down this is a valid observational study with no tape recorder. [Indeed, though unsupported formal research, it could be argued that the level of trust shown by interviewees and staff engaged in ongoing discussions during this thesis case studies was partly due to the lack of a recording device, or the ‘physical barrier’ of a laptop screen].

Conversational analysis (CA) (Pommerantz & Fehr, 1997) allows the researcher the ability to get around the label of ‘abstract formulation’ by the use of observation and scrutiny of details concerning the actual talk and interaction. A high level of rigour and full, accurate notes of all of the conversations allows this (such data is central to this study).

Have (2007) talks of addressing anecdotalism by comprehensive data treatment, which does not rely on a few people supplying evidence of contentions, but instead is every bit as valid as statistical correlation. Mehan (1979) concurs, stating that the end product is an integrated, precise model that comprehensively describes a specific phenomenon instead of a simple correlation statement about antecedent and consequent conditions.

## Case study methodology

Yin (2003), (1981) asserts that case studies as a specific strategy have a distinct advantage when a how or why question is being asked about a contemporary set of events over which the investigator has little or no control. He defines a research strategy of case studies to be an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. He further points out that case studies are suited to generalizing findings to theory. The case study can become the basis for exploring other case studies, as in Jacobs' (1961) "Death and life of great American cities" which created controversy in the profession, and was in essence a theory that was a vehicle for examining other cases.

Lyons (2009) states that case studies are necessary as they provide a general stock of data as well as directly transferable insights, offering comparable data for others to analyse. His work shows the depth and breadth of information which case studies can provide, and he points out that if there are multiple (and longitudinal) case studies carried out over time "they can then also contribute general conclusions and even draw up and/or test hypotheses". Multiple case studies using the same interview structure form a research strategy for Lacity and Wilcocks (1998), consisting of data collection, analysis and interpretation using 'qualitative' coding techniques, and Cavaye (1996) considers case study methodology may be applied to research towards the description, discovery and testing of theory, and can use qualitative and quantitative data.

Even single case studies can be very powerful in focusing on the critical test of a significant theory. Gross et al. (1971) focused on a single school in their book implementing organisational innovations and clearly showed that implementation was the issue - this is seen as a watershed in innovation theory and changed the direction of research. However, most researchers in this area agree that an adequate sample size for qualitative studies that allows for a valid research result is 4 to 12 case studies (Eisenhardt, 1989).

The situation can be summarised as follows:

Case study methodology has become a rigorous and well accepted methodology which has ....evolved from its roots in the social sciences to become a legitimate methodology. Case study, as a qualitative research design, has been used in the social and applied sciences... to study phenomena in their natural contexts, and is a powerful adjunct for exploring particular aspects of phenomena under investigation in the context of a larger or mixed-methods study. Case study methodology is appropriate for describing, exploring and understanding a phenomenon in its real life context and is a comprehensive research approach that provides opportunities for in-depth study of meaningful characteristics of real-life events as one aspect of a larger research study. (Anthony & Jack, 2009, p. 1126)

The confusion that remains is not around the legitimacy of the methodology but the terminology - including case study as a research design, research method, research strategy, data collection method and teaching technique. Lyons (2009) has examined research method typology, contributions, purpose and characteristics and considers that over the last ten years case study research has matured and the methodology around it has become more robust, with an appreciation of the value of long term social sciences research.

This thesis contains longitudinal studies working closely and collaboratively with the leader and the organisation over time which allows both monitoring and reflection of the iterative, emergent process. Nicolis & Prigogine (1989) did this in their work of studying the behaviour of all complex systems to understand their deeper, essential nature. Lacity and Wilcocks (1998) successfully used a research strategy with multiple case studies and an interview structure to that employed in this study, and Cavaye (1996) notes that “case study methodology may be applied to research towards the description, discovery and testing of theory; may involve qualitative and quantitative data and is a versatile research strategy”.

## Integrated Methodology for Complexity Research

Mitleton-Kelly and the London School of Economics (LSE) Complexity Research Group have been working in organisations since 2003 to design or improve organisations using a complexity approach, and they gauge the ability of a leader to ‘embody the principles of complexity and use them intuitively’ largely by observational (qualitative) analysis of how well that leader creates an enabling environment able to co-evolve.

In particular, the LSE has developed an “Integrated Methodology for Complexity Research” which includes both quantitative and qualitative tools and methods using a ‘collaborative action research’ approach, working closely with business partners in a ‘co-creative’ manner over time (Mitleton-Kelly, 2003b). Thus it is action research in the sense that it influences their business partner and is not a one way learning experience as “collaboration and action research are necessarily interdependent and one cannot take place in the absence of the other”. Mitleton-Kelly (2003b, p. 2) describes a quality of the methodology as a “natural experiment – one where the organisation itself wants to change, it cannot be ‘controlled’, and is ongoing. The range of tools provides complimentary information to build up a rich map and triangulate the data. The methodology used in the longitudinal case study phase of my investigation closely follows this format.

The methodology utilized by the LSE Complexity Research Group (Mitleton-Kelly, 2003b) has a multi-layered approach that utilizes a number of tools. The methodology includes:

- Semi-structured interviews to provide a narrative analysis

- Researcher analysis of findings to gain insights into emerging patterns and connections
- Attendance at both formal and informal meetings and events
- The running of a 'reflect –back' workshop to present initial findings to the organisation and 'provide an informed starting point for the identification of social, cultural and technical issues'
- Work with senior managers and the CEO on complexity theory application
- Examination of cognitive preferences of individuals and teams and pictorial capture of themes, dilemmas and underlying assumptions by a resident artist

These qualitative tools and methods are augmented by the quantitative tools of:

- Agent-based models
- "Netmap" which maps each email exchange

## Research design

Research design is the process that links research questions, empirical data and research conclusions (Blaikie, 2000); (Yin, 2003). Research design is "a logical model of proof that allows the researcher to draw inferences concerning causal relationships among variables under investigation", (Nachmias & Nachmias, 1992, p. 78). It ensures that the evidence addresses the research questions, and in particular organisational design requires the capability to justify what is done as reasonable and to provide supporting evidence with an approach that begins with identifying the research problem and then developing aims, objectives and suitable questions towards solving it (Miles & Huberman, 2002).

The Abductive Research Design Summary Diagram below is adapted from Yin's case study method (Yin, 2003, p. 50), with the inclusion of systematic combining by way of a series of abductive loops in the case study section, and additional field validation in the final phase. It attempts to outline in one page the steps that the research took over the stages of define and design; prepare, collect and analyse; further analyse and redesign. This research led to the substantive theory presented.

# Stages of data collection

## Stage 1 - Define and design

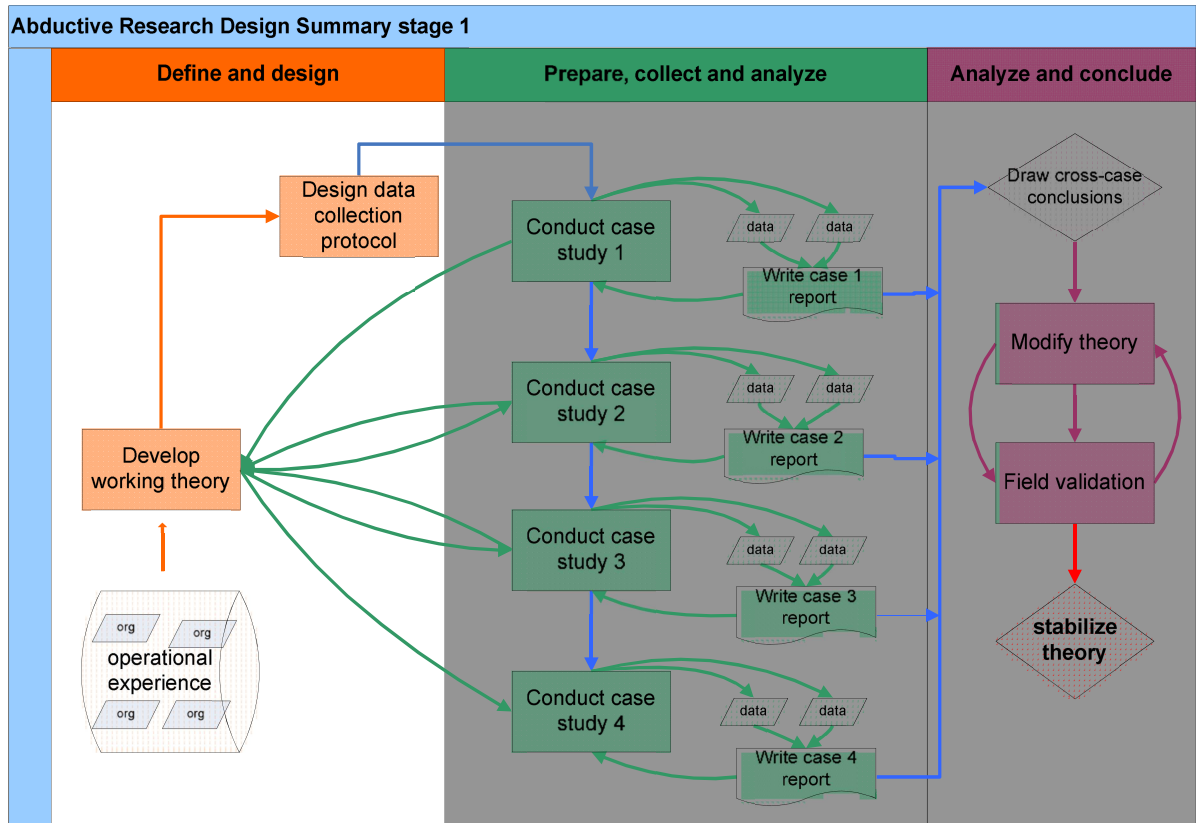


Figure 25: Define and Design stage

The context for the empirical research arose from many years working in senior positions in a number of companies and subsequently in consulting or contract executive engagements to shape the organisation to fit its purpose. Over time consistencies were observed regarding the capability to build a 'fit for purpose' operation, and to increase the potential for the organisation to adapt and flourish through change. This led to initial theory building, and the emergent approach that was developed became the basis for the thesis' case studies and abductive literature search. The protocol for data collection was designed.

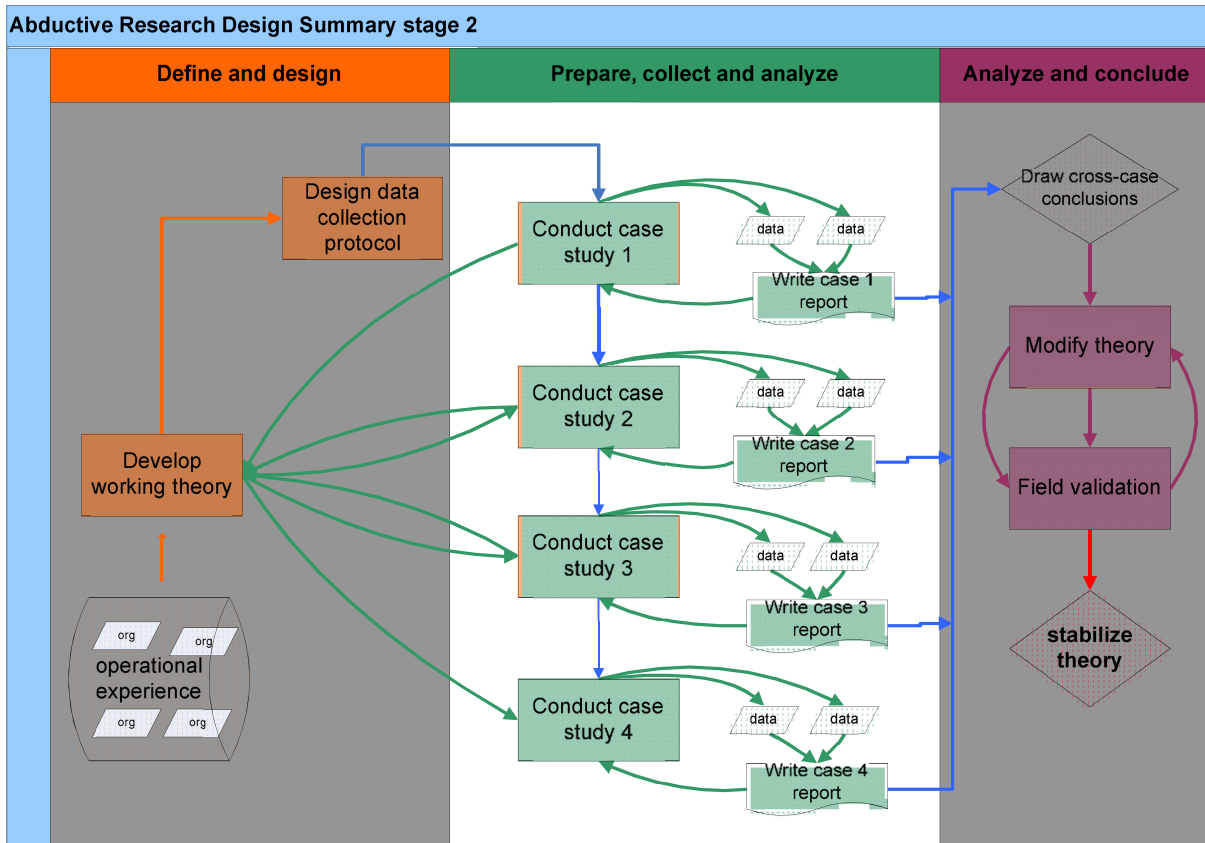


Figure 26: Prepare, collect and analyse stage

The case studies used systematic combining which created, by abductive means, empirical findings and theoretical insights which led to fruitful cross fertilization (Dubois & Gadde, 2002). This further informed the cross-disciplinary literature review and the research questions required in follow up field work to validate conclusions and to focus on the critical test of (the) significant theory (Gross, Giacuinta, & Bernstein, 1971).

This stage consisted of a multi-method study including four consecutive embedded case studies using the consistent collection and analysis of data. It included the use of an open-ended, semi-formal but repeatable questionnaire based interviews with the majority of staff, repeated at regular intervals of between 6 and 12 months; ongoing work with the CEO and executive on organisational change and complexity; weekly management meetings; workshops; direct observations and examination of archival records, documentation and artefacts.

## Case study descriptions

### Case study organisations

The four organisations were similar in size and all underwent a large scale change process over a one to three year period. They ranged in stage of maturation and industry type, and included a professional division of an international pharmaceutical company, a primary technical service provider to a federal research and development body, the national operational arm of a global, private firm in the Defence industry and a key division of one of the country's largest international companies.

All of the organisations were (in complexity terms) at the far from equilibrium or bifurcation state that major change involves, and as such the people were paradoxically anxious about the future and seeking the comfort of recursion, yet at the same time were at their most innovative and motivated. Two of the leaders both allowed and encouraged a (bounded) emergent process to occur and reached an adaptive and resilient outcome in a dynamic environment. The third leader was inconsistent in his approach to leading organisational change, and the fourth leader (interestingly the youngest, chosen for his entrepreneurial success) took a linear, structured and controlled approach which was empirically found to block emergence and stop adaptability.

Funding for the research and implementation activities came from the organisations themselves.

### Organization 1

Organisation 1 was a key division of an international pharmaceutical company, with approximately 120 staff. It had recently undergone significant organisational change to try and improve performance, but the associated restructure did not suit the business requirements and caused further disruption to the members and an attendant performance loss. As there was now a great deal of pressure to improve productivity, this organisation was, in complexity terms, 'far from equilibrium' and had been positioned squarely within the 'space of possibility' or 'bifurcation' condition.

As such the staff were both anxious about the future and at their most innovative. The anxiety was both the normal reaction to change and a response to potential shutdown if things did not improve markedly within a year. The Vice President of the company, who directly oversaw this division, fully embraced an emergent change process which leveraged self-organisation and experimentation. New forms of organisational structure, infrastructure and policies were designed, and corporate practices changed or discarded.

## Organization 2

Organisation 2 was a primary technical service provider to a national research and development body. It also had around 120 professional staff and the brief became a total restructure to that of a flexible and dynamic service provider that would reposition it to better suit its purpose. This entailed change at governance, management and operational level.

A new MD had just taken over, inheriting (and greatly changing) the process while at the same time having to consolidate a new management group and initiate said major change with no established relationship or credibility. In addition she was not a technical expert in the area. The MD showed what appeared to be a natural understanding of an organisation as a CAS with the characteristics of emergence and adaptation, and put in place a 2 – 3 year timeline to complete the transformation and fit such an adaptive process into a hierarchical corporate environment.

## Organization 3

Organisation 3 was the national operational arm of a large, global, private firm in the Defence industry. Its 117 staff consisted mainly of engineers, ex-army vehicle specialists and tradesmen. There was non-alignment between the bureaucratic global parent company and the large federal body which was this organisation's single customer. A different business model was needed to be able to react flexibly and nimbly to both the unpredictable scheduling requirements of active warfare and a lack of planning logistics capability in terms of the customer. The task was made more complex soon after the change process began when the organisation tendered for a project which required a highly detailed 25 year capability plan. This presented major challenges for the adoption of an emergent process. The MD was a systems thinker who relied on his strong political networks and former success during a long career. His style was committed but paternalistic and inconsistent, with strong domain specific knowledge.

## Organisation 4

Organisation 4 was the most successful division of one of the country's largest public companies which was in a state of hyper-growth and had reached the 'jump stage' of moving to a new form and size. The MD was a young, capable expert in his field who had been successful in his previous senior roles and now identified the need for change. Staff goodwill and trust was high and some restructuring activity had already begun. The MD was not comfortable with emergence, ambiguity or inclusion, and his approach was markedly linear.



## Collection of case study data

Each of my case studies was a representative, 'revelatory' case as defined by Yin (1994), (Yin R. K., 2003) built around two or more different points in time with conditions changing over time and reflecting the presumed stages at which the changes should reveal themselves. Each was an embedded case study with subunits of analysis (a more complex design than a holistic case study). The subunits offered significant opportunities for extensive analysis and enhanced the insights into the single cases. Attention was also paid to the larger more holistic aspects of the case through the abductive process of systematic combining to allow for an 'interplay between search and discovery' as each new learning is fed back into the prevailing framework and guides the new direction (Dubois & Gadde, 2002).

Yin points out that multiple case studies are regarded as more robust but normally there is not the time or resources to replicate a longitudinal case study. There are four longitudinal case studies in this thesis, and they follow the required validity requirement of being set up as replicated multiple experiments, with predictions regarding the results dependent on the CEO's ability to create and lead an adaptive organisation. The study was conducted over a number of years, totalling 14 years in all when the additional field validation is included, as can be seen by the timeline shown in Figure 27 below:

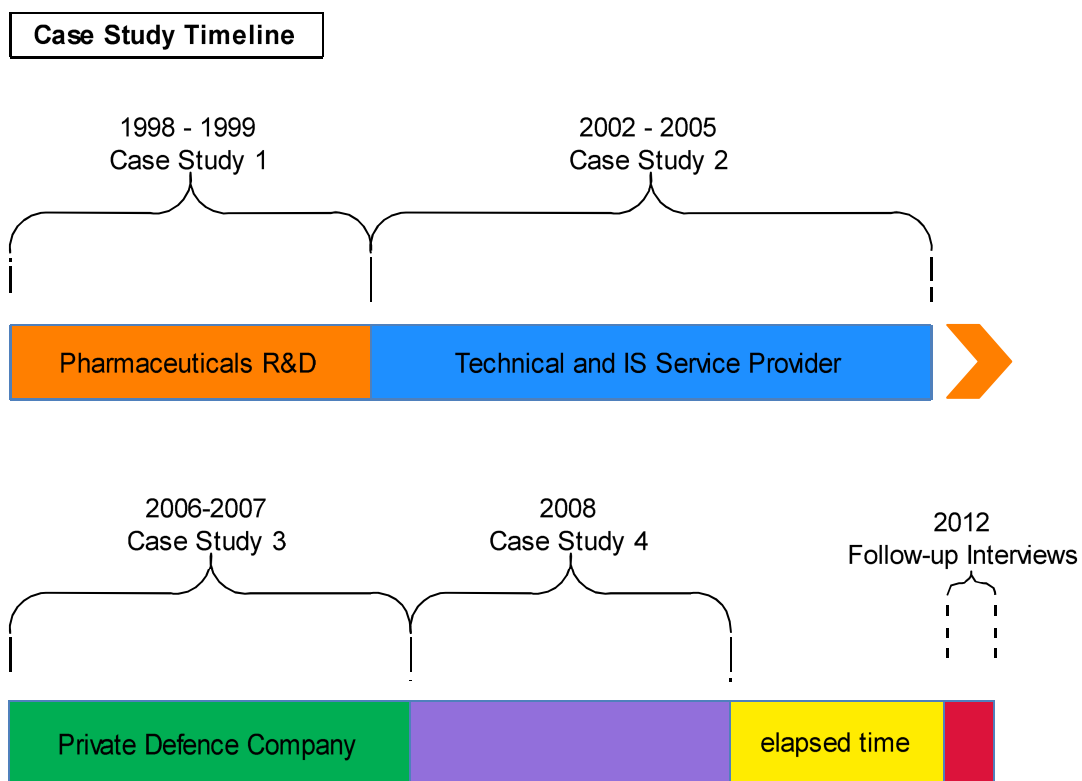


Figure 27: Case Study Timeline

As can be seen by the timeline above, the case studies ranged over ten years, and then in 2012 there was follow up with the two 'adaptive' CEOs. The other two companies were also followed up briefly - organisation 3 moved the MD out and put another one in within a year of the study, and organisation 4 continued to drop in performance and was taken over, also within one year of the study. The case studies ranged in time over 15 years in all.

The studies follow a protocol in line with that described by Yin (2003) for maximum reliability:

- Overview of the project (objectives and auspices, case study issues, relevant readings about the topic being investigated)
- Field procedures (presentation of credentials, access to the case study sites, general sources of info, procedural reminders)
- Specific case study questions the investigator must keep in mind, templates for specific arrays of data, the potential sources of information for answering each question
- A guide for the case study report (outline, format for the data, use and presentation of other documentation, bibliographical info)

The resultant data includes questions asked at all five levels of design:

- Questions asked of specific interviewees
- Questions asked of the individual case
- Questions asked of the pattern of findings across multiple cases
- Questions asked of the entire study (calling on information beyond the case study evidence including review of current theoretical literature)
- Normative questions about policy recommendations and conclusions, so going beyond the narrow scope of the study

## Collection of evidence

As the case studies contributing to this thesis are substantial in both the length of time and scope of work carried out, the description of data collection will not be at the level of activity such as individual interviews (except for the follow up data collection). Instead it will outline the overall design model used in each case study for the reader to gain an understanding of the data collection. It follows a model similar to that utilized by Mittleton-Kelly and the LSE Complexity Research Group (2003b), as outlined in section

3.3. (Integrated Methodology for Complexity Research). However the data collection is more extensive than the LSE model as it was driven by the research questions outlined in this thesis, and ran over a considerably longer study time period (years instead of months).

There is a rich collection of artefacts, documentation and other relevant source material that was accumulated over the period of each case study, amounting to hundreds of documents. As this thesis is not an in depth study of the operational step process, the list below is restricted to a sample of the way data was collected, analysed and utilized. [In addition to this a flow chart of overall activity is attached (appendix 2) pertaining to organisation 2 as an indication of activity]. Some of the major data collection methods were as follows:

## At study initiation

Semi-structured interviews to provide a narrative analysis (appendix 3).

- The same questionnaire was administered at each session, but during discussion any emergent themes or specific points were investigated as they arose. The initial set of interviews consisted of all staff, at every level (including the MD / CEO) being interviewed individually for a period of between 60 and 90 minutes. The information was taken down by shorthand, which maintained accuracy, allowed a high level of eye contact and conversational flow, and also presented minimum potential for individual responses to be identifiable by such means as voice recordings. Respondents were frank and open during discussions. This process took a number of weeks and was repeated at 12 month intervals.
- All raw data (notes from conversations) were analysed for themes and patterns. These themes were colour coded and then the notes re-read and coded appropriately. A small number of additional themes emerged during this second process and were added. The coded themes were mapped onto mind maps to show how the themes and patterns interconnected. It also showed up new themes and these were then consolidated onto a large mind map and the process repeated. Individuals were consulted throughout this process for clarification if required.
- Feedback occurred, as guaranteed, in various forms including senior management briefings, staff forums and discussion groups to present and explore, ratify and finalise initial findings. Throughout this time (and indeed throughout the whole period) both formal and informal discussions occurred with the CEO.
- The analysed information was the basis for a large and detailed organisational audit report for the CEO and their management group, ranging across aspects of organisational purpose, health and viability (internal and external), and differentiating these at the levels of governance (if applicable),

strategy building, management and operations. It contained boundary requirements for decision making and recommendations at each level to initiate the adaptive process.

- An organisational impact assessment was produced that was then presented to all staff in an open forum (and updated each year). This initial impact assessment formed a basis for the design of new structures and processes through a highly inclusive, emergent process. The assessment colour coded all points into red (needs action now), amber (needs action as agreed) and green (positive and to be supported/augmented). The necessary action and accountability level was described. This large, rich data document served as an operational and planning aid for management; a regular progress updates for all staff and also captured emergent and spent issues over each period. The impact assessment (including interviews) was repeated annually depending on how long the case study period was.
- The running of such forums and workshops is in keeping with the LSE method of presenting initial findings to the organisation and providing an informed starting point for the identification of social, cultural and technical issues, and then progress findings each year (Mittleton-Kelly, 2003b).
- Another part of the initial data gathering process was the analysis of all relevant documentation and archetypes to build up a 'history' of the organisation. Once again patterns and themes were defined.

## General ongoing data gathering

- Aspects of collected data and analysis were the basis of ongoing reports, plans, projects and activities undertaken by various staff groupings as the need was identified
- Enabling infrastructure for information flow foster maximum capability for knowledge growth, learning and appropriately dispersed decision making was created and revised as required over time with the increase in complexity and adaptive capability. How these were designed and the information they contained was a useful source of data in itself.
- Attendance at both formal and informal meetings and events over time
- Ongoing work with senior managers and the CEO on complexity and change theory application, including attendance at weekly executive and management meeting
- Ongoing direct and indirect observation of the leaders' capacity and approach to creating and guiding a complex human system, including their facilitation of the emergent process of building enabling operational structures and an adaptive, resilient organisational 'culture'
- Quantitative examination of the manager's cognitive and behavioural preferences, both at individual and team level, with the use of the Belbin (1981) and Myers Briggs (Briggs Myers, 2000) tools, and

the CSIRO team effectiveness questionnaire (1998). This extended to all staff, each year in the case of organisation 1.

Appropriate steps were taken regarding the collection of both individual opinions about how and why the organization works, and also artefacts. Evidence was collected from all “six sources” (Yin R. K., 2003) including:

1. Documentation
2. Archival records
3. Interviews (focused, open ended and conversational)
4. Direct observations
5. Participant observations
6. Physical artefacts.

All sources of evidence were reviewed and analysed together so that triangulation of the case study findings were based on the convergence of information from multiple sources (data, perspective, methods), not quantitative or qualitative data alone.

The case study data base includes notes, documents, tabular material and narratives, and a chain of evidence. It was maintained, allowing for movement from one part of the case study process to another with clear cross references to methodological procedures and to the resulting evidence, ensuring quality control.

The original objective of each case study may not have been a descriptive one but a descriptive approach helped to identify the appropriate causal links to be analysed quantitatively. As with Pressman & Wildavsky's (1973) study of the complexity of implementing a local public works program in Oakland California, such complexity can be described in terms of the multiplicity of decisions that had to occur for implementation to succeed.

The abductive approach of systematic combining was an intertwined research process that offered a capability for understanding the characteristics and consequences of the case study, unlike more linear approaches. The researcher who can go “back and forth from one type of research activity to another, and between empirical observations and theory, is able to expand (his) understanding of both theory and empirical phenomena”, (Dubois & Gadde, 2002, p. 555). The empirical field work, analysis and interpretation allowed the preliminary analytical framework to evolve and in turn directed the search for empirical data. Unanticipated yet related issues were captured, explored, and redirected both operational

activity and the theoretical model over the case study timeframe (refer to Figure 23 for a diagrammatical representation of systematic combining).

As represented in Figure 28, each case study allowed for confrontation of theory with the empirical world and the theoretical framework evolved accordingly. However the data gathering tools as listed above (documentation, interview questionnaire, quantitative tests, collection of archival records and physical artefacts and direct observation) remained consistent to ensure cross case validity.

Stage 3 - Analyse and conclude

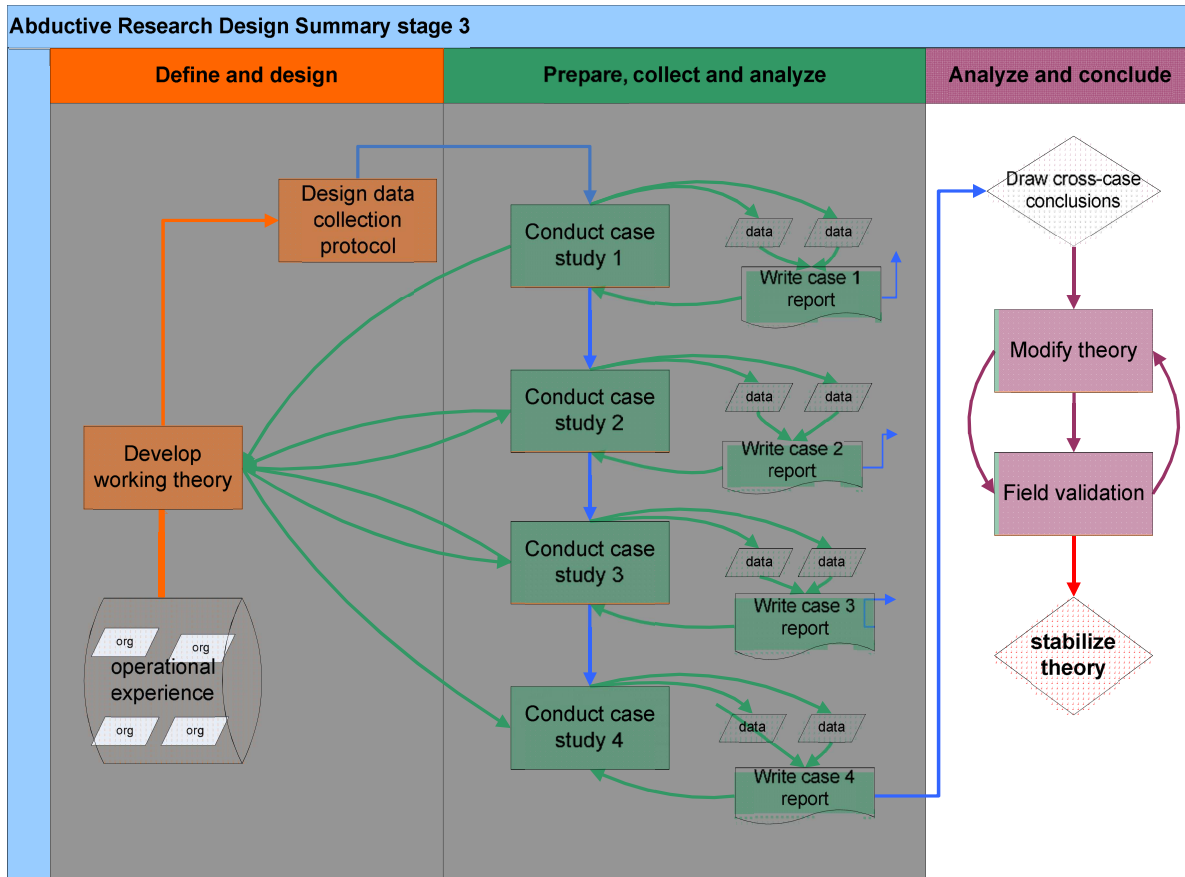


Figure 28: Analysis and conclusion stage

Comparing observations among cases enables theory to emerge, rather than beginning with preconceived hypotheses to be verified or refuted (Glaser & Strauss, 1967). The use of systematic combining created, by abductive means, empirical findings and theoretical insights which led to fruitful cross fertilization (Dubois & Gadde, 2002) and informed the cross-disciplinary literature review and the research questions to address identified gaps.

## Cross case conclusions

Once the data was obtained from all four case studies, the analysis strategy of case study evidence used theoretical propositions about causal relations. Cross-case synthesis is a technique that applies specifically to the analysis of multiple cases, and is relevant if a case study consists of at least 2 cases (Yin R. K., 2003). It is used when each case study is an independent study, and it not only aggregates findings across series of studies, but also is able to incorporate quantitative techniques.

Dubois and Gadde (2002) point out that relationships and patterns in complex structures and processes cannot be tested, and as deep probing case studies contain inseparable theory generation and confirmation, credibility is determined by means such as logical coherence which is a foundation for analytical generalization, and an important criterion for quality in case research. Logical coherence requires an adequate research process and empirical grounding of theory, both of which are addressed in this study.

This descriptive insight later leads to the enumeration, tabulation and hence quantification of the various decision points and conclusions. In this sense the descriptive approach is used to identify both an embedded unit of analysis and an overall pattern of complexity (Yin R. K., 2003). In the Pressman & Wildavsky (1973) case this process of analysis was ultimately used in a causal sense to explain why implementation had failed<sup>41</sup>.

## Analysis techniques

The major techniques recommended for the present study type are as follows;

- Pattern matching which compares an empirically based pattern with the predicted one (or several alternatives)
- Explanation building, which differs from pattern matching because the conclusion changes interactively. [Note: this technique was used as outlined by abductive researchers rather than the use outlined by Yin (2003) and (Glaser & Strauss, 1967) who consider that explanation building is mainly used with explanatory rather than exploratory case studies, and if it used for exploration it is part of a hypothesis generating process as the goal is not to conclude a study but to develop ideas for further study]. The use of explanation building in abductive methodology is also driven by the conclusion changing interactively, but it then continues through the phases of collection and in depth analysis of empirical data and finally assessment of the validity and analytical generalisability of the results, deduced from generated theory (Järvensivu & Törnroos, 2010); (Dubois & Gadde, 2002).

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<sup>41</sup> It took 70 sequential decisions to implement one public works program, so quantifying these and articulating the diversity of opinion and slippage defined factors around low probability of implementation success

- Time series analysis, analogous to the time series analysis conducted in experiments and quasi-experiments
- Abduction, which allows for assessment of prior and original theories and the generation of new knowledge through constant dialogue between theoretical conceptualization and empirical investigation in a real life context (Järvensivu & Törnroos, 2010)
- Logic Model<sup>42</sup> which is a technique used to match empirically observed events to theoretically predicted events. This technique deliberately stipulates a complex chain of events over time. These are staged in repeated cause and affect patterns whereby a dependent variable (event) at an earlier stage becomes the independent variable (causal event) for the next stage. Complexity arises from the fact that multiple stages may exist over an extended period of time (Wholey, 1979). This is a complementary technique for the abductive process.
- Use of Reports. A source of data for this study was the large volume of varied comprehensive reports that were produced from the operational work process, both during and after each case study. These reports provided data for individual case study analysis, and as each case study was completed the data was used for cross case analysis as part of the abductive process of systematic combining. On completion of all four case studies the various types of reports were a rich data source for cross case conclusions. An appreciation can be gained of the nature and interconnected flow of the written documentation from Appendix 2 which summarises the major activities and documentation produced through the three year period of case study 2

## Field Validation

The next step in the abductive process was then carried out to focus on the critical test of a significant theory (Gross, Giacquinta, & Bernstein, 1971). The field validation involved semi structured interviews with the leaders from case study one and two, who were the most successful at creating and leading adaptive organisations. The questions, as outlined in chapter 4, were designed to address identified gaps and test the nascent theory of emergent logic. Findings were compared and contrasted and the theory modified as appropriate.

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<sup>42</sup> This study is an “alternative configuration for the organisational level logic model” (Yin R. K., 2003) which progresses non linearly, and typically describes transformation in an organisation as described by COSMOS Corporation’s (2000) work on cross case analysis of transformed firms. It’s abductive and iterative nature aligns with the complex nature of the topic as it mirrors the fact that the completed transformations or systemic reforms are not an end point implied by the linear logic model, but will continue to adapt over time.



## Literature review

The abductive process was informed by a review of current literature at various stages of the research process which became abductive in itself and thus part of theory generation through the systematic combining of a wide range of relevant literature theories and findings. The literature review covered the areas of complexity science and systems thinking; leader cognition, complex decision making and skill maturation; human systems, and social neuroscience and systems intelligence.

## Web of Causality

Combining all of these techniques in various ways at different stages creates a web of causality which is not possible to see with the use of linear, quantitative or single qualitative methods (Miles & Huberman, 1994); (Yin R. K., 2003). Such methods of analysis

Can destroy the local causal web and result only in a smoothed down set of generalisations. The research... is ultimately aimed to tell a story rather than produce a quantitative performance score (Miles & Huberman, 1994, p. 172)

It may be that the time and effort required to weave such a web of rich research data is a decisive factor in the lack of such attempts at large, multi-layered, longitudinal studies. When such a study is possible, as in this thesis, they are a rich source of information worthy of the time taken to disentangle variables and causation, even if there are some areas which remain unclear.

## Reliability, validity and generalisability

Validity pertains to the kind of understanding that accounts can embody (Maxwell, 1992) and in keeping with Maxwell's typology research it addresses four of the five types of validity through the procedures undertaken:

- Descriptive validity is addressed by way of a factually accurate account
- Interpretive validity through clarification of rigorous data recording and interpretations (assisted by a time frame which allowed reflection on theory-in-use vs. espoused theory (Argyris & Schön, 1974)
- Theoretical validity by way of abductive systematic combining of multiple accounts
- Generalisability, both internal (through the extended period of data collection and extensive, varied nature of data) and external (through both systematic combining and the multiple case study nature of the research). The use of multiple cases upon which to empirically base reconsideration of current

theory and the replication of case approach in other independent cases indicate that evidence for the development of theory is more than specific to a single case (Maxwell, 1992)

The fifth type of validity Maxwell lists is evaluative validity which is less valid for this study as it was not based on an evaluative framework to the objects of study, but rather on a descriptive, interpretive, or explanatory one.

The design is rigorous and cohesive, and uses triangulation of all six sources of evidence (Yin R. K., 2003). It also follows the process of the use of multiple methods and measures of a phenomenon, achieved through data being collected from various sources (Cox & Hassard, 2005).

As stated by Orlikowski and Baroudi (1991), the interpretive researcher acknowledges their implication in the phenomena being studied, both in terms of trying to understand, describe and interpret and more strongly by creating and enacting the reality being studied through the constructs they use to view the world. The researcher's many years of industry experience have some influence on the research approach and focus, as does the nature of the case study work which reflects aspects of the 'natural experiment' methodology used by Mitleton-Kelly and LSE group, entailing "collaboration and action research (as these) are necessarily interdependent and one cannot take place in the absence of the other", (Mitleton-Kelly, 2003b, p. 2).

Finally, research validity is increased by the use of multiple informants from each level of each organisation to account for possible contextual biases and this implies internal consistency, which is a form of reliability. Consistent use of a thematic coding technique and consistency of judgement over several settings is achieved (Boyatzis R. , 1998).

This study denotes how such concepts as systems intelligence can be represented and modelled using qualitative research methods such as semi-structured interview techniques and empirical, abductive studies "to draw out the inherent system dynamics and elucidate the inherent behavioural and systems issues involved in the operational practice of leading a complex human system." (Sharif & Irani, 2006, p. 930)

# Chapter 4 – Findings on research question 1

## Introduction

Chapter 4 presents findings on research question 1: How do leaders of adaptive organisations think? This chapter contains the relevant findings and discussion regarding how a leader's thinking may be reflected in practice. As the question is potentially unbounded, the data is analysed using the techniques listed in Chapter 3<sup>43</sup>, and is also informed by theory making as described in Chapter 2. The resulting themes are defined, and the results discussed individually, and supported by specific examples in regard to each of the four leaders. A distinct picture of each leader can only be gained from the combination of all aspects, as they are inextricably entangled.

## A note on 'examining thought'

It is acknowledged that because this study is based in actual events, there are difficulties and variables that will alter the practical reflection of the leader's thoughts on the ground and thus not all activities and actions will be unblemished reflections of what the leader would have thought or enacted given complete freedom of choice. However, such hurdles are both a relevant and necessary part of studying practice in the field. Not only are they a rich source of information in themselves, but an attempt to identify and rule them out in order to get a 'true' picture of a leader's concept or cognitive state in a specific situation would suggest a skewing of results markedly towards whatever bias shapes the researcher's 'filtering' process. Thus, such criteria are best taken as a legitimate part of the inherent behavioural and systems issues involved in the operational practice of leading a complex human system (Sharif & Irani, 2006). It is sometimes possible to identify and describe such influences and this is done in order to untangle the web of causality and assist in a better understanding of how the leader is thinking, but where this is not possible it does not render practical observation invalid and indeed opens up interesting new areas of future research.

## Research question 1 – How do leaders of adaptive organisations think?

Hämäläinen and Saarinen (Hämäläinen & Saarinen, 2007) describe great leaders as able to 'act constructively and productively within an emerging whole as it unfolds.' They cite Lincoln as an example, with the capability for:

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43 These include pattern matching; explanation building; time series analysis; logic model analysis and abduction

Cultivation and care, insight and intuition, effort and trial, emotional and social intelligence, sensitivity for other people and the possibilities and complexities of the moment, a sense for the most relevant factors, an ability to integrate conflicting forces and a fierce resolve towards a desired state of affairs. (Hämäläinen & Saarinen, 2007, p. 3)

This example highlights the importance of a leader fostering shared intention and goal, grown through high connectivity and interaction between the people involved. It has been called a conscious intention of what the organisation's people want to achieve (Wheatley, 2006); an intertwined dance with the heart and mind of the system (Meadows, 2008); the creation of shared neural nets and neurogenesis (Goleman & Boyatzis, 2008); the regulator of complex adaptive behaviour (Uhl-Bien, Marion, & McKelvey, 2007) and a basis for growing individual and collective cognitive complexity (Kira & van Eijnatten, 2008). Marcic (1997) considers that the last two of his five dimensions (physical, intellectual, volitional, emotional and spiritual) are the least considered, yet the key to productivity and to understanding why organisational change fails. As we learn more about the links between empathy/emotion, cognitive changes and the effect of choice and intentionality on decisions and emergence, new theory building and empirical studies such as this would suggest that intellectual and volitional dimensions are in fact intertwined with the last two dimensions so closely as to be part of them.

## Theme 1: Social neuroscience

Chapter 2 described various neural aspects of human connectivity such as the effect of mirror, oscillator and spindle neurons on establishing trust, empathy & humour; bonding of team mates; increasing information absorption and nimble responses; reinforcement of candour and empathy, and building a positive mood state (as long as the leader's actions and emotional responses are seen as sincere). Whilst an empirical study can describe observed behaviour, outcomes and ensuing artefacts, it cannot state direct evidence of neurological changes. However this study describes behaviour which follows the pattern predicted by relevant theory.

## Overview of Findings

Resistance from staff to new ideas lessened markedly in Case study 1 and 2 as the leaders interacted and connected with people on a personal level, and this led to behaviour indicating an organisational mind being created by those leaders who engendered shared mental models that specified their 'ideal state' for the group and the organization. In theory, this involved the process of neurogenesis (Erikson, et al., 1998); (Boyatzis R. E., 2008), and in line with such theory this outcome only occurred to an observable extent with the first two leaders who painted the future positively and with passion before pushing people into the anxiety prone space of change. Thus people still felt anxious but could cope with

the anxiety as the space and structure to explore safely had been supplied, and a high level of trust in the leaders made an unknown future safe.

Reinforced by a systems intelligence approach from these two leaders, staff showed indications of social cognition maturation (see below) and increased cognitive complexity, both individual and collective. One outcome of such cognitive changes was an observable increase in the ability to understand and apply more complex emergent actions and solutions at all levels (Kira & van Eijnatten, 2008) as indicated in the case study example for complex decision making.

Leader 1 and 2 had a high capacity for both engendering and showing trust, empathy, humour and intuition through fast intuitive assessment of complex social situations and capability for accurate discrimination of the mental states of others, which caused them to appropriately adjust their behaviour in quickly changing, complex human social situations (these attributes bear on other categories of social cognition, cognitive complexity, intuition, etc). During interviews staff displayed a high level of trust in these leaders, and this was exhibited throughout the project along with empathy and pragmatic optimism, supported by a sense of inter-connectedness; an increasing clarity around shared mental models of purpose, boundaries and values; willingness to embrace change, and the capability to grasp and work with increasingly complex ideas and situations.

L1 and L2 both acted in ways which balanced warmth and approachability with gentle but clear authority, adjusting their behaviour whilst maintaining consistency around the clear purpose of the organisation and the values that drove it. These values were built collaboratively in both cases and remained clear and transparent at all times.

## Case Study Examples

### Leader 1 (L1)

Face to face interaction was a great strength of L1 – he was the dynamic resonance leader, consistently up-beat, physically energetic, positive and smiling. The effect was obvious on people. He spoke to and with people (not at them), and L1 ensured that he was physically present when engaging on things new, different or difficult. He was passionate in his belief in what was possible and skilled at communicating his strong, well defined mental models.

Organisation 1 was in flux and faced potential shut down if they did not improve in a short time. L1 introduced the dilemma personally, and spent time with the group to clarify what 'improvement' meant. He listened to how people felt and what they thought, and assured them that he believed it was possible to succeed. He made it clear that he would support whatever the group wanted to do within clarified

boundaries (these were the 'not-negotiables' around resources, time and deliverables). L1 was both candid and supportive, painting a clear picture of the purpose of the division and drawing people into airing what they thought possible. Over the transformation process he was available when required; made frequent personal visits for coffee, discussions and updates; tackled blockers on a one-to-one basis; was candid when the process hit bumps and helped frame a way forward, making more conservative members feel safe with the unusually open and collective process of high group input.

L1 liked change and risk taking, but he made both the risk takers and the conservative staff feel safe by combining his enthusiasm in group discussions on what the change might look like with elicitation of ideas and concerns; objective problem solving and the framing of solution designs. This resulted in a clearly envisioned goal and 'map' of how the road would be travelled.

L1 reframed potential issues by listening and picking up finely grained distinctions among people, situations and social episodes, leading to accurate perception of contingencies and appropriate responses at individual and collective circumstances. He could be serious, candid or directive if necessary in a particular situation, but retained empathy and consistent values. L1 was a pragmatic optimist, and his willingness to brainstorm, listen and explore in turn elicited creative responses and optimism in staff. He both showed and gained trust through an open, confident and genuine liking for his staff which endeared him to them and them to him.

Though a vice president, L1 spent part of the family day celebrations on stage playing electric guitar with a band. He was also known widely for his trademark of wearing bright ties, including bow ties, to the office every day.

Because of this open approach to building relationships with the staff, the trust built was reciprocated. When dealing with him on potentially difficult issues, even of a personal nature, he maintained a non-defensive stance and sought the best solution.

## Leader 2 (L2)

A newcomer to the division, L2 was more reserved than L1 in social situations but quickly built a high level of credibility. She was open, friendly and approachable, with a skill for listening which included direct eye contact, asking insightful questions and requesting elaboration often. L2 understood this as an important part of assisting others (and herself) to shift mindsets and entertain new information or ideas. L2's physical persona was petite and approachable, but she was nicknamed the iron maiden as her clear affection for her staff was coupled with an expectation of the best not only for them but from them, and she would challenge them if they were not delivering. L2 was seen as dealing firmly but fairly in such situations, skilfully mixing candour and empathy with the goal of positive resolution.

L2 inherited a young bright person who was not yet ready for the management position he had been put into (the former MD had confused potential with capability). This was disrupting his staff and the management group that he had joined, and he was becoming increasingly defensive. After watching and following up gently L2 was candid about the manager's lack of readiness for the position, and genuine in her certainty that his capability would eventuate, specifying the areas she saw as requiring time and attention. She offered him other roles with the proviso that he may feel too uncomfortable to take 'demotion' (recognising him as overconfident and immature). L2 stated that the manager's career would probably do best if he left, and returned in a few years when she would be glad to have him. He left, and nine months later met with L2 to thank her for her frankness and for "saving his career".

L2 both showed and elicited trust and commitment from staff, and also understood the need to be physically present when engaging people on new or difficult concepts or issues to build a shared concept of the way forward by listening and filling in the gaps as they went.

L2 did not discuss organisational issues remotely, and considered that video-cam was a curse as it led to lazy management of what often turned into major problems. Because she always sat with a group when dealing with an issue or engaging them on a new concept which would directly affect them, this meant that she was regularly in other states across Australia. Similarly, if there was a new group or a large change in a specific area. L2 spent as much time as possible with them at the start to establish a relationship base for all so that she could primarily interact from another physical location on an ongoing basis once she felt that a shared concept has been established. She still regularly visited all sites in order to maintain alignment and personal connections, considering it the best way to know what was happening and how people were feeling (something they would only really share face to face).

L2 met with every new staff member individually within the first week to go through the 6 values of the division, share her concept (mental model) of organisational purpose and discuss the incoming person's role in relation to hers. This included giving them a copy of her performance agreement and discussing how their role fitted in.

L2 asked staff how they would best like to socialize in addition to morning teas and staff occasions for particular purposes. The group chose a monthly on-site drinks night which she funded and always attended, and which was very popular. Ground rules were agreed on and strictly adhered to (like how much alcohol was consumed).

L2 melded a formerly disparate management team into one with a shared sense of purpose and capability to deal with increasingly complex concepts and issues (see the example in complex problem solving, page 137). She was deft at 'listening to the system' and identifying a need to change or tweak a process or situation, aided by an ability for fast and intuitive assessment of complex social situations. She was highly self-aware, and when working with her she consistently tested her ideas and concepts, and

maintained a genuine interest in alternative opinions or issues, with a willingness to shift position if it was decided that alternatives were worth trying.

L2 inherited the change project when she took over the division. She initially was clear she wished to narrow its scope considerably, but after a joint national tour of all sections during which we sat with each group of staff, listening, asking questions and inviting thought, L2 not only changed her mind but widened the scope –and it became a three year transformation process.

### Leader 3 (L3)

L3 was somewhat of an enigma. He was shy and appeared to require affirmation yet was used to being in control of a situation and had a high need to maintain this. His behaviour was inconsistent in many ways: - he could be friendly and work well in a participative process and novel situations, or he could be almost dictatorial. On a day to day basis he was empathic and paternal with staff (especially with females and non-performers, both of whom took advantage of this). Regarding non-performance, L3 would occasionally overrule a direct manager's decision regarding consequences for the non-performer, but would then be angry at the lack of progress in the situation. L3 vacillated in his behaviour towards his direct managers, ranging from camaraderie and cooperation to becoming dismissive. This became bullying behaviour in particularly stressful situations.

During a protracted and difficult tender process a group of people were gathered in one state during the week to produce a large and complex technical bid – living and working together. L3 took everyone to dinner and then the bar each night and was convivial and social, yet during the (12 hour) work day as the weeks went by his behaviour ranged from benevolent patience to shouting, and one key member left before the tender was complete. The others remained, commenting that this was “just the way L3 was” and supporting whoever bore the brunt of L3's frustration. He was always genuinely apologetic afterwards, and was excused by most who considered he had a difficult task and a high commitment to keeping the company in business.

L3 had a clear mental model of the organisation's purpose and goals, and though this was predominantly built by him it was widely shared and reinforced by the organisation's role as a military hardware service specialist during a time of active engagement. His approachable air during everyday interaction with individuals, along with humour and a high level of commitment to the organisation and its people, engendered trust and a tolerance for a lack of social and communication skills in various situations.

L3 had a unique style when addressing the whole workforce on change activities: Even under specific instruction from credible advisors, he had a tendency to talk at too strategic a level, talk for too long and make terrible jokes, but it was obvious he was making a concerted effort to connect so the staff reacted



well, and made fond jokes at his expense afterwards. People rarely asked questions in this forum however; as they knew he would 'waffle' and instead asked them in person later.

The lack of finesse in these situations was counteracted by L3's skill and level of connections at a senior level across the industry. In such settings he possessed a sharp, finely grained discrimination of the political states of other senior stakeholders and could act accordingly. A few staff had witnessed L3's capability in such circumstances, and he was respected for this and his skill at positioning the organisation in the external political arena.

There was empirical evidence of heuristic biases of selective perception, former success and need for control in L3. These biases appeared to be triggered by familiarity and could 'turn off his radar' when he was with people with whom he worked closely. This, and specific areas of technical expertise appeared to lead to fixedness at times in regard to embracing change or new technical concepts. In face to face interaction L3 stifled new thought and frustrated those working with him at these times.

The bright, competent engineer who had worked on the feasibility studies for three years was consistently left out of technical discussions with the client as L3 wished to portray himself as the expert. If frustrated L3 would also argue technical points with the engineer in the senior group even though he was not qualified, relying on the fact that the engineer was a patient and forgiving young man.

At other times L3 could inspire new thinking and show clear delight in tackling an issue or new concept. Even when he disagreed, in the majority of cases L3 would eventually grasp adaptive implications and move position, thus retaining a level of credibility and candour, and he was always seen as interested in moving the organisation forward.

#### Leader 4 (L4)

L4 was a young, successful MD of a group of national divisions in an international company. He was eager, smiling, charming and socially affable, but was always on guard and communicated in ways that were highly controlled. All formal communication went through his office.

L4 hosted monthly staff lunches with a handful of chosen individuals, mostly from the division he had formerly headed up. (The new GM of that division was not allowed to hold his own lunches). L4 sent a monthly newsletter to staff, written by a Manager of Communications employed to do this, but heavily vetted by him.

Staff liked and trusted L4 in the early stages of research contact, with many commenting in our interviews that "we don't know where we are going, but I'm sure he knows and he'll get us there". L4 was very

engaging if he liked the direction of progress, but would withdraw if not pleased. He did not encourage disconfirming information, and was rarely challenged by his staff and direct reports. Many of the executive and senior managers reported in private interviews that they “knew not to tell L4 what he did not want to hear”, especially in a meeting or other public forum. When he was given direct feedback he did not agree with, L4 dealt with it by denial of the facts, or negating the validity of the source.

There was no shared sense of purpose in organisation 4 as L4 did not share strategic ideas or plans with any level including his executive. They were frustrated in L4’s lack of trust, and apprehensive about doing their role as they had no shared mental model to follow. L4 maintained two management groups (the executive and senior management group) which he did not allow to meet together, and both were aware they were not being fully briefed on organisational strategy or major operational changes.

On more than one occasion during the research period, a major change was rolled out with none of the relevant managers aware it was coming. There was no engagement in the process; they could not prepare their own staff, and had no say in deciding what needed to change. L4 sold this in a way which made a number of the managers feel they were somehow inadequate in the process. Upon discussion, L4 considered that maintaining secrecy until implementation was a mark of success as none of the ‘locked up’ project team had leaked sensitive information.

The transformation process was undertaken as the organisation was in flux, and as this increased (moving far from equilibrium in order to shift to the next level) staff showed increasing sensitivity, and a need for greater communication around shared sense of purpose. L4 responded by becoming progressively more secretive and increasing formal one way communication in the form of written works and large presentations.

L4 remained uncomfortable with the amount of interaction the project entailed with the researcher and staff in the information gathering stage. He heavily censored public feedback of findings, even if they were not of a negative nature, and never allowed the promised communication process to be put into operation at any level.

Whilst L4 was clever and charming, and could assess complex social situations, such assessment was limited, especially in circumstances where he was a subject matter expert, had control or had been successful in previous situations. In those circumstances he appeared to be more functionally fixed and demonstrated a lack of willingness to abandon well used scripts, showing a lack of social conceptual depth.

The staff had fully engaged in the initial interview part of the change process and were eager to go forward in the inclusive way outlined. Goodwill was high and staff still liked and trusted L4. However, the full staff briefing on feedback and future plans became a tightly orchestrated ballroom affair in which L4

failed to read the strong need for promised feedback. When the feedback was given by another, the positive staff response was obvious but L4's discomfort meant the process was not repeated.

## Theme 2: Cognitive complexity (cc)

### Findings

Chapter 2 outlines cognitive complexity as a key requirement for complex decision making and managing human systems. Cognitive maps, schemas and scripts are structures which are dependent on both our experiences and our logical conceptualization of patterns and interconnections between the information, and the richer the cognitive structures in terms of quality of information. The richer the cognitive structures in terms of quality of information, depth and breadth the higher the cognitive complexity and the better the person can respond to different behavioural situations or problem scenarios (Saaty & Shih, 2009); (Zaccaro, Gilbert, Thor, & Mumford, 1991).

L1 and L2 displayed behaviour indicative of cognitively complex scripts organised in a way that produced a diverse range of appropriately cued alternatives (like the chess master). All four leaders displayed knowledge chunks, with L1, 2 and to a lesser extent 3 building experience over time and a wide exposure to different situations. The behaviour of L1 and 2 suggested an abstractly arranged network of such knowledge as they were skilled at extrapolation, 'mentally flexible' and coherent when abstracting. L4 appeared to have deep domain knowledge in his specialist area, but little mental agility. L1 and 2 displayed behaviour indicative of an ability for fine grained distinctions and nuanced retrieval cues, whereas in L3 this was evident in specific circumstances, and in L4 it was not evident at all. All four leaders were able to reframe issues and situations to various extents, displaying behaviour indicative of access to pertinent scripts. However, whilst it is not easily verifiable, this appeared to be driven in L1 and 2 (and occasionally in L3) by the ability to manipulate, recombine and generate new scripts and mental models through an increased ability to control processing. It appeared however that the drivers for L4 included heuristic biases of control and success, and perhaps a lack of empathy (see example on page 128).

L1 and 2 displayed a high level of self-awareness and carried out regular assessment of internal models of both themselves and others to expose blind spots and move people forward by way of discussion, inquiry and joint complex problem solving. This appeared to help lessen the effect of heuristic biases on complex mental processes such as pattern matching and judgement.

Whilst all four Leaders exhibited general intelligence L1 (especially) and 2 actively sought out experiences and skilling opportunities as they were overtly aware of not knowing everything. Their interest in learning allowed them to update and build new scripts through exposure to new information. L3

and 4 displayed the 'confidence' of simplified perception in regard to not knowing that they didn't know, and this lack of awareness of their own biases was displayed at various times and may have contributed to a more limited recognition of variables in such situations as strategy development, complex problem solving and personal interaction. Their organisations also had a higher level of managers which shared lower cognitive complexity as those who were more abstractive and complex thinkers clashed or became frustrated. This would appear to be another reinforcement loop for lower cognitive complexity people attaining high level complex roles.

## Case Study Examples L1

### and L2

From observation, the leaders in this study appeared to vary in cc. L1 and L2 both seemed highly cognitively complex in broad terms, and this combined powerfully with their social skills, leader maturation, intuition, and other cognitive traits. There appeared, however, to be differences in the heuristics which in part shaped their cognitive scripts and their use of knowledge.

### L1

L1 was more likely to act quickly to correct or improve a situation -perhaps in part attributable to a greater personal success bias and an extroverted personality<sup>44</sup>- but this was well grounded in long and varied experience and his high level of perception allowed him to quickly assimilate relevant information from the present situation and act accordingly. L1 was able to quickly grasp concepts and apply them across other areas (abstract). He was open about his comfort with trying and failing, and also his pragmatic optimism that things would work out.

There was a need to jumpstart innovation in the group. L1 allocated Friday afternoon to innovative play (in the shape of skunk works of Lockheed Martin in the 1960's) but little changed. Through conversation it was discovered that the previous boss had tied all innovative activity to direct production capability that would make money, and therefore just giving permission was not enough for people to feel safe. They were also used to being measured and there was no quantification around L1's permission. To make them more comfortable with experimentation a number was put on ideas that had to be of operational use (initially 1 out of 10) and L1 arranged for the managers to decrease this number when the staff got close to it (1/20, 1/30), but critically, other measurements were introduced around lessons learned, the number of things tried, etc. After 3 months people were no longer counting 'failures', and within 5 months the first new innovation in 3 years was made. Thus L1 initially identified a problem, defined it through discussion, but then 'ran ahead', hoping that enthusiasm and permission was enough to engender a change in

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44 Using tools such as the Myers Briggs MBTI personality test

behaviour. He watched and when results showed no change, L1 looked for underlying issues rather than repeating instructions. He changed his approach, doing something counterintuitive in 'quantifying' freedom to experiment in order to end up with a change in behaviour and culture. He then nudged people into feeling safe (dropping the bar until it was irrelevant) and coaxed them into innovation.

L1 dealt more briskly but still adeptly with disconfirming information – it could be argued that this may have been related to the high dynamic resonance aspect of L1's social intelligence which included a higher social risk taking approach, and a greater overt level of confidence around success.

One of L1's methods of drawing out ideas or information that wasn't in line with current thought was to informally ask the person to draw a 'back of a matchbox' representation of what they were thinking. Because of the lack of formal rigour involved, and the genuine engagement from L1, people felt more comfortable exploring alternative ideas and many improvements were made as well as some brand new concepts introduced.

## L2

L2 was more careful before she moved to take action, though she would still act quickly if the need arose. L2 was also highly extrapolative and committed once she had decided an idea or decision had merit – either her own ideas or those gained from collaboration and elicitation from others. L2 trusted her intuition, social cognitive capability and emotional cues in both interaction and complex decision making. This appeared to indicate an expert level of leader maturation (see below) and high quality knowledge structures. It was interesting to watch L2 apply such capabilities to dealing with many concepts and issues that were technical, for which she had no formal training – she learnt each time and applied the learning to the next issue; she did not attempt to make technical decisions but was insightful in ensuring their veracity, and she had the confidence to step in and stop or alter activities if she considered they were not working.

L2 was slightly more self-aware in regard to possible personal heuristic biases, and was also very comfortable actively seeking disconfirming information, absorbing it and amending ideas, plans or actions. L2 worked through the relevant aspects deliberately with those involved and/or her advisors, sometimes reflecting and revisiting again until satisfied.

Throughout the change process L2 regularly employed a process of reversing questions or stated goals in order to ensure that disconfirming information was not ignored due to assumptions driving information gathering. When shaping service resource needs the group looked at the technical services being offered currently and those which were missing – the common aspects of service delivery. L2 expanded the investigation to what was being done for customers that shouldn't be and what was being done that the

customer didn't want (and thus didn't have to be resourced). These last two points were the most informative in shaping resource needs and understanding some of the largest service issues.

The actions and approach of L1 and L2 reflected the theoretical position regarding the fostering of increased cognitive complexity in their staff in that they consistently sought elaboration and facilitated situations which promoted diverse experience, problem solving and resultant script building. Both engaged with their immediate reports consistently, and with all staff on a regular basis, with regard to the complex problems entailed in operational success and creating an adaptive capability. They encouraged regular brainstorming around issues and ideas and invited the staff to design and use information flows and stores advantageous to the sharing of knowledge and learnings.

Organisation 1 designed a multi-level technical skills information base which could be used for mentoring, skill sharing, innovative collaboration, self-organised projects, etc. Tacit information and learnings were shared by buddy-ing, weekly soap box discussions, specialist 'roving star teams' and the Friday afternoon play sessions.

Organisation 2 opted for an informal data base that could store learnings and fixes in any way the individual wanted to enter the information, and the amount of knowledge and information captured and shared was huge in comparison to the tightly regulated corporate system of highly codified data collection. (L2 blocked the corporate ban on this data base).

It was evident in many discussions with L1 and L2 both leaders placed high importance on building organisational capacity through activities which cultivated a work group's capability to deal with complex issues and ideas. Both appeared to understand and appreciate the positive and powerful effect of individuals internalising responsibility to achieve shared purpose and aligned goals, and their leadership style allowed for increased cognitive complexity and problem solving capability at all levels, enabling a high level of self-organisation to grow.

### L3

L3 appeared to be intelligent, with multiple domain areas of expertise, and in novel situations he was able to apply conceptual ideas and extrapolate to come up with new ideas, an exercise he enjoyed. However, he often appeared to be influenced by the heuristics of past success and a high need for control as they were repeatedly topics of conversation or validation, as well as his leader maturation style (see below) which did not reach collaborative status. In familiar situations his behaviour was inconsistent and it appeared to depend on the heuristic involved.

The bid L3 was tendering for had two discrete parts: one required a highly technical modification for combat; the other an (unknowable) 25 year support plan. A marked difference in approach was observable when L3 led the planning for both parts with the same highly skilled team. When working on the long term plan L3 was imaginative, inclusive, insightful and upbeat, whereas in the (difficult) technical modification meetings he was opinionated, hypercritical and often closed to technical advice which was current and came from more qualified, capable, experienced sources. Private discussions with L3 revealed that former experience in managing defence vehicle modification led to perceived success and technical capability even though he was not a qualified engineer and had not done the design work. However, the 25 year plan was completely novel and he was open to input, non-defensive and collaborative in approach.

L3 could be successful in making fine grained distinctions using nuanced retrieval cues, especially in the hierarchical, political setting of the defence world. At other times his actions aligned with cc, becoming constrained by such biases as selective perception, perceived success, and illusion of control or hindsight.

L3 was astute in terms of how to use the informal social network to get formal backing for work in the defence arena, and was successful in achieving support. On occasion he would take one of his senior managers into his confidence and include them in the political interaction, whilst maintaining control of the situation. However, most of the time L3 was secretive, didn't let his managers know what was going on, and sometimes cut across their formal negotiations and took over behind the scenes without warning them. If they had the opportunity to gain informal backing or build direct connections he would, if forewarned, tend to block it or tell them not to interfere.

Such blind spots in L3's strategic role as MD elicited frustration from the managers involved, and his low level of self-awareness around such blind spots caused him to reframe events when given direct feedback on the negative effects of his interference. L3 was technically adept but not qualified as an engineer, and he frustrated in-house technical experts (engineers) by initially dismissing contrary ideas, evidence or disconfirming information in situations where he had experience. Instead he assumed superior knowledge, engaging biases of perceived capability and prior success, and it took effort and resilience from the engineer to maintain pressure to listen. On most occasions L3 would ultimately revisit the situation and move his position, though movement entailed a level of blame or reframing. At other times L3 was good to work with.

At a critical time in technical tender negotiations a problem arose when L3 had not sufficiently engaged the organisation's project engineer as he wished to be seen as the expert. L3 then did so, and rectified the situation after significant trouble. When discussing this privately with a senior manager on the project he commented that "L3 puts us in the \*^+# but he always manages to get us out again and saves the situation".

Both direct and indirect observation over a twelve month period suggests that L3's high level of inconsistency in engaging with managers giving permission to make decisions and problem solving was a primary reason for not achieving an adaptive, self-organising capability over time, as a major outcome of this ongoing inconsistency was a lack of confidence in people's capability to act, gain support and learn.

## L4

L4 was intelligent and had high domain specific knowledge, which had allowed him to rise to GM of this specialist division. [Interestingly, even when he became MD of the whole group, he could not let go of this division and constantly interfered with and blocked the new GM's running of the division] .L4 followed new concepts well and appeared to engage well with complexities, but his application of the concepts consistently became 'linear' in practice. During the research transformation project this combined unfavourably with strong heuristic biases of former success and need for control. The combination appeared to result in simplified assumptions and an overly confident approach which L4 would not test by way of disconfirming information or other people's opinions. On the contrary, if clear evidence emerged which did not fit L4's perception of reality, it was deemed inaccurate or the source was questioned and invalidated.

Two of the major findings in the investigative process around current issues and change readiness were dismissed in this way. One was the emergence over the last year of a 'substructure' that was very different to the major divisional structure. The other was the expressed need at all levels for information on strategy and future direction from L4. Though the first finding was operationally quantifiable (and was a major cause of current problems) L4 would not accept the presence of another structure as it changed the way he perceived the division, and thus he blocked all alignment and remedial improvement plans, to the divisional head's dismay. The second finding was rejected and it was later revealed that L4 had decided this finding had been falsified.

There were recognisable examples of L4 failing to abstract across novel situations due to selective perception which caused him to see the situations as familiar and controllable. He appeared to display a dominant 'linear logic' that was not malleable (Barsalou, 2005); (Gallese & Lakoff, 2005); (Zwaan & Taylor, 2006), and minimised complex abstraction and intuition. This may have played a part in his rejection of disconfirming information, whether it was about his own role, his staff's stated wish for information, a change in structural dynamics or the industry niche to which the organisation belonged. L4's approach had a large effect on his direct reports, and empirical evidence suggests this included the minimisation of a capability for cognitive complexity growth. In particular his inability to discuss complex problems or share decision making and relevant information blocked learning. It took away the possibility to build shared mental models around purpose and values, and opportunities to deal with or understand complex issues or create and apply emergent actions. As change progressed, L4 became more furtive,



disorienting and directive and instead of neurogenesis it created anxiety and a lack of adaptive capability which led to (negative) reinforcing loops that amplified over time.

At the time this transformation project began, L4's method of implementing change consisted of the project team being 'locked up' for one to two months to determine what to change, and how and when to implement. They would then roll out the change and if there was a 'leak' before roll out began the person responsible was fired. The staff interviews uncovered a large amount of unspoken frustration and anger around the process. If L4 got such feedback he dismissed it as people being nosy, untrusting or potential informants for competitors.

L4 stated that he agreed with the open and inclusive methods of the case study transformation process, but could not adopt them in practice.

### Theme 3: Social Cognition and Intelligence

#### Findings

Leading a human system means gaining results with and through people. The literature search section on social neuroscience outlined the cognitive competencies which inspire others to be effective, and how positive empathic reactions synchronise emotional states, building trust, connectivity and candour, and causing an emotional ripple effect (positive or negative). This was evident in all case studies in different ways, as reported in the individual case study findings below. Empathy was a powerful and consistent trait shown by L1 and 2, and inconsistently by L3 (although it still had a considerable effect). The lack of empathy from L4 also had a considerable effect, but it was not a positive one. In all leaders it appeared to directly impact the use of values in regard to decision making, and there was a noticeable correlation, with decision preferences being less arbitrary and more based on consequences when the leaders were empathic. As an example of this, the initial approach to the change process was different from each of the four leaders:

- L1 initiated an open, candid discussion, set up a number of ways to interact with individuals and groups through the change process, and maintained faith even when the going got tough towards the end of the process for a short period
- L2 was new to the division so she initially watched, probed and listened, then expanded the change brief. She set up various interactive methods, and although she had a tighter hold on the process but it remained emergent and open

- L3 reserved judgement but backed the process, interacting sufficiently to maintain momentum with pressure, addressed the group when necessary (warmly) and maintained commitment with some cajoling.
- L4 was initially very keen, but quickly became uncomfortable with staff involvement, tightly controlled information and interaction and within months began to filter and shut down the process

A lack of empathy in relation to the decision making process appeared to limit some leader's ability to make good quality complex decisions – this was sporadic in the case of L3 and constant in the case of L4.

Consistent with a high level of social cognition, Leaders 1 and 2 were adept at making fast, intuitive assessments of complex social situations, and their behaviour aligned closely with descriptions of Systems Intelligence. Both showed a high level of perceptiveness and behavioural flexibility, which are critical components of social intelligence that allow leaders to read multiple aspects of the situation at once and tailor their responses accordingly through a sophisticated, complex web of accurate, nuanced action cues.

The behavioural flexibility which was displayed by L1 and 2 indicates leverage of wide range of such effective responses, and a high creativity and willingness to manipulate, redefine or abandon well used scripts in novel situations (Zaccaro, Gilbert, Thor, & Mumford, 1991). It aligned with Lord and Hall's (2005) work on the increase in expert leader's ability to control cognitive processing. This occurred noticeably in both the leaders and their followers in case study 1 and 2. These two leaders combined this with practical intelligence, competence (see footnote 16 for definition) and a strong mental model of the ideal organisation. Their high group prototypicality was another important aspect of social cognition. It prompted both trust and perceived effectiveness in ambiguous situations from their staff (van Knippenberg & van Knippenberg, 2005), especially in those who had a high dispositional need for closure. L3 had a small group, in which his group prototypicality was high, and each of these individuals displayed accurate perception of his effectiveness – each could predict his moods well and trusted in his commitment to the organisation and its people. L4 was socially affable with general staff but group prototypicality was low as he remained 'apart' from both executive and senior management groups in terms of group identity. As ambiguity increased and the need for prototypicality was therefore increased, L4 did the opposite in practice, drawing away and exacerbating the problem. The empirical evidence suggests that uncertainty heightened the sensitivity of those directly in contact with L4 due to their high anxiety levels, and this set up a destructive reinforcement loop.

## Case study Examples L1

### and L2

Both showed evidence of high level social cognition and intelligence, and made fast and accurate, intuitive assessments of complex social situations. This appeared to be facilitated by subtle action rules and tacit knowledge which they applied to social decisions, allowing both to comfortably think on their feet. L1 enjoyed this more overtly, but L2 became more assured as she progressed (whilst outside the scope of this thesis, perhaps this reflects the work of Hopkins and Bilimoria (2008) on gender neural wiring<sup>45</sup>). Both L1 and L2 were able to respond according to the needs of the situation - thereby showing a range of effective responses to complex situations. There were numerous examples of both leaders' willingness to change their minds, often quite publically, if relevant information was presented that validated such a change (this aligned with the theoretical capability to edit, manipulate or abandon well used scripts) and they maintained a sense of collective identity in changing situations.

L1. The restructure design was almost complete and the whole division (all staff and management) met to present and finalise the new structure. A 'storming' process occurred as this was the first time some of the senior management were available directly for a discussion with staff on what had not worked in the previous set-up, so the session was messy and unresolved. L1 did not interfere (though he privately admitted to having to stop his automatic response to do so), nor did he 'rescue' the managers, instead watching procedures and allowing the clear purpose and goals to enable self-organisation. It did so, and within one week the group had refined and voted on the final structure and had begun a smooth, efficient implementation process.

L2. One of the most sensitive parts of the transformation process was the topical physical relocation of the 'jigsaw' of divisional sections. Though L2 wished to design this with her management group as she recognised that it was vital to efficiency and informal learning, she set up an inclusive process for feedback on where sections should be relocated. This worked so well that L2 extended the process much further. Clear outcome requirements and boundaries were set, and the whole group asked to brainstorm and design the new physical layout. This took only half a day, required one small modification and was implemented voluntarily that weekend.

During the transformation process both L1 and 2 ensured that there were formal systems to gain disconfirming information, and goals were set high enough for growth but not so high as to stop

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<sup>45</sup> Their work suggests that initial differences of higher social radar in women and social (work) confidence in men lessen as cognitive complexity and success increases until it disappears in truly inspiring leaders (Hopkins & Bilimoria, 2008)

experimentation (extrapolative intuiting). L1 and L2 were also strongly group oriented (group prototypical), both directly with their executive group and with staff in the change process in terms of an “all in this together” approach. Pragmatic optimism grew and recursion was minimised.

### L3

L3 exhibited middle level social cognitive intelligence that was inconsistent and appeared to be driven by his comfort with individuals or specific situations. At times he could show high levels of trust, connectivity, candour and empathy, but this was on a one to one basis, or in the small highly trusted group. This behaviour could in turn be invoked by one of the trusted individuals, with the result that these people often managed L3's behaviour when necessary for the rest of the group.

A complex aspect of L3's behaviour was his reaction to new members of the group he worked directly with, for example specialists who joined the bid team. A pattern occurred, well known by his direct reports, in which if L3 saw the new 'kid on the block' as credible and interesting, he would be open and inclusive to the point of favouritism for a period of time. The novelty would then wear off and they would join the normal group ranking. In discussing this point, the rest of the 'trusted' team commented that each had gone through this and they 'just waited it out' with the new member. No ill feeling was evident during the research period, and this initial close relationship appeared to lead to the ongoing bond to a lesser extent as one of the confidential group.

In a group setting L3 showed a lack of ability to apply effective judgement (situation specific scripts). This could mean using humour in the wrong situation or describing strategy to workers for whom it was irrelevant, but L3's clear wish to connect was obvious and he gained their trust. His perceived bias of high technical capability resulted in minimising the emergence of novel ideas in less confident technical staff as he could be dismissive of alternative ideas.

L3 was quite social as an individual, but as ambiguity increased in a situation he drew away from the group in general and chose a few people he trusted and felt comfortable with. Thus he was not seen as prototypical by all managers, and the perception of him as an effective leader in times of flux differed widely. In his favour was his obvious intent on a good outcome, and in his day to day interaction with general staff he was empathic and fondly paternalistic. However this made him uncomfortable with performance management, and would sometimes cause him to override a manager's decision regarding poor performance of an individual staff member and be too soft, only to then criticise the manager for not resolving the problem when it arose again.

Inconsistency extended to technical decisions at times. One of the highest income streams of the organisation concerned the fitting of a certain type of large weapon. L3 had not worked with these before, considered the technology imminently defunct, and planned to stop the service even though it was

pointed out that this would result in no income if the new tender was unsuccessful or delayed. It took a lot of effort and direct conflict from the highly trusted group, for L3 to change the business plan and show trust in their judgement. (Even when they were subsequently proven correct he remained vocal in his disagreement that it should be part of the business).

## L4

L4 exhibited a low level of social cognition/ intelligence, restricted by strong bias filters including control, success, selective perception, and augmented by low empathy. While this can be potentially improved through direct, relevant exposure and feedback, unfortunately L4 was strongly selective in regard to minimising situations which called on him to exercise empathy, and thus there was little opportunity for development (Goleman, 2006).

L4 agreed to, and then cancelled, each of the smaller, more personal feedback forums to staff on findings from the initial research interview process. Even the large feedback session which had been promised was turned into a formal one way presentation and L4 removed all findings regarding how people saw the change, even though the feedback was quite positive. The much anticipated debriefs for the executive and senior management groups never eventuated. L4 blocked the summary of findings from staff interviews because there was comment that staff did not know what the strategy was. When questioned on this L4 reported that he had fully debriefed the groups on the research.

This lack of exposure appeared to minimise the opportunity to create fine cues that allowed differentiation of nuanced social interactions and a subsequent inability to plan responses accordingly (Zaccaro, Gilbert, Thor, & Mumford, 1991)<sup>46</sup>. His intelligence appeared to be domain specific and filtered by his use of power differentials and need for highly controlled social interaction (Lord & Hall, 2005). Behavioural flexibility was low, revealed by a fairly narrow, highly confident response repertoire. This also related to lack of empathy and appeared to directly result in decisions driven by personal or positional appropriateness (as stated in the Complex decision making (CDM) section). L4 did not display trust, connectivity or candour, and these were not reinforced in the workforce culture<sup>47</sup>.

Even when a high level of frustration was evident from L4's executive as they did not know what was happening, he did not share information. When he was told that one of his direct reports was close to a nervous breakdown due to stress, though he voiced concern there was no personal engagement and his action was to confidentially begin to source a replacement.

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<sup>46</sup> For example, when briefing staff on imminent large changes, L4 consistently failed to differentiate and connect with respondents who required reassurance, instead giving all a brief smile and confident quip.

<sup>47</sup> The results strongly bore out Reicher and Hopkins (2003) work on the trait of successful leaders to be able to actively construe a high level of group identity and group norms (prototypicality) in change or crisis situations

L4's strong individual identity created low group prototypicality, and as the situation became more ambiguous this seemed to be a key factor in the change from staff liking and trusting him to still liking him but, as trust diminished, no longer seeing him as effective (Reicher & Hopkins, 2003), especially in the majority of staff who were culturally disposed to closure and stability. Due to L4's secrecy around decisions and lack of engagement on complex problem solving at any level of the organisation, there was no observable increase in cognitive complexity or shared mental models of purpose and values.

## Theme 4: Complex decision making (CDM)

### Findings

Chapter 2 proposes that successful complex decision making leverages intuition, as both are unstructured and deal with disparate information and ambiguity, which alerts extended cognitive, behavioural and emotional resources to increase rationality and tag values (and consequences) to decision outcomes (Wenstøp, 2005); (Hare, Camerer, Knoepfle, & Rangel, 2010). Observation of the four leaders revealed distinct differences in their ability to make complex decisions and this appeared to align with their levels of observable emotional maturation, in particular empathy. When successfully unravelling complex problems all of the leaders portrayed behaviour indicative of strategic schemata and / or cognitively complex maps, even if it was only in domain specific situations for L3 and 4. Interestingly confidence and former success appeared to have different effects on L1/2 and L3/4. All of the leaders were confident, and had met with career success, but in the case of L1 and 2 their confidence seemed to encourage them to test their assumptions and mental models, whereas in the case of L3 and 4, their confidence and former success appeared to act as a filter which discouraged such testing and in fact narrowed their ability to frame and diagnose issues by simplification of the problem and its variables. Thus for L3 and 4 confidence and former or perceived success were strong heuristic biases which limited the testing of assumptions and the recognition of complex problem variables and their inter-relationships (Stubbart, 1989). The bias of perceived control was high in L3 and 4 and this appeared to add to their decision making confidence, whereas L1 and 2 were aware that they were not in control but were comfortable that they could steer, and work within, the situation anyway. This different type of confidence requires a deep 'systems awareness' around how the organisation connects and interacts, and how to balance control and emergence. As an example, when there were (inevitable) complications in the process, the leader's reactions differed considerably:

- L1 had an idea of the issue, engaged personally with a relevant number of staff, elicited and elaborated ideas and acted, or empowered them to act
- L2 did the same in a more structured way, quantifying the blocks to remove

- L3 initially became irritated and blamed individuals. He then reflected, asked questions, and either advised, allowed others to act or stepped in and took total, temporary control. Thus only emotionally resilient managers took direct action.
- L4 was not happy when problems occurred, faulted planners or implementers, interacted by telling people to improve or to give instructions, and rejected information regarding cause or solution if he did not agree with it.

The behaviour of L1 and 2 appeared to increase and follow theoretical findings of rationality in multi-criteria decisions by emphasising values and subjectivity (emotion). There was noticeably less of a tendency with these leaders to apply known fixes, and instead they explored the situation sufficiently to regularly develop new approaches, suggesting the building of associated new schema and comfort with heuristic 'rule breaking' (Gupta, et al., 2009). This allowed them not to reach for the hammer until it was assuredly a nail they were dealing with.

## Case Study Results

In this section I will give examples of complex decision making in each organisation, but will expand them to integrate some of the other relevant factors at play in order to illustrate the impact of the differences in leadership cognition, capabilities and dominant logic style on not only the decision making capability of the leaders and their staff, but the directly related impact on the wider adaptive capability of individuals and the organisation

### L1 and L2

Specifically related to CDM

L1 and L2 showed an expert level mix of analysis and intuition which allowed them to both recognise patterns and connections in information or situations, and fine grade distinctions that simple cognitive scripts fail to differentiate. They appeared highly competent in combining intuited knowledge with relevant real time information and requirements. The ability to handle complexity and ambiguity was enhanced by self-checking and experience, and the courage and trust to act on something untried in order to realize goals even when the outcome was unclear. L1 was more eager to step into the fray here - an example was the decision to use 'risky' methods such as the voting in of managers and design of the organisational structure in the transformation process. He regularly followed the 'act as if' model of

decision making rather than that of a 'rational' identify-evaluate-enact model<sup>48</sup>. However, action was taken with accurate (fast) evaluation and a deep understanding of the system.

L2 used more analytical techniques, but still trusted her capability to step into an untried situation, and her more methodical approach meant that contingencies were usually available when required, whereas L1 had to improvise more.

Both leaders' apparent conceptual depth allowed for a wide range of responses to various problems and more accurate scanning for relevant information which left time to seek out and weigh up disconfirming information to test the decision. This was obvious in L2's decision not to overrule her executive group's hastily designed new structure but to help them discover its flaws (see next example box).

Both implemented a complex, emergent change process which included the ambiguity of untried methods and the dissipation of old thinking / doing to allow emergence of the new. Both also established decision making tools for their management groups: - L1 used six hats to push all members to use innovation and reflection in operational decisions and L2 used more traditional analysis but sometimes in untraditional ways, such as reversing questions or assumptions and robust scanning methods.

### Expanded view of integrating other factors

L1 and 2 appeared to consistently demonstrate high cognitive complexity, social cognition and intelligence along with an expert level of leadership maturation, specifically a collaborative identity focus, mature meta-cognition and appropriate emotional regulation. As stated previously, both were highly intuitive and comfortable with allowing the expert knowledge to be intuitively applied as a valid part of complex decision making. This was a clear factor in shaping the intuitive complex decision making capacity of the group as the leaders invited rather than excluded knowledge and information which could not necessarily be 'linearly traced backwards for validation' to be put on the table along with the real time data available to them. In doing so, the leaders enabled an increase in intuitive, conscious, complex decision making habits in the groups they managed.

This was a deliberate strategy as both L1 and L2 considered that the best quality strategic solutions combined analytical techniques, intuition and supports the research concerning a resultant increase in recognition and consideration of more of the essential elements and critical issues involved in a problem. Such activities also offered script building opportunities and decision making permission which appeared to increase cognitive complexity in both the team and individuals.

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<sup>48</sup> Gartner's 'act as if model' is aligned much more with Saarinen & Hämmäläinen's Systems intelligence approach of realistic, hands on optimism (Hämmäläinen & Saarinen, 2006), or Sarasvathy's 'effectuation model of causality' (Sarasvathy, 2001). All act before the opportunity identification and evaluation process is finished (or sometimes formally started).



## L1

L1 had an open style with his managers which mixed an expectation of skilled, collaborative problem solving and technical knowledge with permission to take the discussion on a 'creative tangent' if the individual or group considered it warranted, in order to gain valuable insight or knowledge.

While most of the management team were able to balance both of these activities there were a few who were either strong in their opinions / specialist bias (thus minimising collaborative interaction) or who used permission to be tangential to 'naval gaze' unproductively.

After a candid discussion and brainstorming session, L1 initiated two formal activities to increase skills and awareness around these issues. The managers underwent six hats (De Bono, 1985) training as a group, and then a facilitator role was created to assist the adoption of changed behaviour over the following 6 months until this method of running a problem solving meeting became embedded. This stopped the opinionated members (one of whom was senior) from taking over or donning the black hat at everyone else's suggestions, giving the others in the group a method of agreed discussion structure. It also reigned in the 'green hats' to an allotted time and purpose.

The other activity implemented was a 'Toastmasters'<sup>49</sup> program which ran for a number of months on site (after hours each week). This was chosen when brainstorming revealed that an issue for various managers was the ability to concisely argue a point or idea, resulting in waffling or blustering, and frustrating constructive discussion. The Toastmasters program was a success, and also acted as an excellent team building exercise for this (new) management team. An ongoing bonus was that over the following year, if members of the team began to slip back into their old behaviour of waffling, the timer was placed in the middle of the table and acted as a cue to stay on track<sup>50</sup>.

## L2

When the process of transformation began in organisation 2 it was agreed that a new operational structure was required to better meet the purpose and outcomes of the group and its customers. The senior management team had come up with a new structure within a week but it was another siloed technical structure to replace the siloed technical structure they had.

L2 decided not to overrule her (new) management team, but instead engaged in a 'self-organising' discovery process, 'parking' the new structure and allowing a period of what she termed investigation and

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49 Toastmasters International is a non-profit educational organization that helps members improve their communication, public speaking and leadership skills by learning the arts of speaking, listening, and thinking.

50 One of the tools used in toastmaster training is a traffic light timer that visibly counts down the stages of the three minutes given to the speaker to put forward an argument. When the red light shows, they are stopped!

validation to ensure the structure would be bedded in well. L2 prompted the management team to collect a wide range of data, opinions and information from multiple sources in order to work through the 'fit' of the mooted structure.

She exposed the team to many complex problem scenarios over the course of the next 12 months (while the governance structures and staff were aligned with the requirement for change) there were weekly transformation management team meeting as well as structured activities to assist in building complex problem solving skills.

The second year found a maturing management team which tackled complex decision making differently, had identified the flaws in their structural model by themselves, and was building a new one based on technical service outcome requirements, with input from customers and a high level of input from staff.

When the final shape, infrastructure and implementation had been planned, a two day workshop offsite was run where the management team used varied decision making tools to ensure that they covered the 'known-knowns' and known-unknowns', and had early warning feedback processes for the 'unknown-unknowns', along with contingencies where possible or practicable.

This was a vastly different team in terms of group cognitive complexity and intuitive complex problem solving capability.

It would appear to be the case that this not only allowed intuitive complex problem solving to occur from the natural intuitors, but that this also nurtured the ability for leadership intuition and allowed the latent complex problem intuitors to grow their capability. (The empirical evidence from the case studies was that there were more intuitors in the management groups of organisation 1 and 2; less in organisation 3 and there was little evidence of any in organisation 4).

L3

Specifically related to CDM

L3 enjoyed making complex decisions regarding novel issues or situations, and his ability to accurately diagnose and frame new strategic problems, was high. There was, however, a shift towards the application of known fixes when he had personal experience already in the area, especially if he perceived that he had been successful (this perception was not always validated by other participants). L3 then tended to define new complex problems by analogies to situations where he had been in control. Consequently he was less open to disconfirming information and could become fixed, only moveable by someone whom he trusted as credible, rather than by information. This would suggest that the associated

empathy elicited emotional rationality and values driven decisions (consequentialism), allowing reassessment and room to move.

### At a more integrative level

L3 was inconsistent regarding problem solving and decision making which included intuitive consideration of potential evidence or issues, both in terms of using it and allowing it. Direct observation of his style bore out the contention that leaders who can only work in one mode at a time (cooperative or competitive) are at a disadvantage compared to those leaders with the requisite cognitive and behavioural skills to work in modes simultaneously (Denison & Hoojberg, 1995). The mediating factors appeared to be his level of technical confidence and bias in a specific area; his personal relationship with the individual offering input, and his mood (partly linked to stress level).

This potential for disharmony tended to dampen intuitive and creative problem solving in general as the qualitative nature of input was easier to pick on when the situation became difficult. The other reason it was minimised was that L3 only tended to use abstractive discussion away from his management group, such as at a small dinner with hand-picked participants.

However, L3 could be good at developing new strategies and ideas in low stress, novel situations where he was quick and intuitive to work with. This happened sufficiently often to allow the resilient complex thinkers to maintain momentum. These individuals were also more adept at engaging L3's empathy, and knew he would "settle down and listen, or think about it and come back" (Operations Manager). However, this took continual effort from those who interacted closely with L3, and though they maintained a level of trust in his commitment, along with personal fondness for him and an accurate appreciation of his skills, it hampered increased cognitive complexity and the building of organisational adaptivity.

### L3

Part of the ongoing activity during the transition research period was feasibility planning for meeting a 25 year tender. This required analytical rigour in terms of technical capability and requirements as technology changed over that extended time period. It also required an intuitive speculation in regard to such aspects as what the technical possibilities may be; changes in client requirements, and what the organisation would need to be able to achieve twenty five years hence.

The bid team comprised of an array of outside consultants, along with an internal bid manager, engineer, finance specialist and L3. This group was housed interstate for a number of months to be close to the client and each other for regular meetings, and tended to eat, drink and work together for the week as

that was L3's style, only going home to different states on the weekends. Operational people would be canvassed for specific information, but most of the speculative work was also done by this team.

Initially the group brainstormed constantly and L3 led a number of high quality CDM sessions. As the weeks passed the pressure mounted as the bid team were between a client who lacked efficient complex project tender processes and the parent company that was unwilling to acquiesce to overseas requirements. The combination of stress and increasing familiarity with the group seemed to lessen L3's willingness to collaborate or listen to disconfirming information; he became intolerant of hurdles and technical problems, looked for people to blame, often shouted and made autocratic decisions instead of listening to ideas and problem solving. Quality decision making dropped observably during this, and one core person left the team. (The resultant bid was not accepted and had to undergo a major review).

Individuals with natural leadership intuition and capability for CDM still existed in organisation 3, but because of potential conflict with L3 they became skilled at framing the solution non-intuitively. However, those who required nurturing to acquire or improve their intuitive problem solving skills did not do so, as nurturing was sporadic and could potentially become difficult. This reflected on a number of aspects in regard to L3: including emotional regulation, relational leader identity and social cognition (as the primary factors for allowing intuitive complex problem solving and creative abstraction were his personal feelings for the individual and his mood). It also appeared to be related to heuristics of need for control and selective perception in terms of his inability to recognise the effect of his behaviour on the complex problem solving capability of his staff, even when this was raised specifically.

L4

### Specifically related to CDM

L4 portrayed a combination of domain specific expertise and general intelligence, with strongly perceived self-efficacy, control and success. He was able to absorb and analyse large amounts of complex information and he was skilled and accurate in his area of expertise. Interestingly this was his initial approach in novel situations which he initiated (and thus perhaps felt control over) such as the initial stage of the transformation project, but he would quickly bound analysis if he became uncomfortable with the direction of the process. L4's low level of empathy appeared to result in less emotional rationality than the other leaders, and to decisions driven by personal or positional appropriateness or gain rather than consequential criteria. This included the criteria of 'the common good' – a decision criteria evident in the other manager's judgement, and central to wisdom (McKenna, Rooney, & Boal, 2009). When combined with L4's lack of trust and high need for control, the result was that L4 shared strategic information and decisions with no-one, including his strategic team and his handpicked 'future strategist'. Instead, such decisions were made in an ever increasing vacuum. A lack of systems intelligence was evident in

decisions which failed to take into account the way the organisation connected and interacted, or the capability to balance control and emergence.

### At a more integrative level

L4 did not allow abstraction or intuitive input from his executive or management teams. Any input brought to the table by managers and executives that could not be factually validated and quantified was deemed irrelevant. L4 appeared to genuinely enjoy such discussions at the start of the transformation process with the three person transformation team and showed interest in new concepts as they related to his organisation. However, as the discussions (and the process) included aspects of change outside L4's comfort zone or direct control, he exerted stronger limits and evidence increased regarding strongly linear meta-cognitive processes (Lord & Hall, 2005). None of the change feedback or plans were shared with the executive or management teams, and as L4 had committed to debriefs as part of the process, this created frustration.

There were very few obvious intuitors evident in organisation 4, apart from the strategic futurist. There are a number of potential reasons for this:

- The complex intuitors were there but not allowed to employ these decision making processes
- The complex intuitors were at a minimum as they did not remain in the environment
- There was little development of intuitive decision making habits (or script building) as only analytical techniques were allowed
- There was limited script building as exposure to multiple scenarios and complex decision making was extremely limited (Goodwin & Ziegler, 1998)

L4 did not reveal the combination of high cognitive complexity, social cognition and leadership maturation seen in L1 and 2; nor did he display a collaborative identity or empathy. He did not reveal any intuitive process as part of complex decision making, did not share real time information he thought sensitive and restricted opportunities for his direct reports to develop scripts through brainstorming and exposure to variety in decision making.

### L4

Organisation 4 was in a state of flux. There were both overt and covert change agendas (transformation and merger) with restricted methods of strategic scoping and problem solving. L4 maintained a separate strategic executive team and senior management team (which he would not amalgamate), resulting in a lack of any cohesive view of information, joint debates or problem solving activity at the senior level.

Meetings and agendas were tightly controlled by L4 and based firmly around analytical techniques and restricted information flow (both from L4 and to him from the senior teams). During one-on-one interviews a number of the executive commented that: “you don’t tell him what he doesn’t want to know”. All of this minimised strategic capability and CDM at the level of both the team and of L4 himself.

Scanning and strategic accuracy were further limited by the way in which L4 gained strategic intelligence. The strategic futurist (head of a special department designed to plan for the organisations future) described his briefs from L4 as single parts of a jigsaw puzzle that he had to piece together while trying to guess what the other parts looked like. No matter how strongly he made a case for gaining a superior outcome if given a wider view of the situation, or his appeals on the basis of professional frustration, this was refused. The planned merger was kept secret in terms of L4’s transformational restructure process, and though there was an increasingly obvious hidden agenda which drove decisions as well as requests and activities that did not align with the transformation, the merger was not divulged until it occurred.

## Theme 5: Leader Skill Maturation

### Findings

The literature search outlines critical leader skill maturation factors in developing deeper cognitive structures associated with leadership expertise ranging across leader identity; meta-cognitive processes and emotional regulation. There is some obvious overlap with other trend factors, but their entangled maturation identifies some unique trends. Across the four leaders, performance appeared to range in skill level from novice to expert and there was evidence that unique skills had developed when the leader’s sense of identity and leadership activities were grounded in overt, coherent, self-relevant, authentic values. Empirical research supported the current theoretical position that behavioural, cognitive and social skills develop at different rates and were not able to be fast-tracked.

Another aspect of current theory which was supported is the requirement for different learning experiences – it was relevant that L4 was the only leader to have been fast-tracked yet he exhibited the lowest level of leader skill maturation as well as other listed traits, some of which required ‘proaction’ on the leaders part to actively seek the situations in which maturation occurred. L1 and 2 did this. L3 did it to an extent and L4 avoided such situations. There was strong evidence of qualitatively and quantitatively different capabilities in knowledge and information processing across the four leaders.

The leaders with higher levels of overt leader maturation showed evidence of meta cognitive processes which had developed to the ‘expert’ level of abstractly organised, deep, coherent knowledge structures, as these leaders spent more time on interpreting and planning and less on searching for solutions (Lord & Hall, 2005). Identity ranged from centering on individual uniqueness in L4, through a relational focus in

L3, to a collective focus in L1 and 2 based around group and organisational identity. These had become 'true leaders' who, in practice, elicited the same move in followers over time from an individual focus to that of the group (Lord & Hall, 2005), and who raised the median quality of relationships in their direct reporting group(s). L3, however, created a mixed set of relationships in his direct reports through a level of (shifting) favouritism and his comfort level with individuals. Interestingly, empirical evidence showed this to lower the quality of team member exchange (Dasborough & Ashkanasy, 2004), but only in the less mature members of the team.

L1 and L2 combined a group centered approach with an understanding of individual followers and how to lead them. Emotional regulation appeared higher in L1 and L2<sup>51</sup>, and they displayed higher levels of behavioural and emotional flexibility, as well as social intelligence. Pragmatic optimism and flourishing increased in organisations 1 and 2 as the leaders framed more situations as opportunities and this set up the willingness to approach the situation, whereas L3 quite sometimes framed situations as threats and there was noticeable avoidance. L4 either did not frame the situation at all, or he named them opportunities but once a pattern was established of such situations having threatening consequences such as stress, more work, confusion and a frustrating lack of alignment which were not dealt with, he was no longer credible and everything became a potential difficulty. L1 & 2 displayed a stern resolve to take people positively along the path of change with them, but they expected their staff to come on the journey once they were supported. This is a key attribute of the fluent, bifocal thinking which makes up systems intelligence (Saarinen & Hämäläinen, 2007), and showed evidence that these leaders appeared to attain the personal integration phase of Gardiner's (1993) four phases of bifocal thinking maturity. It resulted in a balanced, loose-tight approach to leading (which is discussed in Chapter 5) – as L1 and 2 sensed what needed to be managed and what they would allow or actively enable, to emerge and evolve.

## Case Study Results

### L1

L1's career background gave him very wide exposure to new and different situations which he had often proactively sought out. He had worked in many different countries and industries which in itself displayed risk taking. He took chances within organisations and openly learnt from 'mentors' even at CEO level. He headed up international companies and then moved on to do different things in different countries and industries which took him out of his comfort zone and gave him wide exposure to new experiences. Consistent with the literature, he also appeared to get maximum benefit from such exposure as he was open to new and novel information and ideas.

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<sup>51</sup> Emotional regulation becomes more automatic, with more cognitive time to monitor the leaders own behaviour and performance and richer interpretative standards (Lord & Hall, 2005)

L1 had strong leader identity which was met with both social acceptance and task success. He was the most comfortable of the leaders to step into the 'space of possibilities' and to lead people into the unknown. L1 appeared to enjoy the high social risk of mature social intelligence coupled with an extroverted personality.

L1 had progressed to a collective identity and actively fostered this in people at all levels. He also demonstrated in his enthusiastic approach a systems intelligence bias towards the existence of a solution, and generated a shared expectation of success. L1 was comfortable with admitting he did not know something, following up if he then took on the task to find out but also asking if anyone else preferred to become the owner of the knowledge or expertise. L1 was open in his desire to grow the leader maturation of each manager, as well as the general capability for decision making in all staff, and sometimes this meant taking his managers out of their comfort zone.

Part of the new structure was placing the 3 section managers physically in their operational groups as well as the executive group, which was a change in itself. However, a more challenging part of the restructure process was the voting by secret ballot of all staff on who the new managers should be. This was the major criteria, but not the only one, and was carried out after a rigorous process which ensured people knew what each manager had to achieve, and took the vote seriously. Some of the managers were most uncomfortable with this process, and L1 maintained adaptive tension by being supportive, available, and patient but did not stop the process or rescue them. Confidentiality was maintained (with only one staff member attempting to derail the process when he was not voted in), and those who won the votes for each position ended up successful in getting these positions.

## L2

L2's career background was going from a specialist area (as a librarian) into managing and then leading ever larger groups of people. She entered this highly technical industry, in a hierarchical, political (defence) industry sector, and actively sought challenge. These were initially short term senior roles, perhaps due to her not fitting the normal organisational profile as she was female and had no technical training. However, her success in such roles led, and continues to lead, to long term opportunities (including this case study) at ever higher levels in difficult postings.

L2 was less flamboyant than L1 in her overt approach to new and unusual situations, but was confident in identifying and embracing new challenges, and highly skilled at drawing or nudging people into this next adjacent space. She was also able to demonstrate strong and consistent underlying values grounded in emotional flexibility in terms of not being seen as manipulative or inauthentic when altering leadership methods to suit a situational or individual need. L2 had a strongly collective identity and not only was she able to elicit this in her managers and build it into the culture, but she expected it, just as she considered workable solutions were possible to all issues, and she showed trust that these solutions would be found.



L2 made it clear that she herself would be honest about issues and blocks to both the transformation process and ongoing operations, and that she also wanted the staff to (feel safe to) do the same in order for improvement and agreement to occur. One of the 'surfacing' tools through the 3 year transformation was an annual interview and audit process with each staff member (run by the same neutral but credible party) who revisited all logged feedback, issues and potential issues from the last round. The results were categorised into new, ongoing and resolved issues as well as things which had gone well and unanticipated wins/advantages. The issues were coded in terms of urgency (red, yellow and green), with accountability and timing allotted. The comprehensive document was the basis for various working plans, meetings, activities and information sharing; it was posted on the intranet and a distilled version used for quarterly all-of-staff meetings, monthly group staff discussions and frequent informal walk-around's by L2 to ask for specific feedback. This quickly led to a high level of feedback and pro-activity as a part of L3's approach was that people at all levels were responsible for acting to improve org 2.

The mature, high level meta-cognitive processes of both L1 and L2 have been discussed elsewhere, but when looked at in concert with the other major maturation traits, it was evident that with their years of experience<sup>52</sup>, there was a mature 'self-view meta-structure' which guides knowledge access, goal formation and actions/interpretations of social reactions. The empirical evidence suggests this played a vital role in their success in leading a human system.

### L3

L3 had held senior positions as MD of organisations within Australia and overseas. All of the roles were in the private Defence service industry, where L3 built up a high level of specific technical knowledge (though he did not actually have technical roles), and expert skill in the workings of political and informal structures. L3 used this knowledge and approach to status in a paternalistic style of control over organisation 3 and its people. This worked well in some aspects of the role, but it proved problematic and confining within the organisation as a management approach as it minimised the capability for many aspects of learning, trust, open communication and self-organisation.

L3 had a strong leader identity, but there was evidence of it not having permanently progressed to the collective level of group identity, and the majority was relational behaviour (his identity in relation to others), with occasional individual behaviour (differentiating by his own uniqueness). Interestingly, this only elicited the same behaviour in those managers who were at that (individual) identity maturation stage, with the others remaining at higher levels. L3 was the oldest leader in the study by many years,

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<sup>52</sup> L1 and L2 were in their late 40's and had experience to draw on, but while such experience is necessary in part because some of the above traits take many years to develop, the other key attribute is high general intelligence / cognitive complexity which allows individuals to get more out of their experience as they abstract greater understanding and finer distinctions from it, resulting in greater breadth and depth in script organisation (Mumford, Zaccaro, Harding, Jacobs, & Fleishman, 2000); (Zaccaro & Klimoski, 2001); (Lord & Hall, 2005).

and his success and status at times appeared to constrain the level of cognitive complexity and empathy he displayed. His emotional regulation had become more automatic with experience, and he often did not pay enough attention to feedback to change his approach. He was seen as driven by the good of the organisation/ group, but being inconsistent.

L3's inconsistency showed many facets. He could be empathic and use a novel approach: [the quality manager was young, individualistic and performing poorly. Instead of getting rid of him, L3 sourced an outside 'guru' to mentor for a 4 month period, with deliverables set for the manager, and ongoing discussion with the guru.] He could be autocratic and rude [the bid team had difficult political and technical issues to resolve and L3's frustration in this intensive process led to him regularly shouting at individuals and driving himself and others to work 12-14 hour days]. He could be insular [sometimes when even technical problems may have been solved quickly L3 became a funnel-neck if he considered that he was the only one with the insight to deal with the situation and would not pass information on or discuss the issue]. He could be social and inclusive [the bid program lasted for months and each night L3 enjoyed taking everyone involved for dinner and drinks].

All of this behaviour would still appear to reflect either individual or relational leader maturity, and the effect on his manager's leader maturity was unclear. It appeared empirically that those managers who were already at a more collective level of maturity managed the situation, knowing when to tackle difficult areas and not personalising events. It seemed to impede the development of an adaptive team.

#### L4

L4 had been successful in his area of speciality and whilst still quite young and working for a competitor he was sent overseas on an international fast-tracking, executive development program. He gained quick promotion and early success, and moved to organisation 4 where he headed their largest division and then become MD of a whole group. He was aiming for a position on the executive board.

L4 was strongly individual in his identity level maturation and elicited the same in many managers and staff – he was not a team player and prompted minimal contribution and avoidance of collective contribution which requires trust that support will be given. L4 did not appear to have developed a mature cognitive-emotional balance (what Lord and Hall (2005) term his self-view meta-structure)—and the very strong heuristic biases of success, control and selective perception appeared to affect social, meta-cognitive and identity aspects strongly. There was low evidence of bi-focal capability from L4 as he did not give weight to the human dynamic of a process. L4 did not appear to operate from a complex, holonic, systems perspective, instead displaying quite linear thinking, though it was framed in well-structured 'management theory speak'. On Gardiner's (1993) continuum he remained a dualist, seeing things in fairly rigid black and white.

L4 became prescriptive in the boundaries which he put around the information emerging from the early transformation research work and within the small research group was openly critical to the bearer of information he did not like (R1), accusing them of going 'outside their scope' (though it was in line with the agreed process). Soon afterwards L4 got the chance to present the project to the board as it was getting noticed and was seen as potentially what was needed across international divisions. He strictly controlled what R1 could present in the board presentation, so that when the board chairman and other members (rightly) asked questions outside the strict scope R1 did not take them up. Thus the presentation fell flat, and L4 lost the chance to be seen as strategically progressive. He blamed R1 for "unprofessionally misjudging the opportunity", and denied any part in the outcome when questioned.

Some of the aspects of L4's leader maturation may be seen to validate the theories discussed in the literature search regarding meta-cognitive and emotional skills taking many years to mature, and not "installable" by formal training or 'fast-tracking' (Lord & Hall, 2005); (Raford, 2009). Alternatively, or in addition, his style could reflect the capability to build cognitively complex, abstractly organised, deep, coherent knowledge structures being limited by linear underlying cognitive structures (Mumford, Zaccaro, Harding, Jacobs, & Fleishman, 2000). L4's lack of collective leader maturity appeared to lead directly to a lack of such behaviour in his two teams, even though a small number of them displayed such behaviour at other times.

## Theme 6: Intuition and Emotion

### Findings

Intuition was seen as a useful competence by each of the leaders, though the meaning of the term differed. The literature search section on Intuition uses the term to mean the gut feel which is robust and draws on rules and patterns from perceptual systems that are not linearly traceable, which people routinely use to assist in the solving of complex or ambiguous problems. This is closer to the meaning understood by L1 and 2, whereas L3 and 4 used the term to label what in practice was often a strong heuristic bias that appeared to limit their access to 'chunked' knowledge and expertise. L1 and 2 drew on and trusted an expansive mine of information that they could quickly retrieve in real time and apply to the operational reality they were dealing with. L3 and 4 did this to an extent in areas of domain expertise, but there were limitations which appear to align with current cognitive theory (Patton J. R., 2003) as well as the effect of emotion and the lack of ability to self-monitor. L1 and 2 demonstrated better control over behaviour in response to their own cues, in part through being more aware of them and therefore using 'conscious script processing' (Mumford, Zaccaro, Harding, Jacobs, & Fleishman, 2000) when engaged in fast, intuitive development of new scripts in novel situations.

L1, 2 and 3 made robust complex decisions which appeared to be assisted by instinct combined with analysis of the present situational requirements and current information at hand. L1 and 2 openly discussed the fact that emotion and empathy were valid, and that radar was vital for a leader to be finely tuned to their people and organisation. They also showed evidence of discernment which is closely linked to intuition (Traüffer, Bekker, Bocârnea, & Winston, 2010) - knowing when to bet on intuitive leads, informed by the courage, awareness, perception and compassion to trust in themselves in ambiguous situations rather than try to control it as did L3 and 4.

L1 and 2 trusted in the contribution of others. The three N's of intuition (natural, nurtured or never able - (Patton J. R., 2003)) was born out in this research in terms of the value of leaders who nurtured an intuitive consideration of critical issues. L1 in particular, but also L2, allowed and encouraged this more abstracted style of decision making, whereas L3 and 4 insisted on objective and factual justification of the decision making path. In L3 this partly came from the military culture he was leading. Both L3 and 4 displayed functional fixedness, arguably from their (unquestioned) domain specific expertise. [Note: it was not a 'technical versus service' divide as the first 3 organisations were all technical industries]. The higher level of intuitive problem solving in organisations 1 and 2 was a potential outcome.

## Case Study Results L1

and L2

L1 and 2 both used and trusted their intuition, comfortable to act on intuitive thought and observation. L1 and 2 fitted the profile of natural intuitors, and nurtured the ability to sense essential elements of sound decisions and tune them to real time information in both themselves and their managers.

With regard to their "instantly retrievable, expansive mine of information" (Patton J. R., 2003), both L1 and 2 demonstrated this with insightful, probing questions with those involved in the discussion. They not only showed openness to disagreement, but allowed their staff to work towards their own discovery of valid information and build potential outcomes. Both L1 and 2 had a formal agenda process which analysed what was different about a given situation from similar ones, tested the use of past fixes, looked for unexpected aspects and asked what the best solutions may be if there were no limitations to implementing a solution.

L1 and 2 were also comfortable with showing emotion and empathy, trusting their ability to modulate it appropriately. They were openly friendly and enthusiastic (L1 to a greater degree), but not overly friendly, and when showing negative emotion they maintained control, remained objective and were clear about the issue or situation in order to empower those involved to both recognise and rectify it.

## L1

Though not linked in academic theory, the 'dynamic resonance' aspect of L1 appeared to connect with his strongly intuitive style as he would make 'intuitive leaps' quite publically and with clear pleasure, and then invite discussion in an open and non-defensive manner. He sought input with genuine interest, encouraging intuitive thinking in others as he was very comfortable with it, but then combining this with real-time information as a reality check. L1 often had a high level of self-awareness in his use of intuition. He would act on it quickly at times which appeared to work well in the majority of cases as his depth and breadth of organized knowledge augmented such confidence and allowed him to accurately think on his feet.

L1 'legitimized' intuitive approaches from staff in various ways. Part of the process of improving innovation was the skunk-work Fridays explained in section 4.2. and apart from disconnecting ideas from production outcomes, L1 specifically targeted intuitive hunches as valuable, legitimate and to be shared and played with by others. This was seen as pivotal to their first new invention in years. He also 'repositioned' the profile of the intuitive blue sky thinkers (identified in testing) to being highly valuable resources to the core business.

## L2

L2 had good 'radar' and was comfortable when using intuition, with a level of self-awareness which allowed her to openly test her assumptions and invite disconfirming information. She nurtured intuitive input and reflection from others as well, as long as it was then augmented by analytical reasoning. L2 was more apt to apply logic to test her initial intuitive insights, but over the years she became more comfortable with the non-traceability of some of her most robust knowledge areas, especially after specific discussion on how intuition works and the validity of the outcome.

## L3

L3 had a more situation driven and task specific intuitive capacity, and was the least intuitive in technical matters he was unsure of as his need to linearly trace evidence impeded his trust in chunked information sourced intuitively<sup>53</sup>. This meant he could be pedantic, but was unaware of this and often dismissed feedback initially, sometimes revisiting it. L3 was intuitive, however, in novel situations that he chose to be part of, and he enjoyed the process.

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<sup>53</sup> This aligns with the hierarchical cognitive organisation of knowledge structures from concrete scripts to abstractions – he was less comfortable in formal technical situations as retrieved knowledge became more abstracted (Zaccaro, Gilbert, Thor, & Mumford, 1991).

L3 had accurate political radar and was highly astute and intuitive in this arena, watching, listening and trusting his instincts. On a number of occasions during the tendering process L3 correctly read the intentions of the customer to change direction and with no preparation worked potential solutions subtly into the negotiating process, thus maintaining the front running position in gaining the work.

Regarding his emotional maturity, L3 was not skilled in modulating emotions and empathic judgement. This resulted in behaviour ranging from pleasant everyday interaction which sometimes became too 'soft' with favourite middle and lower staff (which was taken advantage of) through to near abuse with his trusted colleagues if he was angry or stressed.

## L4

L4 appeared to be neither intuitive nor empathic. He questioned non-traceable cognitive instinct in others, yet demonstrated skewed judgement in decision making and problem solving due to his bias for control or success, though was unaware of doing so (this is linked to novice level leadership maturation). L4 was intelligent but his heuristic biases of control and success led to simplification of problem definition and knowledge script retrieval, especially in his specialist area. Intuition also appeared to be blocked by an observable lack of trust and empathy, which affected L4's intuitive ability in two ways: he demonstrated a lack the compassion for discernment and the seeking of advice, and also a lower 'reflective equilibrium' because of the lack of emphasis on values and emotion in ambiguous (multi-criteria) decisions. This resulted in decisions driven by logic rather than consequentialism (Wenstøp, 2005). L4 had little intuitive radar regarding increasingly negative 'feelings' of staff.

It transpired after the transformation project that L4 had been negotiating a full merger which had vastly different requirements and outcomes for the organisation in secret. At no time did L4 discuss this with his executive; his specialist engaged in future strategy or the transformation expert. Each party was aware that information was being withheld and requests for research did not make sense, eroding trust and increasing anxiety. When the merger was announced, any remaining trust was extinguished.

L4's discomfort with intuiting, and lack of understanding in regard to its relevance to decision making, meant that this capability in his executive group and staff was not only un- nurtured but openly challenged and then shut down. The result was limited problem investigation and decision making driven purely by analysis.

## Theme 7: Systems Thinking and the Growth of Systems Intelligence

### Findings

The literature search establishes the position that to lead an emergent process the leader must intuitively understand people and organisations as complex beings. L1 and 2 demonstrated such understanding consistently and, as will be seen from the additional field validation section, this has increased over time. They considered that organisations as well as people learn and adapt, and demonstrated an understanding of connectivity, interdependence, information flow and feedback (both amplifying and dampening). In watching how the organisation worked L1 and 2 watched the interactions and interconnections that caused system behaviour, and tried to define the patterns over time. L3 was a systems thinker, but was not adept at dealing with a complex human system with its requisite elements of choice and intentionality. L4 was well versed in the trendy 'new complexity ideas' about organisations, such as the black swan theory (Taleb, 2007), but his behaviour reflected linear issue definition which appeared to move between the complicated and simple realm of conception. L1 and 2 portrayed Systems Intelligent behaviour (Hämäläinen & Saarinen, 2007), as systems intelligent leaders understand and work with the human aspect of an organisation as a CAHS. They regularly demonstrated knowledge of where to best use their influence, direct intervention or resources to shape the structure and foster interconnections - the use of leverage points (Meadows, 2008). L1 and 2's style of management was to steer and tend rather than try and control the system, which was the approach taken by L4, and L3 to a lesser extent. L1 and 2 regularly considered and discussed the kind of organisation they wanted to build, and over the period of transformation they showed an ever increasing capacity to listen to, and develop a feel for, their organisation as an adaptive system.

L1 and 2 understood that people react the way they think the system will reward them, and reinforced the power of small actions (Hämäläinen & Saarinen, 2007) and micro-behaviours (Losada & Heaphy, 2004) which minimised systems of holding back. For L1 this was a challenge due to staff baggage and potential closure. For L2 it was the opposite culture to the highly suspicious one she took over. Instead they offered faith and a clear description of new possibilities which allowed people to explore what was possible. They exhibited a 'bifocal' approach to leading a human system – dealing with both the operational requirements and logistics and the human dynamics at the same time. L1 and 2 appreciated the effect of human choice and of the positivist elements of flourishing (Hämäläinen & Saarinen, 2007), trusting their staff and themselves to act, even when not everything was known. This understanding was clearly a powerful source of leverage in building momentum to take on unknown challenges. L1 and 2 ensured the existence of a clear purpose, supported by simply expressed expectations and boundaries, and they publically and consistently showed trust in people to interpret those principles.

## Case study results

The four leaders had their own approaches to leading the transformation process:

- L1 was keen to run an emergent process and fascinated to see how it would progress. He initially spent a lot of time creating a shared vision and purpose, ensuring that people knew he trusted them and watching, tending and stepping in if needed. He removed all corporate blocks during and after the process
- L2 had a more planned approach but still allowed an emergent process. She more closely monitored the situation and used a higher level of more formalized public feedback, but then watched and tended as required. The culture was much less flexible initially than organisation 1 so this meant formalizing more interaction.
- L3 vacillated between his interest in emergent ideas and events, and anxiety at not being in control, at which times he would interfere, setting the healthy self-organising process back. He would then re-commit and step back, enabling others to have an influence for a while until he once again felt usurped. However L3 wanted the change to succeed, and the staff clearly recognised this.
- L4 had a clear idea of what he wanted out of the process and blocked emergence as it occurred. He had to control more tightly as events began to go where he did not wish them to, pulling away from staff interaction as he did so. Meanwhile, L4 was instigating another parallel change. He wanted the process to make him successful.

### L1 and L2

L1 and L2 were Systems Intelligent Leaders. They were consistently able to correctly identify problem elements as they recognised that the hidden dependencies and interconnections around issues. Though neither of them used systems terminology, they displayed systems intelligence by making good use of leverage points to produce large change from small but critically timed action. L1 and L2 understood and discussed the fact that the easiest and most obvious things to change (such as personnel) were not as effective as augmenting how easily people could interact, and both built ways of enabling such interaction in order to try and produce profound shifts.

When L1 asked the group what got in the way of building a great culture, appropriate appraisal was identified as one element. He allowed them to design their own system and they removed technical capability from the appraisal process, building a multilevel data base of self- assessed expertise for mentoring, projects, etc. which greatly increased collaborative work. The appraisal was built around 5



specific values (i.e. integrity) with descriptors for low, medium and high levels of each, rated by 360 degree feedback. This proved extremely powerful in changing behaviour.

L2 was good at enabling people to give feedback in ways they were comfortable with on questions which they would not publically answer. With regard to building a shared purpose, L3 asked people to consider such questions as: “is what we want to do different from what customers want us to do”? “Why don’t some of the customers want us”? “What would they see as most useful from us”? “What do we do now that we shouldn’t”? “What are we best and worst at, and why?” She then asked the customers the same questions, and eased staff into public discussions around the answers. This created alignment and fostered shared goals.

L1 and L2 created belief in the possibility of change and improvement (aiding neurogenesis). They focused on doing right but their fine grained understanding of feedback and interaction also meant they knew when to deal with doing wrong, seeing this primarily as a misalignment of values. Both leaders envisaged leading as a ‘loose-tight’ balance of tight values and a gentle grip, and this deceptively simple capability showed the cognitive weighing of paradoxical aspects of leading such as bifocal thinking and the balance of control and emergence (Hämäläinen & Saarinen, 2007).L1 and L2 demonstrated the pluralistic capability to look at the present in terms of how else it could look at the same time. L1 encouraged reflection and creative play, formalising it when it didn’t happen at first because of cultural baggage. L2 was less prescriptive but encouraged such mindfulness as part of knowledge creation and sharing, and intuitive decision-making processes.

Both leaders actively sought disconfirming information, understanding that once challenging old ways is made safe, transformation is possible as people can let them go (dissipation can occur). They were good at listening to the weak signals and recognising ‘perking’ information (Aaltonen & Sanders, 2006). L2 was more structured in seeking disconfirmation, and her logical approach was countered by quiet consideration and obvious valuing of honest input.

L1 and L2 exhibited a sensitive use of multifaceted, ethical judgement exercised though decisions and actions governed by a long term perspective. They empowered people through fostering shared intention, goals and values to create a common volition to act, either participatively or autonomously, thus ensuring flexibility and resilience in unknown situations, as seen in the examples.

### L3

L3 appeared to work more in the complicated rather than complex area for much of the time in terms of understanding the connectivity and interdependence innate in a system. His systems intelligence appeared to be lowered by confusion with regard to the human aspects of a CAHS. L3 demonstrated

inconsistent judgement, and his attempts to leverage the system or reinforce specific behaviour were erratic. This may have been due to a lack of self-awareness regarding his own inconsistency in reacting to others ideas and behaviour, coupled with his apparent biases of control and selective perception (Schwenk, 1988). Thus his leadership drove the system through the power of small actions, but not always in the desired direction.

L3 held managers accountable for any performance issues from their staff, yet he would over-rule their attempts at performance management if he liked the person in trouble, had an issue with the manager or had been appealed to directly by the staff member. L3 would then complain about ongoing poor performance and blame the manager. Such inconsistent 'permission giving' and unclear agendas blocked staff capability to learn, decide and act, and trust the process.

The power of small actions also worked positively for L3 in one important area – he clearly had the good of the staff and the organisation at heart, and was able to be swayed by adept, emotionally resilient staff. These individuals maintained forward momentum and often took others with them. Thus adaptivity inched slowly forward (often one step forward and two steps back).

## L4

L4 often exhibited strongly linear thinking while considering himself a complex thinker. His linear approach of reduction, analysis and scenario planning strategy left no room for the synthetic approach of sensing, looking for patterns and recognizing interconnections within a CAS. L4 used the term CAS but his actions reflected a conceptualisation of a controllable, freezable, perfectible entity able to be commanded and stabilised from the top. L4's genuine initial commitment to the success of the organisation and a happy workforce was evident enough to engender reciprocal feelings of goodwill through the initial growth of the organisation. This goodwill arguably acted as a buffer when L4 was increasingly faced with emerging properties he tried to control or stop, but the lack of a shared mental model, active disconnectivity and the use of power differentials and information barriers reinforced the growth of systems of holding back and increasing anxiety.

An ongoing issue when attempting to implement an emergent process was the level of dissonance between L4's concept of what was important and the creation of an adaptive, resilient capability. The need for such things as alignment, honesty, connection and shared purpose were not accepted as valid and the identification of multiple structures was denied. Increasing frustration and the need for direct communication was ignored, and the face to face contact withdrawn.

## Chapter 4 Summary

L1 and 2 were able to share their strong, well defined mental models through showing and fostering trust, empathy and often humour which created a sincere connection with their staff. They elicited behaviour consistent with neurogenesis, helping to equip people for the natural anxiety state that a change process elicits. Thus people had faith, a clear goal and a shared definition of achievement, which lowered resistance to change and allowed them to take in more (complex) information and create nimble responses. It invited the offering of disconfirming information which leads to innovative change.

L1 was the archetype of dynamic resonance and 'inspirational' leadership, good on his feet and willing to take risks and deal with conflict (his was the most bold transformation). This meant that on occasion things had to be retrofitted, but his pragmatic optimism and understanding of a CAHS typically met with success.

L2 also understood the organisation and its people as complex systems, and though not as flamboyant as Leader 1 she instilled a deep faith in the capability of herself and her staff to enable an adaptive culture. Her more staid but empathic and consultative approach ensured people could challenge old thinking, offer alternatives and bring initiatives to fruition.

L3 was less adept at this, and inconsistent in approach, but still portrayed and gained a level of trust, empathy and a willingness to enter the new space of novel situations. However he appeared more fixed in high heuristic areas such as technically familiar situations, or those which cued the biases of control, success or selective perception turning down (or off) his radar. L3 struggled with the human aspect of a CAHS and staff had a less clear idea of where they were going, or faith that they would get there. Only the more resilient staff were able to champion novel ideas that were not in line with those of L3, and this restricted adaptive capability. Observing L3's organisation, it resembled a close but somewhat dysfunctional family with a strong, stubborn but well-meaning patriarch.

Leader 4 was young, outwardly friendly and successful, but did not engage at any social cognitive level. His interaction was tightly orchestrated and as the organisation's state of flux increased his lack of willingness or capability to envision a clear and strong mental map of the future in the staff led to positive reinforcement loops of increasing staff frustration, tighter control and decreased empathy from L4, and a lowering of staff trust. L4 was intelligent but powerful control/success heuristics filtered out relevant information and minimised social perceptiveness and behavioural flexibility, causing him to apply known solutions rather than develop new ones. He demonstrated functionally fixed behaviour and low empathy levels, and there was no opportunity for the growth of cognitive complexity or neurogenesis in his staff at any level. As L4's alliances were not transparent with individuals, there was a lack of perceived fairness of relationship quality, which then affected the bonds between his direct management groups. The quality

of the transformational working group was also negatively affected by the strength of L4's individual rather than collective style, and their potential was dampened.

### Note on cognitive flexibility.

In the investigation of dominant logic in Chapter 2, Snowden and Boone's (2007) assertion that a true linear logic thinker can learn to become a complex logic thinker and thus a successful leader is one who can move between states at will was questioned. A lack of evidence for this was confirmed in these four long term case studies, and further supported by the experience of working closely with more than 30 leaders over a 25 year period. While complex thinkers could discern a problem's level of complexity and use the appropriate decision process, a strongly linear thinker such as L4 does not appear able to move into the complex space but remains linear in their approach to complex problems for the many reasons outlined. This appears to align with the theoretical position that they do not have the 'inherent potentials' that are able to be shaped by experiences (Mumford, Zaccaro, Harding, Jacobs, & Fleishman, 2000); (Erikson, 1959); (Jacobs & Jacques, 1987), (1991); (Lewis & Jacobs, 1992), and in practice follow the same pattern outlined by researchers such as Patton regarding intuitive decision making capability (naturals, *latent's* and never will's) in terms of being a 'never will'. This would be a valuable area of future research as it potentially changes how and why leaders are hired, what their role is and how their skills are grown.

## Chapter 5 – Findings from Research Question 2

### 5.1 Introduction

Chapter 5 presents insights into research question 2: What do leaders of adaptive organisations do? The chapter contains relevant findings and discussion regarding how a leader's actions directly and indirectly impact on the organisation and its individuals. As in Chapter 4, the question is potentially unbounded and so the data was analysed using the techniques listed in Chapter 3 (including pattern matching; explanation building; time series analysis; logic model analysis and abduction), and was also informed by current theory and abductive theory building as described in Chapter 2. As actions from such a large empirical study number in the hundreds, in order to paint a coherent picture for the reader and render the information useful to both practitioners and researchers, it has been grouped under the high level categories which emerged during analysis of the data. Once again the results of each are summarised (including comment on their often intertwined nature), along with discussion regarding individual leaders as pertinent.

#### Research question 2 – what do leaders of adaptive organisations do?

The leaders in question deal with complex human systems which adapt. As noted in Chapter 2, adaptive organisations have the capability to learn, respond actively to events and adapt beneficially. But as is now clear, as complex systems they are also dynamic, unpredictable, non-linear and emergent, driven by connectivity, interdependence and feedback, and able to self-organise. Adaptation can in fact be either beneficial or detrimental to the on-going viability of the individual system, and this holds true in a human system because of the paradoxical effect of human choice and intentionality. How the system is structured (including how we shape elements such as org charts, pay/ reward systems and information flow) is a major source of that system's behaviour as its inherent nature is in its interconnections and dependencies. Thus it can be shaped, steered and regulated, and creators of adaptive organisations are mindful of this and reflective of the kind of system they want to build.

Chapter 4 discussed the thinking of the four leaders in this regard to creating and leading adaptive or non-adaptive organisations, as well as the inferred changes in cognition at leader, executive and staff levels. These include cognitive complexity growth, social and cognitive maturation, neurogenesis and the ability to make more robust complex decisions. Chapter 5 looks at what the leaders did to create and lead such organisations, or to fail to do so. The high level themes include how the leaders conceived of their role; what their understanding of complexity looked like in practice; the types of enabling structures / infrastructures and processes they built and why; and how they managed themselves, their people and the organisational dynamics in order to channel emergence and turn their clear sense of purpose and

deeply held values into an adaptive and resilient operational culture. The last part of chapter 5 contains the 'additional field validation study' which details information gained from semi-structured follow-up interviews with Leaders 1 and 2 who continue to successfully build adaptive organisations.

## Theme 1: How leaders of adaptive organisations conceive of their role

In Chapter 2 the holonic nature of the organisation was discussed, partly in relation to the increasing complexity which occurs in the roles at different levels up to that of the leader. This role is at the highest requisite level of complexity in terms of having the widest visibility of both internal and external elements and variables affecting the organisation, and the greatest power to allocate resources, build formal structures and steer the system. This level allows visibility of which areas are in flux and which are relatively stable, enabling the leaders to stimulate or channel emergence accordingly as well as integrate and align the varying states (Hunt, Osborn, & Boal, 2009).

### Flux and Uncertainty

Whilst not using these academic terms, L1 and 2 saw their role as assisting people to deal with high potential uncertainty, and differing states of stability or churn across sections as each were affected by local forces (such as technical or functional changes relevant to them). Through their actions L1 & 2 tried to balance and integrate the continual flux which occurs in ongoing adaptation. This included allowing areas to settle down after a change process in order to ensure local adjustment maximised opportunities. At the same time some areas needed to be nudged into the next adjacent (Mittleton-Kelly, 2003a) and move towards a different way of operating, so 'adaptive tension' was applied while ensuring clear alignment with the organisations agreed purpose and values. Some sections were in active flux as they were in the middle of a change process, and here L1 & 2 offered support, guidance and resources, watching progress closely enough to know which was required.

Both L1 & 2 discussed elements of organisational cognition, understanding that outcomes are achieved through people and are primarily shaped not by their skills, roles and resources but by their attitudes; shared mental models and values; the ability to both elicit and cope with change and their capacity to trust in their leaders and their future. L1 & 2 understood that how they interacted with and influenced their staff had a critical effect on this. They demonstrated a high level of perception in regard to their pivotal role as a leader to ensure people had the faith to let go of old ways and take hold of the new. The two leaders had different ways of doing this, but both pushed themselves and their staff to embrace uncertainty, pressuring people to move into the adjacent possible space but making it safe enough to ensure the anxiety level would not be high enough to cause recursion (Houchin & MacLean, 2005).

## Scanning

L3 was not sufficiently aware of the importance of consistency when painting a picture of the future, and vacillated between applying pressure to change and insisting on the retention of old ways which would get in the way of the process. L4 applied great pressure to adapt to his changes, whilst neither trusting nor sharing his vision with anyone, thus pushing the system steadily down the path to recursion.

Mittleton-Kelly (2008) defined two key roles of a leader as identifying challenges correctly so that problems do not become intractable, and creating an enabling environment able to co-evolve with its broader social ecosystem. All four leaders were aware that they were responsible for scanning the system within, and the horizon, but approached it differently. L3's scan was blinkered by blind spots, and for L4 this was the area of ultimate power and control which was his alone. L1 & 2 showed evidence of the ability to identify and listen to weak signals, new information and feedback. They backed new ways of trying things, and pulled back if necessary, allowing them to support more than one way of doing or trying something before committing to a single path. Both saw their role as providing impetus and resources for change from the top, and allowing change to emerge. L2 was more structured in this process, but both ensured a shared purpose, bounded by the non-negotiables of required outcomes, and a common understanding of how the organisation would operate (values). Thus people were free to innovate. L3 identified some challenges and opportunities with almost prescient accuracy, yet missed others completely and would not take advice from his management team. L4 saw his role as creating and implementing what the organisation needed from the top alone.

Much of what L1 and 2 did over the transformation period was to create 'patterning of attention' through their sense-making capability (Weick, 2001) of isolating and communicating what was important. As sustainable strategy builders they tried to ensure that strategy included adaptation and flexibility rather than planning that locked in a 'known' future. Both were effective in balancing their multiple, sometimes contradictory roles as leaders and integrators of complex, dynamic, open systems. In particular they were capable of making each of these roles very clear. This resulted in the loose-tight balance of trusting and tending which they drove by operationalising tight values and clear purpose, combined with a gentle grip which let things emerge and allowed innovative thinking and self-organisation.

## Case Study Results

### L1

L1 saw his role as both a shaper and facilitator of "the best the organisation could be". He actively scanned the horizon, envisioned new possibilities and integrated new knowledge and ideas. L1 also saw his role as propagating such knowledge and ideas, using his high profile and credibility to paint these

pictures in different forums, with an intuitive understanding of the power of face to face encounters (which he discussed comfortably) to allow his enthusiasm and belief in success to catalyze staff. This was apparent in fast and accurate gauging of resistance and accurate critique, as well as allowing L1 to decipher where to put most effort to ensure all were on the journey from the start. L1 naturally linked what was to what could be, and saw this as part of his role.

To enable the organisation to be truly adaptive the staff also had to think about how they wanted to drive the culture. They changed the performance appraisal to one based on values, and then redesigned the pay and bonus methods along with the laboratory timetable processes to allow for personal circumstances; - i.e. parents of small children no longer had to do laboratory night shifts but worked out ways to increase flexibility for the group in other ways. The bonus was changed to equal shares, and then abandoned in favour of using the money in other ways.

L1 encouraged different change activities depending on which part of the organisation was involved – he was aware of varied states of stability/change and also maturity/complexity that existed and took responsibility for merging these at a corporate level. L1 naturally 'held the space', and most of the time succeeded in ensuring that people felt stretched but not threatened to go there.

During the advanced stages of the transformation process the group had to make difficult decisions regarding the placement of people, and the use of non-performers. They began to disengage with the process in order for L1 to impose order and make decisions. Instead he worked with them to clarify that this was (a hard) part of the responsibility of restructure and they had to therefore own it, while he supported them through the discomfort. L1 also maintained tension at board level while he gained agreement to allow the R&D group to ignore corporate rules and structures. Other examples already given of holding the space are the voting in of managers, the use of an emergent process for transformation and developing 'skunk work' Fridays.

Rarely L1's own high level of comfort with risk and change caused him to underestimate the level of anxiety it could create<sup>54</sup>. However, his radar alerted him quickly to this and he dealt appropriately by reframing rather than rescuing. The high level of trust he showed and earned appeared to act as a buffer, and to assist in the growth of staff resilience for dealing with more complex issues. Empirical observation suggested that L1's high group prototypicality also played a significant part in this.

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<sup>54</sup> The voting in of managers by secret ballot as one part of the appointment process was an example of L1 understanding which managers would be threatened, but underestimating the work involved in maintaining engagement



The transformation approach was a radical, emergent process to build an R&D capability that would be able to meet marketing requirements yet maximise innovation, be values driven and allow appropriate self-determination regarding the use of peoples' skills and ideas. This approach produced both excitement and anxiety as a natural consequence of the group being able to make a large number of decisions throughout the process. There was further anxiety due to external pressure from the board that the change be achieved within 12 months and the output turn from loss to profit within a year. L1 was candid regarding the size of the challenge but established hope and a shared, positive vision for a new entity. He remained supportive throughout the process including challenging when necessary, and resourced the process as required. He allowed experimentation even when he thought it would not work - an example was the vote to flatten the classification structure completely. L1 warned this may not work in practice but allowed it to be voted in and then changed within 6 months when it became obvious to experienced, expert staff that there was legitimacy in differentiating to a degree.

## L2

L2 took on the leadership of organisation 2 at the beginning of the research period, and considered the role was to create a resilient, cohesive and highly skilled organisation, aligned to customer and governance requirements. L2 was cognisant of the 'lynch pin' nature of her positional power and engaged up, across and out until alignment occurred. Though less gregarious, her social cognitive style and high group prototypicality allowed her to pay attention to what was important and communicate it accurately. L2 allocated resources by recognising which parts of the organisation were stable and which were in a state of change (flux), where she identified valuable 'new' ideas and potential innovation.

L2 had a number of areas which were in different states of transition. The front of house section required direct assistance as it wished to change its structure and processes to better align with agreed customer focus, so the staff wanted support and resourcing for large changes. This contrasted directly with some 'back of house' specialists who did not want anything to change, and here L2's effort was spent on gaining acceptance of the fact things were going to be different, and an understanding around why, in order for the group to proceed with deciding how to achieve agreed outcomes. The network technical group had implemented new technology but was not yet working smoothly. Investigation revealed a very strong individual who was highly skilled in his technical area but functionally fixed, and would not accept the new technology. L2 rewarded the others openly while convincing the blocker to become the expert in the new technology. He became its champion.

L2 picked up on anxiety and, like L1, she dealt appropriately with it by making the person or people feel supported but still under tension, rather than 'fixing' it. Part of L2's stated role in the culture she had inherited was to eradicate truculence, which she did successfully as within a year her candid, transparent but empathic method largely eliminated this tendency.

L2 considered that communication was critical and built methods for two way flow (many face to face) to ensure everyone remained aligned through the federal governance chicanes that threatened to derail or blur collective purpose. She was highly skilled and persistent in aligning upwards to secure an ongoing capability to pursue a transformative process. L2's deliberative but open style and clear values created behavioural consistency across the multiple roles, and an understanding that she expected all to take responsibility to come on the journey, and could trust that it would be travelled together.

### L3

L3 saw his role as two fold - scanning and connecting with the external environment to position the organisation advantageously, and waging a continual battle to align two large bureaucracies with conflicting aims, both of which directly impacted his organisation. He was skilled at both, but was much less clear and capable in leading the organisation. The tender for a large, new long term project also took a lot of L3's time. His paternalistic approach to the role of MD meant that strategic positioning was not optimised when he made autocratic decisions shaped by technical bias, but this was uncommon. In the majority of cases he secured and allocated resources effectively and efficiently but sometimes there was inadequate discussion on plans or requirements, leading to inaccurate prioritisation or frustration if people did not then act as anticipated.

L3 could be highly perceptive regarding picking up weak signals from the external environment and would involve his immediate team in investigation. Largely the outcome was successful innovation as he would allocate time and resources, push people into the space of possibilities and manage avoidance systems. However, he could also be autocratic and actively dismiss signals even as they got louder depending on their source or nature. While this had been a viable process before the case study period, it had become an issue as adaptive capacity was low and operational knowledge on how to improve 'fit' with the customer was not being listened to and maximised by L3 in his role as MD.

While organisation 3's major function was fixing and maintaining a specific armoured vehicle for the Federal government, they also worked on tank turrets for overseas vehicles. L3 considered this was not a fit for the organisation and wanted to stop the work, even though it was the cash cow for the company. He removed them from the strategic plan, reintroducing them after huge arguments with the senior team who pointed out that if the new tender was not successful, there would be no income. They were proved right, but L3 did not acknowledge this and remained vocal in his resistance.

### L4

L4 prioritised his scanning and positioning role, with past success creating confidence and drive that had paid off up until now due to a sharp intellect and high domain specific knowledge in a tightly controlled

industry sector. However he had recently moved from running the large specialist division to heading a group of divisions, and thus the domain specific knowledge was no longer as important. L4 continued to make all decisions on resource allocation and identification of appropriate options and readiness states across a growing and changing organisation. This method had initially been successful and the major division had grown rapidly, but it was now approaching midsize and changing structurally (bifurcation). This made alignment of purpose and goals critical to success. It included both formal and informal agreement around activities and resource allocation during transition, but instead L4 decided on everything in isolation.

L4 based decisions on his own idea of the information required, including what data was relevant, how it would be collected and by whom. He gave each party an isolated part of the picture and requested only quantitative data. This was fed back to L4 who then interpreted it alone. The futurist mounted a valid case for alternative integrated method but this was rejected.

L4 saw his communication role as informing people of decisions and impending events rather than interpreting patterns, listening and eliciting ideas, opinions or information. There was very little loose in the loose-tight role balance due to a high control need and a low level of bifocal capability or enabling leadership. Goodwill faded and trust dropped, confusing L4 as he had anticipated it to rise due to continued growth and a merger. L4 became increasingly frustrated and tightened control further, also isolating the project team engaged in change activities completely. Outwardly this group appeared successful for a long period, arguably due to a high level of existing goodwill, constant image management by L4 and low connectivity which isolated frustration into pockets. Eventually system dynamics overrode these factors and frustration grew.

## Theme 2: How leaders of adaptive organisations work with complexity

There were some definitive aspects of understanding the organisation as a CAS that L1 and 2 demonstrated in their operational behaviour and priorities. Both of them showed an intuitive understanding of people and organisations as complex systems (Mittleton-Kelly, *Complex Systems and Evolutionary Perspectives on Organisations: The Application of Complexity Theory to Organisations*, 2003a). They appreciated the importance of fostering an ability to learn, seek patterns and adapt at group and individual level, which is what Gupta et al (2011) consider differentiates a CAS. Both L1 and 2 talked about and leveraged the informal grapevine in the organisation, showing an understanding of the complexity feature of information flowing along human networks. Another aspect of human systems that both leaders appeared to understand was the effect of human choice and intentionality on the organisation. Both discussed the need for people to feel they had some control (choice) over what was happening as this could either grow or stifle reflection and innovation, encouraging adoption of new ideas, artefacts, and methods. L1 and 2 demonstrated an understanding of the intentionality paradox

(Gupta & Anish, 2011) which pulls people towards both security/stability and excitement/innovation. They worked at balancing this tension at individual and organisational level which included balancing the seesaw of introducing changes and allowing them time to be adopted, tweaked and learnt from (sustaining the border between stability and instability).

L3 and 4 were not aware of the tension as something to balance. Instead, in the case of L3 it was something to fix so that he could paternalistically show his people that he knew what he was doing and would look after them. He was then frustrated when their choices did not follow the path he wanted them to, but could not recognise that he was not allowing them to make choices or grow. In the case of L4, the tension was something to control, and he misread it as the positive stress of getting used to a fast moving, growing organisation. As this tension began to pull the organisation further from equilibrium, he correctly identified a state of potential change, but had little concept of what such change (bifurcation) requires of the leader and the effect on the staff (as part of a human system).

L1 and 2 demonstrated a further understanding of the added complexity of flux, in that they were comfortable with managing the different states of stability and instability across the organisation depending on local events and requirements. Both had a (systems intelligent) understanding of the causes of recursion in that they adopted an approach which maximised trust, neurogenesis, shared mental models and support to ensure that the natural anxiety of change did not lead to refusal to take the journey.

These two leaders saw it as 'common sense' that people at all levels (including themselves) needed to stop doing things the old way in order to adopt new practices. Regarding system dynamics concepts such as dissipation, phase transition, bifurcation and the chaotic nature of organisations, L1 and 2 demonstrated a natural understanding of these through their approach to creating transitional change. Both actively looked for and monitored patterns over time by including an events history, and tried to understand its precursors and reinforcement mechanisms. At times this meant just listening to the system (Meadows D. H., 2008) so that they could measure what was important, not just what was quantifiable (Meadows D. H., 2002). This approach allowed them to better pick up the weak signals of potential change (van Eijnatten, 2004a), assisted by inviting disconfirming information. Both leaders took the systems intelligence (Hämäläinen & Saarinen, Systems Intelligence in Leadership and Everyday Life, 2007) approach of actively deciding what kind of system they wanted to enable – L1 spoke of making the organisation "the best it could be", and L2 openly confirmed that an open adaptive organisation was possible even in their hierarchical environment.

## Case Study Results

### L1 and L2

L1 and L2's intuitive understanding of the organisation as a steerable complex system driven by human choice meant that both concentrated initially on creating in their people an intention to adopt a new way of doing things, having decided that the old way is no longer advantageous. They had a noticeable capability to manage avoidance systems (both their own and others) so that the organisation and its people (system) remained under pressure and movement occurred.

### L1

L1 was intent on creating an innovative culture as this was critical to viability, and he investigated the resistance created by the former boss reinforcing low risk behaviour and punishing creative ventures that did not result directly in profit. He made trying new ideas safe (increasingly leveraging the safety aspect of trying new ideas), and eventually it became habit in the growing low blame, high risk environment (see example, page L1154). L1 was determined to adopt an emergent transition process as he wanted people to grow and mature through the journey as well as own what they created. As this transitional process is not smooth but irregular and discontinuous (van Eijnatten, 2004b) (in practice progress followed an exponential curve), a new structure was designed emergently near the end of the agreed timeframe.

L1 became apprehensive when a surge of disagreement looked like it was going to derail the imminent adoption of the structure. However, he maintained faith in the process and intuitively recognised this as a 'step' or 'jump' into the new (bifurcation point, (van Eijnatten, 2004a)), and was rewarded by the sudden take off of the whole group adopting the new structure and implementing it rapidly. This reinforced his faith in people's ability to push the organisation towards sustainability. L1 enabled connective infrastructure and processes to be built, and decisions to flex and change until things worked as desired while maintaining flexibility. The result is described below.

Through a process of guided emergence, the R&D group came up with a three phase structure with 'semi-permeable membranes' which people could pass back and forward through depending on the needs of the project or task. There were handover processes for the work to move to each phase if no-one was 'going with it', and running across all phases were specialist structures called star teams which ensured continuity of specialist knowledge in an efficient manner. The phase managers sat within each phase and also sat on the executive group.

L1 also allowed staff to have a high level of control over the systems and infrastructure that would best achieve the groups shared purpose. (Example page 131). Many of the corporate structures were radically

changed or rejected by the staff, and L1 championed this at executive level, gaining sanction because of the rapid success of the new entity.

The R&D organisation built systems that captured and defrayed various types of information rapidly and widely. Learning and cross functional collaboration was specifically targeted as areas to improve, and was improved by a multi-level information data base containing everyone's skill level and expertise (self-rated) and experience. This was used for mentoring, project group design and knowledge transfer. The other improvement was the use of 'star teams' - groups of people that sat across the structure and projects, consisting of an expert in the required area (i.e. pelletisation, taste masking) and a member of each team that would use such a process in their project or role. The team members were not expected to become experts, but gained a quick and very useful overview of the impact and requirements of the process / technology.

## L2

L2's use of complex thinking and emergent logic became more pronounced and observable over the time period of the transformation. She had worked in linear, hierarchical organisations and had, in organisation 2, inherited a recursive system reinforced by history and informally rewarded to remain siloed, with minimal interdependence, interconnectivity and therefore no capability for adaptation. L2 took time to understand the system as it was, gauging how such things as information, knowledge, and learning flowed; the state of stability or flux of each unit: how decisions were made and where the capability and responsibility to act resided.

During many discussions with L2 she demonstrated a solid understanding of how an organisation worked as an interconnected system, but initially she was more prescriptive in regard to shaping the organisation rather than guiding an emergent process, having herself always been judged by highly quantifiable measures and time frames. Her shift towards a clear steerage style was evident over the first 12 months and her explanations indicated a growing confidence in both her own emergent style and the capability of her staff to take on responsibility. She handed over more and more of the planning and decision making in regard to what the structure and business processes should look like to the appropriate groups, bounding and guiding the process instead of managing the outcome. Delegated decisions included the org structure, physical location of sub-units, how the customer interface would work and hand-off rules for technical work. This systems intelligence approach continued to strengthen over the whole period as it fitted her dominant logic style.

L2 took time to understand how to best leverage the system, and looked for areas and issues of resistance which she could tackle through appropriate engagement in order to surface mental models and reframe change as both positive and possible. L2 was good at looking at events as outcomes of long

term patterns, and was able to use this information in combination with present requirements to choose the appropriate solution or task others to do so.

L2 used a number of ways to elicit both ideas and reflections on how the organisation worked and what was driving it. Those trends and issues which had identifiable causes or reinforcements were identified (surfaced) through such methods as the rolling audit progress document described in theme 5, (Chapter 4), the risk management log, monthly discussions and personal walk-arounds. Those which were emergent, difficult to explain or had only just started to move were captured in a 'cloudy bits' paper that was not analysed in the same way but tried to capture trends and movements that were not easily quantifiable but had a definite, or potential(undefinable) impact on the transition process. The management group was initially baffled by how to input to such a 'fluffy' method and L2 used intuitive problem solving methods to enable 'gut feeling' and hunches to be seen as valid contributions to discussion and investigation. The 'cloudy bits' document became a major identifier of things that shaped the culture and direction of the organisation and improved their skill in noticing perking information.

L2 also had a feel for the role of informal information flow (along human connections rather than through formal systems) (Wheatley M. J., 2006), and allowed people to set up social and informal ways to get together, often attending to chat and listen. This allowed her to hear the concerns of staff that they could not *formalise*, as well as the weak signals of new ideas. L2 actively encouraged constructive criticism and disconfirmation as tools for improvement of processes and methods of dissipation, and she was adept at making people feel they would be supported. At the same time she expected people to take responsibility to fix what they could, and in this way kept up the pressure to move to different thinking and doing by openly adopting new ideas that supported the clear, shared purpose of the organisation.

### L3

L3 was a systems thinker in terms of understanding that an organisation is complex and driven by connectivity and feedback, but he did not understand how much of this depended on people's relationships and their need to retain a feeling of choice around aligning their actions with their intentions. Thus he often became perplexed about the direction in which the organisation went.

When the situation was novel L3 was good at fostering innovation and emergent thought, but in daily work situations he underestimated the need to foster a shared idea of purpose and direction as he saw it as his role to lead and others to follow, becoming frustrated when people acted in ways contrary to his ideas. L3 was adept at 'following human networks' himself and used this to great political advantage, yet he often did not anticipate or recognise this process in others and as such did not gauge information and decision flow accurately.

L3 was skilled in using informal networks in the political hierarchy based industry sector, often gaining access to valuable information he would not have got formally. He tended to sequester information and place himself in the position where he controlled information flow to the managers, depending on his relationship with them. (this reinforced such information flow in others whose leader motivation was low). When information was then so used by others, running along 'relationship' lines within the organisation, he became angry and subsequently sought to control the flow of information even more.

L3 picked up on the states of flux in the organisation but considered that his role was to bring them back to stability, or to control how change progressed. His lack of capability to create trust and clarity around a shared purpose combined with his inconsistency in terms of permission for others to decide and act. This resulted in limited learning and created sufficient anxiety for people to aim for stability, or wait for a long time before stepping into the adjacent new. At other times people were ahead of L3 in their wish to embrace change, and became frustrated by his need to maintain control and a lack of willingness to listen to feedback. The heuristic biases of control, previous success and selective attention created a tendency to simplify issues. (In systems terms he appeared to default to complicated, linear analysis rather than complex, emergent synthesis).

The transformation process in the operations areas of SA and Brisbane brought managers, operations and administration areas of the organisation together as never before and as it progressed the local managers were the main orchestrators of the change process, apart from flying visits from L3 (based in Melbourne for personal reasons) for an average of one day a week. As the process gained momentum and people began to act on L3's permission to make decisions he became increasingly irritated and behaviours included insisting decisions go through him, interfering in them and reversing those which had already been made or implemented. At other times, L3 would be happy to accept decisions and actions with even greater impact - commenting that the proposal should have been done already so get on with it.

## L4

L4 was well versed in the concept of complex systems and eloquent in his discussion on implementing the methodology, but in practice he did not move out of the linear space of complicated (or even simple) thinking. This was evident in his constant drive for best (rather than adaptive) practice and its proof by quantification of what often ended up being simplistic and even inaccurate criteria, caused by over-segmented tasking and data requests. L4 saw the organisation as something to be shaped and controlled by him, and expended huge effort doing so, rather than *channelling* the emergence he was fighting. When L4 first took over organisation 4, his enthusiasm and rich domain knowledge led to early success and caused people to happily adopt his ideas and methods. However, more areas of the growing organisation started to enter a state of flux, and new parts were created with minimal integration. The result was a lack of network development, resonance, connectivity and shared purpose was sufficiently



disruptive to pull the staff (and system) towards security and recursion. This mounting resistance was reinforced by L4 making constant changes with little warning which he thought would manage the state of rapid growth. No enabling structures or infrastructure was built as although L4 espoused empowerment, he did not wish to enable distributed decision making or learning to occur within the organisation (in complex terms he conceptualised the power differentials as purely hierarchical). Instead human interaction was tightly controlled right up to the level of GM as his direct report, who was restricted in how he could interact with his staff<sup>55</sup>. L4 did not show an understanding of human systems, and as resistance grew he pushed harder for compliance, becoming frustrated and confused by the drop in goodwill<sup>56</sup>.

Part of the transformation process was an investigation of what was reinforcing the organisation (system) to act as it did. This was met with discomfort followed by denial when it revealed a wish for more open communication, inclusion in plans and changes, and less hierarchical control on the part of L4 from a growing majority of staff. The investigative process was informally shut down and, when people pushed to continue, discredited by L4. This only created greater instability, which L4 then tried harder to dampen and control.

### Theme 3: How leaders of adaptive organisations build enabling environments.

The empirical studies in this thesis bore out the theory that the most enduring organisations are diverse, adaptable, efficient and cohesive (Fiksel, 2003). L1 and 2 consciously endeavored to build an enabling environment as they wished to grow social, cultural and technical conditions that facilitated emergence, connectivity and interdependence, without which they knew that their organisations could not adapt – in L1's words they "would not be the best they could be".

Both L1 and 2 simplified their organisational structure, but this did not mean that it was flattened or streamlined into the common misnomer of a 'lean and mean' structure (less positions with more work). Instead L1 and 2 simplified the organisation by working out where each required control structures, and how these combined with sufficient freedom to allow flexibility where needed (loose-tight structure). They understood the role of clear vision and values in driving the design, co-ordination and regulation of many parts of the organisation by assuring common purpose and minimising the need for formal rules and regulations (dampening feedback loops).

It also meant they spent less time working at an operational managing level, with strong alignment around expected behaviour in regard to ethics and values and agreement on what constituted risk and

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<sup>55</sup> L4 had a monthly lunch with chosen staff members of the GM's division as a communication method, but the GM did not come and was not allowed to do the same thing.

<sup>56</sup> This aligns with Lord and Hall's (2005) work on individual leader style taking things personally

how to practice freedom of choice. In short, L1 and 2 used such clarity to empower people to act independently as all concerned 'knew the edges'. The 'formal' part of this enablement was distributed decision making as L1 and 2 were convinced that this was the way people could act on shared understanding.

This was not the case in organisations 3 and 4 for different reasons. L3 was inconsistent in his distribution of decision making authority. At times he would do so freely, and at other times he would distribute responsibility without the requisite authority and then punish when things went wrong (even though the primary cause was L3 not informing the relevant decision maker of his own interference in negotiations, or not divulging all necessary information). The result was a lack of confidence and trust in the power to take action even when both authority and responsibility was delegated as it was potentially temporary. Organisation 4 had no such problem as L4 did not delegate decisions. Even when this became an issue which was directly discussed during the research process, L4 could not conceive of decision making capability at multiple layers in the organisation as a simplifier (Ashmos, Duchon, McDaniel, & Huonker, 2002) but instead considered that it would add huge complexity (potentially based on his high control bias and lack of trust).

Distributed decision making is an element of power differentiation, and this has various elements which were seen differently by the leaders. In the case of L1 and 2, power differentials were considered consciously when shaping allocation of responsibility and decision making capability to the lowest appropriate level. In discussions with L1 and L2, both expressed an understanding of the importance of allocating the ability to act as a requirement to learning and the ability to increase adaptive improvisation in staff (in Kira and van Eijnatten's (2008) terms, increasing cognitive complexity at individual and group level). Thus systems were structured to benefit emergence in ways that increased network development and encourage input into the allocation of resources through gaining agreement, and invite people into the processes of scanning and sense-making.

Removing obstacles, even at corporate or board level, was seen by L1 and 2 saw as reinforcing their commitment to strategic purpose, and modelling risk taking and loyalty to what they believed the organisation was there to do. Their upward management did not, however, come in the form of 'fighting the ignorance above' as both L1 and L2 were aware that this would have painted a picture of dissent and could create a disempowering lack of confidence in the governing echelon.

One of the major aims of both L1 and 2 in relation to the environment they were building was to ensure that the faster a situation changed, the more 'morph-able' the structure was in order to allow for strategic improvisation<sup>57</sup>. Physical structure took human networks into account where possible (Wheatley M. J., 2006), and facilitated rather than restricted flow of information, communication and learning.

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<sup>57</sup> Cunha & Cunha (2006) talk of 'bricolage' component of organisations improvising with available resources

In organisations 1 and 2 the infrastructure was built to allow for the dual states of stability and flex in different parts of the organisation at the same time, ensuring they remained aligned, networked and interconnected. It aimed for information cascade to wherever it was useful. Where possible learning was supported, and outcomes were storable and practically retrievable. Both formal and informal connective networks were maximised and accurate feedback and measurement systems set up so that there was a capability to see what the system was doing.

Processes included accurate and transparent reward systems, minimum regulation loops and procedures that pushed for learning instead of closure and encouraged disconfirming information and constructive criticism in order to assist dissipation and bifurcation. Overt practices of reflection<sup>58</sup> were encouraged and built as part of robust decision making and bedding in learning.

## Case Study Results

### L1

L1 understood the concept of 'simple organisations with complex people' with a capacity for response, bounded and shaped by common purpose and values. He gained clear agreement on priorities, boundaries and 'viability', and empowered the group to design what they considered would work, resulting in minimal, dynamic and resilient structure. L1 waived adherence to corporate procedures and generic infrastructures, allowing local ones to be built that prioritized information and learning cascade, reflection and innovation.

The R&D group implemented a number of information forums including monthly soapbox forums to present an area of knowledge to all interested R&D staff, public and electronic information packages from anyone going to conferences, and designed a large (7 level) 'knowledge' data base (see infrastructure) that was specifically built to support requirements identified by the group. Star teams and skunk work discussions also ensured that information and learning circulated regularly. As information flow is both pushed and pulled out, the R&D staff identified lack of capability to communicate ideas as an issue, and chose three ways to improve - they were all trained in 6 hats and underwent a toastmasters program so that each could articulate quickly and accurately all aspects of their idea. All staff grew in ability to push their ideas out, especially formerly reticent (but brilliant) scientists. At executive level there was an annual review of the formation of any gates or blockages to information cascade.

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<sup>58</sup> Reflection and mindfulness not only link to cognitive and neural processing, but also allows 'surfacing' of beliefs and assumptions which can then be examined and revised.

Many organisational processes were changed, with promotion criteria and bonus allocation built around both stability and flex in the different segments of the structure, the appraisal system changed to reinforce defined values, and formal, overt methods introduced to encourage reflection and innovation.

Pure blue sky innovation had stopped in the organisation because the former CEO had tied operational success to ideas creation. Skunk-work Friday afternoons were formally introduced to push people to play with ideas, to meet and discuss concepts, and to plan cross-functional and cross-discipline collaboration. Over 6-8 months the need for results was de-coupled from concept creation. Innovation returned.

## L2

L2 also gained clear agreement on priorities, boundaries and 'viability', but she had to do this both internally and with the external governance body and customers.

L2 took the first year to set up and work with a number of bodies from governance, management, staff and customer segments to fully investigate and discuss expectations and reasons why organisation 2 existed and what it should and could look like. By the end of the process the level of alignment and shared vision of purpose meant that the transformation process was deeply understood by the majority of stakeholders, both internal and external and alignment was ensured.

With a shared mental model of purpose, an appropriately skilled and structured operation able to adapt to fluctuating requirements was designed over 12 months. Distinct technical sections of the group were positioned using criteria of agreed connectivity, interdependence and informal communication flow. Decision making was shaped to allow for ample freedom whilst ensuring coordination and agreed priorities<sup>59</sup>. Infrastructure was locally designed to capture both information and learning in the formats people wanted to use, rather than single generic formats which often do not suit particular subunits.

One of the things that surfaced during initial investigation into how the organisation worked was a former valuable tacit knowledge capture method that was no longer in use. People had recorded learnings immediately they returned from working on a new problem by putting it into a local shared data system in whatever way they wished while it was fresh in their minds. It was a well-used source of information, learnings, ideas and customer support. The idea gained corporate interest and the local system was put on hold while a large new system was built. 3 years and 3 years of lost data later a huge generic system was put in with strict input rules, and no-one used it. We re-introduced the local, messy capture system and immediately people began to use it again. The benefits were immediate.

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<sup>59</sup> This is what Cunha et al (2006) call structured openness or disciplined imagination.

Communication methods for various types of information were designed collectively to ensure it flowed up, down and across the organisation as required, as well as out to and in from customers – enabling a widely distributed capability for problem solving and service improvement. Scanning and critique was embedded in decision making with disconfirming information a standing agenda item in management meetings. This not only surfaced such information but increased the facilitation skills of the managers to handle such feedback from peers and staff.

### L3

The organisation's role was critical to national defence and required a nimble capability (in an active warfare situation), yet it was tied up in process and bent under inflexible regulations of both the overseas parent company and the Defence Material Organisation (DMO). A major tender allowed L3 to argue for a more aligned process, and the organisation was reengineered to be able to meet its current goals, with the flexibility to meet the long term tender requirements. The technical structure was simple and practical, but supported by infrastructure and processes that enabled flexible decision making and resource allocation that was based on shared outcomes and agreed priorities.

Organisation 3 switched to using the same scheduling and logistics planning systems as their single customer. This had both a short and long term effect. Short term they were suddenly on the planning radar of the customer (the DMO) who automatically began to think of them as part of the workflow, creating seamless handover, increased connectivity and interdependence. Scanning and feedback methods were set up in a similar way, with measurement criteria agreed by all parties instead of being contentious flashpoints. In the longer term the customer began to agree to releasing long lead time hardware to organisation 3 which greatly reduced the lag time between a damaged vehicle arriving and being fixed, and allowed for workforce planning to be more accurate and even for organisation 3.

Unfortunately there remained enough rigid structure and infrastructure requirements from the overseas parent company that blocked emergent structural change. In combination with L3's inconsistent leadership style, the organisation remained (and remains) viable, but there is a vast gap between its present performance and capability, and its potentially nimble and dynamic state.

### L4

L4 correctly identified organisation 4 as being in a state of hyper-growth, but was not able to translate this into a requirement for minimal organisational form. The elements of unpredictability, discontinuity and individual freedom that allow strategic improvisation also require structured openness, delegation and trust – all of which L4 saw as a loss of control. Staff were not empowered at any level (even the executive group) and the lack of information flow and shared sense of purpose minimised connectivity,

interdependence and flexibility. The apparent heuristic biases of control and selective perception (Schwenk C. R., 1988) also caused blind spots for L4, leading to actions such as the denial of a new internal structure co-existing in the organisation.

Early work during the research period revealed a new, robust structure 'nested' within the larger division which was of a completely different nature (a 'call centre' within a specialist division). This required different systems (reward, training, employment, backfill) and explained a lot of the dysfunction. The staff and management of that area immediately recognised the issue and felt empowered to integrate the structure during the transformation process. L4 disagreed that there was a call centre in existence and stopped integrative action. Instead he imposed (simplified) measures of 'success' to fix the (simplified) problem as he saw it. The resulting statistical measures were considered by staff to decrease service but increase potential blame. Goodwill continued to drop.

Feedback designed in organisation 4 was based on regulation loops and measurement mechanisms were quantitative with criteria based on L4's wish to present a high "best practice score" to the board rather than paying attention to what was important. Reward systems followed these measurement mechanisms, and in interviews with staff they saw results as benefiting those who knew how to play the system and look good while not recognising real effort and loyalty. The aspects of learning, disconfirming information and reflection were neither rewarded or enabled, but instead were tightly controlled or extinguished.

#### Theme 4: How leaders of adaptive organisations lead.

There are a large number of individual actions taken in the course of leading an emergent process, and this section will outline major themes that were observed over time in the case studies, with substantiation from the literature where informative. Whilst all four leaders talked of the need for strategic adaptation being greater than strategic planning, only Leader 1 and 2 understood the concept in practice. They embedded it through such processes as risk management aimed at adaptivity and diversity instead of stability and control. They created shared mental models of purpose, values and strategic intention, and supported this with adequate simple rules<sup>60</sup> to enable individual freedom in interpreting how to achieve the clear purpose. These leaders built a flourishing environment through displaying honest, pragmatic optimism and reassuring people out of their comfort zone, while providing safety to explore in a low blame, risk adept environment. L1 and 2 held the space rather than fixing, closing or stabilizing it, by regulating the stress and managing avoidance and anxiety.

L3 found it difficult to maintain the tension on people and the system to move, jumping between pushing when he was frustrated, and stepping in to fix and dampen the tension so that people would feel better

<sup>60</sup> Set around boundaries, priorities, timing, 'how-to's' and exit rules (Davis, Eisenhardt, & Bingham, 2007)

and have faith in his capability. Unfortunately this did not have the desired effect, but it did appear to maintain a level of trust in his caring for the organisation. L4 never rescued people from the tension pulling them into the space of possibilities - instead he pulled and pushed people into the gaping void of the unknown and got frustrated at their mounting resistance and inertia.

Rather than locking in options early and planning their implementation, L1 and 2 recognised when to try multiple exploratory scenarios. They were confident in their understanding of how to monitor, reinforce or stop any of the scenarios as required until a clear way forward emerged. The loose-tight approach of steering rather than control was applied deftly by these leaders, and both displayed a keen sense of timing around when to step in and tweak the system. They implemented accurate systems of scanning the horizon so that people could learn to pay attention to monitoring the system and picking up weak signals.

L1 and 2 knew they were a source of interconnectedness and knowledge flow across the organisation. L1 especially revelled in this aspect of his role, but L2 was also very proactive in ensuring such connectivity. They communicated, showed commitment, reframed and envisaged the future through consistent dialogue and an open acknowledgement that the future would not look like the past. L1 and 2 ensured that resources were available to build the capability for learning and innovation into the organisation's structure, infrastructure and processes. This ensured the capture of tacit and explicit knowledge in ways people identified they would best be able to use it, and encouraged the flow of disconfirming information. L1 and 2 both showed a keen grasp of the need for people to balance the known and unknown in a change process as practical tasks allow the sense of mastery that gives people the confidence to experiment and innovate. Thus they continually tasked people with both reflective and practical tasks to enable them to feel competent enough to step into the adjacent possible.

## Case study results L1

L1 had become leader of the underperforming division midway through a "teaming" restructure, which he observed for a while and then openly acknowledged was not working. At all times through the transformation he engaged often and candidly about the issues while at the same time showing realistic optimism about the possibilities and opportunities regarding change. L1 ensured a shared vision of purpose and strategic intention along with clear values; gained clear agreement on the simple rules and non-negotiables, and confirmed that how the division wanted to achieve it was up to them. He then maintained a watching brief of loose-tight leading, showing trust and only stepping in directly to reframe issues and foster belief in the outcome; to manage negative trends and minimise anxiety whilst holding the space through adaptive tension.

There are times in an adaptive process when negative behaviour emerges and needs to be dampened appropriately. During the voting in of managers the secret ballot process was questioned and one staff member demanded it be made public. There was sufficient candour in the group to know that this feeling was not widespread, and it was narrowed down to one person who was annoyed at not being voted for (he was not a manager, but wished to be). The managers tried to make him feel valued, but when he did not desist in trying to derail the process L1 dealt personally, firmly, and non-judgementally with the individual. The behaviour stopped.

L1 allocated resources in agreement with those affected, and moved roadblocks to enable the group to shape what they thought would work best to achieve the clear purpose and goals, waiving non-legislative corporate procedures and dealing with the angst of other vice presidents who were not ready for such a process. The resultant semi-permeable structure was dynamic, with flexibility enabled by the new processes mainly designed by the staff. L1 backed these changes after a guided process of robust problem solving identified them as best fit solutions.

About 2/3 of the way through the process people became 'over-empowered' and anarchy began to loom along with a lack of focus. Staff that had become used to being able to make decisions were now joined by new people without the maturation or context related to taking responsibility for such freedom. At the same time some managers were becoming 'soft' as they were not sure where the boundaries were. This was tackled clearly by an all staff discussion on how appropriate empowerment worked (requiring a sliding scale of both experience and capability), and the role of the manager in such an environment was discussed and clarified.

L1 was a skilled bifocal leader, seeing himself as both part of and outside the system, and dealing with operational requirements as well as the human dynamics on a daily basis. He maintained the juggling act of managing resistance (his own and other people's, both inside and outside the division) while empowering an emergent process. The outcome was a radically different division within 6 months that hit its agreed viability targets within 12 months.

## L2

The organisation that L2 was appointed to lead was a primary service provider which was not aligned or integrated with its governance body or customers, resulting in a lack of clarity regarding its purpose and an attempt to be all things to everyone. L2 set out on a 3 year journey to clarify and align role and purpose at all levels, and build an appropriately skilled and structured operation that could adapt flexibly to fluctuating requirements over time. She too forged a clear vision of purpose, strategic intention and guiding values, but had more of a direct role than L1 in what the organisation could and would look.



This was not only a style difference – the capability for emergence was not at the same level as organisation 1 when the process began. There was a newly formed management team which had yet to become mature; general dissent through the ranks regarding roles and responsibilities, and no common vision regarding scope or level of optimal service. L2 engaged the whole group in defining such service, and identifying what the organisation might look like in order to achieve it. She also used a process of guided emergence, though more structured than L1. This included the use of various ways to increase connectivity across the technical silos with accurate monitoring, feedback and reward (Uhl-Bien & Marion, 2009) which led to greater interdependency and trust. L2 allocated resources in agreement with those affected and moved roadblocks to enable emergent behaviour and innovation. Some of these roadblocks were internal and L2 firmly but fairly addressed behaviour and processes that veered from clear values and purpose, blending direct feedback with anticipation of success (Hämäläinen & Saarinen, 2007). L2 and her management team maintained direct contact with staff through formal and informal forums, emails and weekly social interaction.

The first year of the 3 year process was largely spent scanning, gathering relevant information from within and outside the organisation (including every staff member), building customer and governance level alignment, forging a competent management team and fostering innovative alternatives from all staff in various forums. The second year this was honed into operational outcomes, structure and processes and an implementation plan was built and consistently tested. Many of the new processes (such as knowledge and learning banks) were implemented, monitored and tweaked until they worked well. The management group melded and matured greatly over the period, shifting to a 'complex systems' approach as a group and designing the new structure with the staff and with high customer input. The third year saw the implementation of an innovative tiered service structure, put into place with no drop in front line service. Another six months of bedding in and coaching was resourced to address the various implementation aspects of such a dynamic process as they emerged and tweak as appropriate.

Throughout the process L2 ensured constant input from all levels of the organisation (both formal and informal) and maintained pressure to move and sufficient support to try, encouraging emergence wherever possible. She asked staff how they wished to engage, and what they would find most useful from her, and in return was candid about what she expected from them (including pragmatic optimism instead of a culture of complacency and cynicism, which markedly dropped in the first year). The organisation became adaptive and resilient even though embedded in a siloed and process driven environment.

### L3

Organisation 3 had a specific role critical to national defence, yet the customer was inefficient in utilizing the service and the parent company interfered with service supply due to bureaucratic ossification and different goals. L3 understood the need for a nimble capability (in an active warfare situation) that instead

was tied up in process, inflexible, nonaligned to the customer and under threat by the parent company. He undertook a restructure of administrative and operational infrastructure and service delivery to gain flexibility and integrate with the customer. The operations of organisation 3 were completely dependent on their customer in terms of scheduling and logistics (when a vehicle was required, when supply of parts could be arranged, whether the activity was categorised as a project). However, none of its business methods and tools were aligned with the customers. L3 sanctioned changes to these business processes which were then 'pushed' into the customers planning process, putting org 3 on the radar and greatly increasing both coordination and communication.

L3 was skilled at political positioning, scanning and strategic adaptation and at times demonstrated clear pragmatic optimism during the restructure and realignment with both customer and parent company. He also understood the value of delegation of authority and shared purpose but it appeared that his control bias combined with a paternalistic attitude often resulted in a lack of information sharing and shared decision making. He tended to move between the poles of the 'loose-tight' aspect of leading – at times leaving people to decide on action almost to the point of abdicating his own responsibility, but most of the time keeping a firm grip on proceedings. Often a lack of information dis-enabled people from making competent decisions, and L3 then stepped in to fix mistakes by micromanaging without adequate discussion, oblivious to his role in the problem or the disempowerment of those involved.

Official audits were mandatory for organisation 3's ongoing preferred supplier status, and the Quality Control Manager's (QCM) capability was critical to viability. The present incumbent was not performing despite a lot of effort being invested in him, and a near failure of an audit caused L3 to direct the Operations manager to performance manage the QCM to ensure that the next audit was successful. A plan was drawn up quantifying what was required from the QCM and the consequences of not adhering to outcomes. L3 then decided he was not comfortable and hired an external person to complete the audit without telling the Ops manager or coordinating the two audit plans. This stopped the performance management process, let the QCM off, and undermined the Ops manager. When the QCM then underperformed again, L3 severely reprimanded the Ops manager for not managing the situation.

L3 had a chosen group with whom he could skilfully generate and explore multiple scenarios with shared input and building of novel ideas. He allowed disconfirming information from this group but could be dismissive and even combative with those he considered could 'handle it'. [The setting was relevant here, as the defence environment rewarded a more hierarchical operational culture. A number of key roles were filled by ex-soldiers who did not see L3 as harsh – they got frustrated at his inconsistency, but acknowledged his empathy and drive to make the organisation successful].

As part of the organisational restructure, the emergent process put in place to decide on the new structures and processes was challenging to L3, but early success in aligning with tender requirements

meant he remained engaged with it. For the reasons noted this did not transit to a transformational process, but it did build momentum for an adaptive operational culture and eventually L3 was replaced.

## L4

L4 was a young, successful domain expert who had moved from GM of the largest division in the company to MD of a group of divisions. He maintained a strong hold on his original division partly because that was his knowledge area and therefore his comfort zone and partly as it was the most successful division which aligned with L4's evident individualistic need to be seen to be associated directly with such success (and this was what the system rewarded). L4 identified that the organisation was changing and attributed it to "a need to implement processes and infrastructure to formalise many of the informal ways of doing business that used to work because the division was smaller and people knew each other" but now were creating inconsistencies and difficulties. This was partly true, but also the high goodwill and trust which had existed was dropping as the organisation was moving towards bifurcation and L4 continued to maintain a high control, high secrecy, low trust approach with friendly but superficial connectivity.

L4 was initially enthusiastic about the transformative process and very engaged with its progress. Whilst not comfortable with all staff having input by personal interview, he conceded and was soon keen to hear of emerging themes in the early stages of the process. However, as strong themes began to emerge which included L4 changing his behaviour (around sharing information, envisioning the future, allowing input to decisions and increasing connectivity) he quickly became discontented and questioned the process. His denial of a major finding of a nested structure within the division that was causing many of the daily operational problems in the division, as described above, was a fairly public example of stepping away from the process when he did not agree with the results, no matter what others felt.

Fast growth was a badge of success for L4, and he could not accept it as a source of increased anxiety for exhausted staff dealing with constant 'surprise' changes. This caused many of them to become recursive (Houchin & MacLean, 2005) once it was obvious there would remain little reassurance, interconnectedness or information for people to explore new possibilities safely. They wanted things to stabilise, and L4 saw this as a reason to push harder.

As the emergent process began to push L4 to adapt, he resisted more strongly. As a mechanism grew for people to engage with him, he drew back further. L4 maintained strategic planning rather than moving to strategic adaption (Fiksel, 2003) and the processes he endorsed were still based on control, best practice, high levels of quantitative monitoring and minimal dialogue at all levels. He became increasingly guarded and ensured no-one had all of the parts of the future picture. Communication was only done through orchestrated engagement with staff on the strategic plan (a glossy power-point ballroom bash) where the emphasis was on continued success and even greater pressure due to continuing hyper-

growth which he framed as success. Even though people were openly tiring of the pace and lack of direction and wanted to engage on how to stop the turbulence, but no two way discussion was allowed.

The culture of high control and low capability to engage in the process appeared to minimise the skills of staff to deal with the increasing complexity. Those who had the skills to do so were a source of difficulty for L4 as they pushed for a more open, emergent process which he was not willing or able to oblige. Though gaining proficiency with the language of organisational adaptability, L4 was unable to move from a linear, hierarchical control style which was now impeding the capability of the still growing and changing organisation to adapt dynamically to its changing market and setting. The transformation process was unofficially stopped, which particularly upset many senior managers who were frustrated and stressed by their ongoing disempowerment, had 'surfaced' this as part of the process, and saw the transformation process as a way forward. Within months the surprise merger occurred and the resultant level of difficulties in the division caused the board to begin yet another external review (instead of dealing with the problems identified in the research process).

## Additional field validation

In 2011 all four cases were followed up to ascertain their ongoing viability and culture. Leader 1 had moved organisations and appeared to have successfully implemented similar changes in his new position. Leader 2 had also moved, and was now in a similar leadership position for a much larger global organisation which she stated she won largely from her success in case study organisation 2. Leader 3 was moved out of the role of MD and given an overseas posting dealing with one of the main suppliers. The organisation remains but has changed to a maintenance based operation. Leader 4 moved into a new role within six months of the case study completion. This was part of a merger which he had been brokering during the case study period, but which he had not revealed to any staff including his executive strategy team. The small level of trust and goodwill now disappeared and divisional performance declined steeply. It was 're-positioned' in the public conglomerate, and within another two months the MD had left for promotion in the lead company.

## Follow up interviews with Leaders 1 and 2

Following analysis of cross case conclusions and modification of initial theory, the next step in the abductive process of this thesis was carried out in the form of field validation. This consisted of a number of semi structured interviews with L1 and 2 who had been successful at creating and leading adaptive organisations. A number of years had elapsed since the original case work and this was fortuitous as it allowed for observation of intervening progress as well as further maturation in terms of both operational skills and cognitive attributes. It provided a long term view of how these leaders had put this into practice over time. The questions were designed to test the nascent theory of emergent logic. Findings were

compared and contrasted, and the theory modified as appropriate. A summary of findings is presented below, with specific illustrative comments from L1 and L2 where appropriate.

## Interview Questions and Summary Findings

1) What have you been doing since we met?

Comparing L1 and L2 in their respective leadership positions and recent history, in the last few years there has been a changeover in that L2's role has become larger than L1's in terms of power differential, while L1 has moved into a more creative, lateral role. L1 remains very engaging, dynamic and passionate about what he is doing and why.

(L1). From becoming vice president of organisation 1 after the transformation, I held a small number of technocratic roles, each involving restructuring of organisations with very important work to alleviate the traits of 'over-divisioned' structure and lack of transparency. I seem to be driven by co-creation and began starting up ventures which get the best possible people to work together, whether it is within the organisation, or across competitive bodies, or building new entities entirely. I became the founding CEO of one of the new entities - a CRC - until 2009, which pulled together 3 competing bodies. I then grew up a new CEO, bedded them in and moved to my current role as head of national strategy, innovation and business in (a high profile cross industry body).

At the end of the transformation project L2 was headhunted to a Director position in a global organisation:

(L2). This was to carry out a similar process to the transformation. They then merged with a company larger than their Australian arm and I was given the merger to integrate, as well as running the company's largest technical service division and joining the board. In November of 2010 I became GM for a high profile program representing over 200 private sector companies and linking them with one of Australia's largest federal bodies.

L2 represents three firsts for her present role – she is female, not a technical expert and not from Canberra. She has become more confident over time regarding her style of tackling complex change, commented that she learnt a lot during the transformation case study experience of building an adaptive organisation, and has gone on to do the same in other organisations. This was typical of her open acknowledgement of others in her own journey of learning, and comfort with allocation of credit.

It would appear from the ongoing success of both L1 and L2 in creating adaptive capacity that possessing existent rich scripts and large response repertoires enables the person to abstract more understanding and finer distinctions from experiences, resulting in even greater script depth and breadth (Zaccaro, Gilbert, Thor, & Mumford, 1991).

An interesting similarity in L1 and L2 is their lack of 'functional fixedness' in regard to their technical expertise in the area they lead, yet it comes about for different reasons.

(L1). I rely to an extent on my technical expertise for the role - not to carry out technical work, but as something which affords me credibility and allows me to understand the people in the industry as well as how it runs.

(L2). I am not qualified in the technical industry I now oversee, and though it has been an issue at first for others, I consider it an advantage as I don't have the dilemma I see with my technical peers who have a natural bias for one technical solution over another. Instead for me they are complex problems to solve, not technical ones.

2) What have been (and currently may still be) the largest challenges in leading a change process?

Both leaders consider the most important challenges are the need to build and show trust; the early creation of a shared mental model of purpose at all levels, and the guiding principles to get there.

(L1). A big challenge is building trust and a larger vision than the group have dared to have, but one that is totally doable if we all stretch for it. Make people fully aware of constraints and measures, judgments, non-negotiables, and then watch as off they go. Working out and changing what gets reinforced is really important, and then reinforcement by small level changes and specific drivers, while at a higher level trying to build a wise organization.

(L2). Building trust and the culture that allows for capability, positive attitudes and high quality outcomes. There needs to be a lot of engagement with staff, especially initially, and overt effort around building a good culture - and then the new structure and culture should be constantly reinforced.

For L2 a large part of building a shared mental model of purpose is building upwards

(L2). A lot of my time initially is managing up in a global organization grown huge with a merger. Often the clarity is not there and I have to really push up and paint a picture so they understand what the strategic changes mean in reality.

L1, however, spends more time building this across different entities as well as within his organisation.

(L1). A lot of it is about recognising what needs to be aligned and enabling natural networks to grow and stream across wherever they need to be. Teasing out the win/wins is critical for people to cooperate across barriers, helping to connect those people and things together and let them solve bigger problems

because of those interconnections. The CRC I created was the solution to a problem of two major blocks; money and a lack of specific skills. It took a lot of building alliances, connecting ideas, neutralizing competitive market pressures with win/wins.

Both leaders spoke a lot about the operational enabling of quality outcomes, clear accurate goals so that the right things could be reinforced and simple connectivity; all of these things can take the group through the 'bumpy' patches of adapting;

(L1). Minimize structured paths such as regular meetings and emails – just talk to and inform each other at the time – it is much more efficient. You also need to develop criteria that are agreed on regarding when to kill a project or activity- this is the other side of ensuring we have the best people and the most current information and knowhow, and allows us to try new things, and also to let them go if they don't work.

(L2). A problem for our group has become our success at change implementation – we are an ideal global pilot site to trial change due to numbers, geographical diversity, a single operating structure and change skill so now we are in the spotlight of a rich parent. The issues arise when its priorities change – last time we were far ahead after looking, listening, aligning and then starting to implement the value add emerging from bottom. This resulted in a start-stop change process with wide reach and no depth, and then I had to manage the frustration of people moving forward who were pulled back and stopped from doing good things whereas other groups had done nothing and it was much easier for them. That had to change!

3) Describe how you apply your 'loose-tight' approach to leading

Both leaders were clear on what is tight: clear agreement on what has to be achieved; the organisation's purpose and what success looks like, as well as the major objectives along the way.

(L1).Tight aspects are clear agreement on what has to be achieved, result measurements and identification of the key things we have to have secured and nailed down at the edges. Then next step is looking at the organisational structure, identifying competent people early and trusting them – daring to delegate and setting integrity as a clear expectation. Then change people if needed in positions of influence, and ensure power is not misused. At the macro level, sort out the significant from the insignificant.

(L2). The tight is keeping them reminded of the goals and vision, and revisiting alignment with the 9 objectives agreed on for the next 2 years.

An example from L2 regarding the 'tight' aspect was her action regarding an executive manager who worked "too much", and still held onto what was now delegable, resulting in very long hours.

(L2). After 12 months of discussion on balance, lifestyle, working smarter, empowerment of his staff and role modelling, I formally docked his time and pay until he engaged with the issue.

Both also spoke of trust as an integral part of the above alignment, both trusting and being trusted. L1 & 2 also have a strong conviction that values drive behaviour, and L2 shares them on the first day in a one to one chat with each new starter, as well as her performance outcomes. With these elements in place to 'steer against', the loose aspects can be encouraged. Both L1 and 2 stated that the values also influence appropriate use of power differentials and capability to act. They consider that it is the 'how' that is defined, not the 'what', which is up to the individual as much as possible.

(L1). The loose is ongoing trust to let them get on with it because they have a clear, strong picture of shared destination.

If issues occur, identifying and addressing poor performance is critical in a human setting. People know there is high risk, low blame, and I won't yell or deliver retribution, address issue as the issue it is and move on quickly. If it was me, admit publically to show that is expected and safe – integrity.

(L2). Loose is the allocation of 'responsibility' for things being carried out – it is not any one person's job to ensure they happen, and I can't do it, but I can ensure a collaborative working environment, good support and delegation and then people choose whom they think is the most relevant for the activity and how it will be done. I get formal information back up the line with quarterly reports, but I am aware through the informal walk-a-round's and communication feedback methods of the status of activity, and whether or not to get directly involved or just watch and enable. The risk is that no single person is responsible for "the 9 objectives", but no one can be, and this way they are done better than any one person could have decided and orchestrated.

The 'loose' part allows and enables people to decide on what to do to get the best result. L1 and L2 both said this is successful because they choose the best people possible for the job, and then rely on the clarity of purpose and values to act as a rudder, and support them with what they need. The comments of both leaders outlined a stance of 'trusting and tending', allowing self-organisation, and only tweaking as needed in a bounded way.

4) How has your style evolved?

L1 and L2 had very different backgrounds.



L1's style has evolved from wide experience.

(L1). At the start I was a bit of a 'lone wolf' to begin with, but I was offered a lot of opportunities to create things with people and I took them. I ran companies in a number of countries in two main contexts: the known culture with well managed matrix management, consensus and quick uptake in somewhere like Sweden, and the culture foreign to me like a Japanese company with ops in 26 countries that involved many cross-cultural communication lessons. That was a large challenge of working in ambiguous cultures where no preconceived ideas were possible, but it taught me to work in total uncertainty, develop and trust radar and intuition, and the use of different power influences and styles for different situations. What became clear was that two way communication, and sorting out a shared destination and understandings on how to get there are the key.

His diverse background empirically supports the work of Denison, Hooijberg and Quinn (1995) who contend that a person learns the most effective leadership skills when work crosses boundaries<sup>61</sup>.

L2 began in an information management specialist professional, but her proficiency and ability to get people to work together and get results led to running complex projects, and then to leadership positions.

(L2). I became head of a specialist library, restructured it successfully and was asked to step in and hold the fort in Org 2 when the MD left abruptly as it was a key national technical service provider. Instead I fixed the system level issues and began to address areas of alignment and strategic innovation. I won the role of MD despite having no technical expertise. I now see this as an advantage as I remained 'out of the weeds' and delegated much of the technical operational management by necessity. I keep taking on larger transformation or integration programs - the latest role involves over 200 technical organisations.

Both L1 and L2 spoke consistently about the importance of intuition and radar as key to successful change. L1 was always comfortable with his, and L2 acknowledges she has grown to trust it and rely on it as much as L1 does.

5) How do you envisage 'connectivity' in your organisation, and how do you grow it?

Once again, trust was the first thing both leaders spoke of in terms of connectivity, as they consider that this influences everything else, requiring them to lead by example, be candid and transparent, and show faith in staff's capability and ideas. This is then reciprocated.

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61 "Boundaries between functions, occupations, companies, industries, and public and private organizations all require a rich behavioural repertoire to bridge, integrate, and manage. Crossing national, linguistic, and cultural boundaries creates a need for requisite variety within the behavioural repertoire of a leader", (Denison & Hooijberg, 1995, p. 537).

(L1). Build and show trust. Lead by example and dare to show it – they will reciprocate. Influence and ensure the flow of trust as it seeps downward. For example, look at cultural blocks to how people connect well, and how those blocks are reinforced – this organisation is fairly a-political so overt ambition is not expressed. A Machiavellian could use connectivity wrongly, so ensure there are no rewards for doing this.

(L2). Connectivity is trust, which can take 1-2 years. I start day one with a personal talk with every new starter to establish clear values and purpose, and share my performance agreement. Monthly morning teas allow both myself and staff to say what's on their mind, which leads to questions afterwards when I do my walk a rounds. Staff can come and talk to me about something, but this is about being there and available for ideas and connecting, not escalation – if they have an issue they go through their manager.

The structural aspect of increasing connections in all directions was brought up by both and discussed, with both watching where the natural, informal connections happen and then facilitating the flow.

(L1). 'Hotwire' the organization - look at who informally cuts across layers, and give them more power. Here that was the junior scientists who were more curious, networked, and less political than bosses and pushed across silos to connect.

L1 also stressed the need to unearth people working on the same things in different pockets of the organisation, and his emphasis was not the transitional reason of efficiency but the emergent synergy gained when people collaborate.

(L1). Actively look for areas where people are working on the same things independently, and get them together – the whole is more than the sum of its parts.

A major part of L1's work for years has been about bringing organisations and sectors together, and he uses the same techniques.

L2 has stepped into a similar role since November, 2010. Both stress the importance even at this level of watching how connections happen, and asking people how they would like to shape processes to ensure that connectivity is facilitated naturally, as it cannot be 'implemented'.

(L2). Set up communities of practice (informal) which puts people into contact with each other across formal structures. In the last organisation I created the role of 'thinker' to allow a senior capability to listen, reflect, interact and ensured they had the power to do things staff and customers see as important.

6) Describe your priorities regarding communication, transparency and information flow.

Both leaders spoke of the two aspects of communication and information flow – informal and formal. They see the unstructured and informal communication that happens at all levels as a major shaper of the culture, and as indicated throughout their case study data, both are keenly aware of the value of face to face communication for fostering trust, empathy, imagination or creativity, or where anxiety may be created. Such direct interaction is not to dampen activity, deny issues or impose closure, but to engage, reassure and make change safe enough to risk.

(L1). Communication needs to be unstructured at all levels. Develop judgments regarding who needs to know what and ensure it can happen. Model the expectation that we will not have regular meetings if we can talk as and when required, and go and discuss face to face instead of emailing – it saves time and increases quality of outcome. Create a 'Water torture of information' culture and know that some drops will work on some people and not on others. When I start I talk to many people, and ensure an ongoing on-line information gathering and feedback capability which I talk about in larger forums.

(L2). You need formal and informal methods, but informally is where we connect. I talk with everyone right at the start on what I see as givens: strong customer focus; teamwork; loyalty; information flow and response on time; the leadership and direction they want; and availability. I listen to what their givens are, and build a common alignment on things that matter to them. Then I reinforce this with face to face informal contact - regular morning tea chats about what is on their minds, walking around asking relevant questions to engage on matters such as specific changes being mooted or required. It doesn't mean we all have to agree, but it lends transparency to decisions and they know what is needed and why.

Good information flow requires formal structures, infrastructures and processes that enable people to access, store and combine information, knowledge (both tacit and explicit) and data as and when they want it. Both leaders had interesting examples of imaginative and even quirky information data bases that were exactly what staff wanted. These led to excellent information flow and collaborative ability but would never have been designed formally.

(L1). The other side of communicating is building good systems and tools so people can share the information they want to. Here we have electronic lab notebooks – they allow for formal records and the ability to easily see who has IP priority, and it is also an ideas notepad for full sharing of ideas. Both aspects make it fair, and so it is well used. The other thing people wanted was an archive capability on projects so that they can pick up tacit and explicit info when they pick up a project. It works!

(L2). After thought and discussion we put in the full time thinker for the group, and through him a lot of multi-directional communication methods have been built. These fuel my walk-around's and allow for informal but concise questions and chats that are relevant. The CEO agreed to talk about current

business every month for half an hour to all staff (this was a first) and that actually helps to align upwards more than downwards.

Both L1 & L2 said that transparency is critical, and is about being honest and candid.

(L1). Just do it. They deserve it and you want it back, so model it.

(L2). The judgement is not about being honest, but in ensuring people are not drowned and that the information is delivered and discussed in a way which is relevant to them. Where necessary, this means different levels of detail for people at different stages of dealing with it.

7) What is the role of risk in creating change?

L1 and 2 both consciously create a high risk, low blame culture that means people can embrace change but feel safe enough to step into the space of the adjacent possible

(L1). I give bite size chunks and initially let them explore at their own pace, nudging them to take on perceived and actual risks – building up their “threshold of daring”. We outline the worst case scenario, and a fallback position if needed.

(L2). They need to embrace change but feel safe. It resets where they think the edges are.

L1 is still more overtly prone to risk taking and uses ‘safe risk’ to push both his own boundaries and everyone else’s in order to get the best doable outcome which he pointed out is often much better than all initially aimed at.

(L1). Place people where they can stretch safely, and stretch them. I ensure strong mentors for myself and my people. When I have my own small group I use the high connectedness to throw someone in the deep end of ambiguity and mentor them but let them grow. Never close your own mind to new ways – expose yourself to new things too. In the CRC I took the stance of “time for another failure” to make risk acceptable, but I am clear that complacency is not!

L2 is quieter but just as forthright in pushing and holding people into the tension of natural flux (instability). L2, like L1, is consciously aware of the need to regulate but not remove the stress, and at the same time to manage avoidance in both herself (not really an issue for L1) and other people.

(L2). Spend time building a relationship, listening, and then reframing – if the group is embittered from former change failures then the second time we interact they have to give me examples of things working well as well as badly. When I say I will fix things so people can stay safe, I fix them. Be honest when this

will take a while, and visible when pushing upwards – I can be seen pushing to board level so people can see that I take risks as well. Differentiate availability and escalation – staff know they can come and talk, and they do, but I am not going to ‘fix’ things – I will support them to do that if they can.

Both leaders stressed that keeping their word was a critical part of making people feel safe and ensuring trust when things that people have risked going for become problematic or delayed. Managing this was more of an issue for L2 due to the change history in the organisation.

8) How do you hold stress in play in terms of ‘nudging’ people into the space of trying new things but not creating too much anxiety?

The major thrust from both leaders concerned regulating the stress of change but not removing it, supported by adequate and wide information access in all sorts of ways and from different sources.

(L1). The organisation needs good systems and tools to enable people to step into the space –we have shared data systems and a common repository so people can see experiences of others in change.

(L2). Both upwards and downwards, I give the bad news as well as the good about the effects of changes, as well as the consequences of staying still. Upwards, I deal with the fact the board still won’t get it until issues occur. So I need to judge what information will turn the lights on. Downwards, I increase interdependence by pushing up contact between parties to ensure tacit information flows. I brief new people on a different strategic picture than their boss because of my different vantage point in the organisation, and I give them homework on strategic principles directly relevant to their job.

Both L1 & 2 talked of their responsibility to make direct contact which is honest and relevant to people, and which reinforces the agreed shared vision of purpose by letting people know things will not stay the same and that the resultant anxiety is normal.

(L1). I try and make them understand that everyone including myself will hop between self-doubt (is it really possible) and self-assurance all of the time, but if we keep moving the default setting becomes resilience, a positive outlook and an understanding that most things are achievable through people. I must minimize fear as complexity is scary – I give examples of success to make change safer.

Both talked of engendering an appreciation of the difference between rescuing people from change and keeping them safe in it. Both also discussed nudging in directions apart from down – L1 nudges sideways as he engages with other people at his level in different organisations to get them to shift what they think is possible. L2 has had to do this upwards (in Australia and globally) more than across, but in her new role she is now in a similar position to L1. L2 described the ongoing need to identify safe boundaries

within which people can explore safely, and this requires the need to ensure meaningful work (De Jong & Den Hartog, 2007).

(L2). I have agreement on how to measure both progress and failure, and I don't blame unless it is warranted as the bravest people can be trying new things so I differentiate.

9) What do you see as the role of feedback and tacit information in building adaptive capability?

Both leaders remain cognisant of the rich vein of tacit information and knowledge that will flow wherever it is needed if it is facilitated and there are minimum blockages.

(L1). Informal communication routes are the way feedback and tacit knowledge travels, downstream, over the fence, and I need to watch how the water ripples and allow that to be the way the information flows. It is my early warning guide so I know when to tweak.

(L2). Tacit information flows when you put people in contact with each other. I ensure that this is enabled.

They both have informal communication channels that they either use directly or just listen to in order to watch "how the water ripples" (L1). L2's creation of the role of thinker is specifically there to better enable a range of communication, information and knowledge flows, often with unrestricted local design.

(L2). We noticed in surveys or change impact studies that issues come up but people were reluctant to engage face to face, and both I and the CEO weren't getting honest direct feedback, so the thinker investigated what might work. We now have a values question on Fridays set up on an interactive website which comes from that week's occurrences, or a particular issue that has bubbled up over time. Over 80% of people respond to it, and it is a great source of engagement on my walk-around's and discussion with the CEO and board.

For L1 a lot of what he spoke about regarding feedback was mentoring, which is actively encouraged and is not formalised but malleable to suit the people concerned.

(L1). I combine attempts to use logic with use of stories /examples to show the reasons why – they are more powerful. At individual level, I expect that people will do their best, and notice. Then I only rarely have to use check / control 'directives' for feedback and it is mostly gentle. I still seek mentoring myself to ensure that I get feedback, as it does not always happen easily or openly at my level.

L2 also mentors her direct group informally on an unstructured basis. She begins the feedback loop as soon as an individual at any level joins the group.

(L2). Regarding feedback, I start the feedback process and gain tacit information with the initial discussion on values when people join. They are asked if they are willing to sign up to the values and told we use the values to review behaviour. This conversation works two ways - it elicits questions, aiding two way feedback, and it seems to lead to less defensiveness in general.

Formal feedback processes regarding quantitative data on organisational performance is agreed on and monitored in both organisations, but the emphasis is not on compliance but learning. Both L1 and L2 are aware of how easy it is to measure the wrong things and pointed out that they ensure that any quantification is accurately telling whoever needs the information, what they really need to know.

(L2). Formal feedback is in terms of quarterly reports on fostering collaborative culture with agreed criteria. Formal feedback is based on both what is going really well so we know what to keep doing and why, as well as what to change.

Because of the type of organisation L1 runs he has more of a capability to minimise formalised measurement, and takes advantage of this in terms of maximising self-organisation and emergence wherever possible.

(L1). Sometimes it is what you take away that counts – I regularly perform social experimentation where I allow people to run for a period and explore boundaries and then see if we need to put a rule back again. Normally we don't, and if we do it is because it points to a gap which has been clarified.

10) What gives you the faith that you know what you are doing?

For L1 it was a fundamental belief in people:

(L1). For the most part people are good and trustworthy, and they respond best to being shown belief in their potential development when it is communicated positively. I am doing the best possible job by developing relationships as this supports and aligns people and gives me an early warning and feedback system.

L1 trusts in his intuition to watch and tend, and commented that he uses intuition even more in the scientific/tech environment. The other source of confidence is having learnt off some “great” mentors:

(L1). My first great mentor was the former leader who stayed on when I took over and became almost a sensei for me (this was in Japan). It was a huge lesson in being both humble and strong. I have learnt much more through many experiences from mistakes, and it has given me the courage to fail, always learn and improve.

L2 spoke of her faith originating from her upbringing:

Faith in what I do is generated from parents who were self-confident and on whom I have tried to model myself. My parents believed that I could do anything and supported their belief with actions. Building on that I then modelled their self-confidence. For context, my parents were not at all arrogant but instead poorly educated, financially-stretched farmers who went out on a limb to support a daughter in a way virtually unheard of in the farming community in those days. They had a strong set of values - honesty, integrity, sense of community - which drove their behaviours and now mine. (L2)

11) Are there other traits or qualities an 'emergent logic' leader needs to build an adaptive organisation?

The dot point lists below are good summaries of discussion here. Both leaders named intuition as vital to good leadership and decision making, though L2 does not use the term a lot as in her industry she was fed up with people thinking it meant guesswork. Recognition of potential leverage, innovation and collaboration was discussed. L1 had a strong emphasis on collaborative ability, both inter and cross organisational:

(L1). A good example is my having convinced the CEO to allow me to consult technically 20% of the time to what are technically our competitors for grants, because this strengthens the entire sector and builds potential collaborations. It is working slowly but surely.

Both emphasised the worth of trying for an impossible goal just to see what happens, as part of trying multiple innovation solutions.

(L2). Innovation was a source of frustration: we got great ideas in our ideas forum but no resource allocation, so I got the group to choose the top risky innovation idea (no business or project plan), and negotiated 10% of their time to work on it, with the proviso that it had to be cost neutral but a promise of implementation within 3 months if they succeeded. They did it.

Both L1 and L2 emphasised that they lead human groups, and so communication, connection and shared expectations must be what the system reinforces.



Table 3: Relevant quotes

Leader 1	Leader 2
<ul style="list-style-type: none"> <li>• Intuition. It is involved in nearly everything I do.</li> <li>• Being able to recognize and leverage the collaborative capability with the unlikeliest parties, even perceived competition – and finding common ground</li> <li>• The ability to reframe competition and adversity so that it is possible to try.</li> <li>• Thriving on change, particularly leading it, but not making change for change's sake.</li> <li>• Enjoying the complexity of creating things with people.</li> <li>• The ability to take a helicopter view and put things in the context of larger questions and larger issues, and connect the span of analysis to context. Being able to have a strategic discussion that is relevant for all people.</li> <li>• Designing structures based on collaboration and cross connections.</li> <li>• Recognizing internal cross cultural issues because different parts of the organisation have different drivers (scientists, accountants) and connecting them.</li> <li>• Managing expectations, both up and down. Even the CEO has a board or shareholders, and I need to keep the company safe by ensuring they will allow us to-do what we know will work best.</li> </ul>	<ul style="list-style-type: none"> <li>• Knowing when to engage and when to tend - I keep an open door but empower people to go and learn new skills and come back</li> <li>• The ability to find what is relevant regarding strategy and get people to link their role in the organization to it so it makes sense</li> <li>• Creating and using both push down and pull down communication methods</li> <li>• The conviction of chosen moral stance – work out what things like integrity and transparency mean to all and stick to it.</li> <li>• Close the loop, on whatever you have committed to.</li> <li>• Give interesting and unusual goals but ensure those high risk ones are not punishable if they aren't achieved.</li> <li>• Fair is not treating everything and every group the same – it is the ability to recognise and work with different states and levels of maturity but remain consistent</li> <li>• 'Stickability' – the courage of convictions to stick with aligning above, beside and below my own position in the process</li> <li>• This does not mean being stubborn. It is mixed with knowing when to let go of an idea or practice if something else is, or becomes, better.</li> </ul>

## Summary

Through descriptions of practice, the leaders revealed principles guiding their creation and leadership of adaptive organisations; processes that reflect operationalisation; frameworks they use to facilitate the processes, evidence of cognitive complexity and maturation and the firm foundations which serve as contextual drivers for their specific approach.

The key aspects were identified and described throughout chapters 4 and 5, and the further analysis of follow up interviews revealed additional insights in Chapter 5. The conclusions from these findings will be explored along with their theoretical implications in Chapter 6. Together, conclusions from the empirical data, informed by current literature, shape a conceptual framework which reflects the approach of leaders of adaptive organisations, and lead to the theory of emergent logic and the model of the emergent bicycle path of adaptability.

# Chapter 6 –Implications and Theoretical Conclusions

## Introduction

This final chapter presents the implications and theoretical conclusions of this thesis in order to address the research questions posed. In summarising and considering the implications of the findings, Chapter 6 presents a theory of emergent logic, which is a synthesis of the empirical findings of Chapters 4 and 5, and the extensive literature review and theory building of Chapter 2. At the centre of this emergent logic theory is the rich, interconnected jigsaw of how leaders of adaptive organisations think in terms of shaping and leading an emergent, adaptive process.

A practice framework is then proposed which reflects what such leaders do, based on empirically observed practice in regard to leading the emergent process of building adaptive capability. This will both inform and assist theorists in the field, and forms a basis to assist leaders to operationalise the theory's implications and results. The practice framework is offered as the 'bicycle path of adaptability', an operational roadmap for emergent leadership practice. This is shown in Figure 30 below.

The final figure in Chapter 6 synthesises the theory building, empirical findings and current literature findings offered in the thesis by representing in visual form the integrated nature of the emergent logic leader's critical impact on organisational adaptability. The chapter then outlines both theoretical and practical contributions of the research, and discusses possible directions for future research.

## Conclusions regarding research question 1 – How do leaders of adaptive organisations think?

The response to research question 1 contributes to our understanding of the rich tangle of meta-cognitive processes and social neural activity underlying how leaders of adaptive organisations think. It begins to shed light on the how and why of essential aspects of leading, such as complex decision making, leader skill maturation, the critical role of emotion, intricacies of values attribution and the appropriate and vital use of intuition in all manner of activities, especially strategic decisions. Disaggregating IQ from cognitive complexity and social cognition enables us to understand how someone with high 'domain specific' intelligence is yet not able to conceive of complexity's web of interconnected, time delayed patterns that create unknowable dependencies and outcomes. Systems intelligence paints a picture of the capable leader who:

Connects the two leadership areas of 'rationally controlling, engineering and commanding complex structures' with 'sensing, experiencing and sharing the subtleties of one's environment through human connectivity and the subjective dimension' (Hämäläinen & Saarinen, 2007, p. 5).

Research question 1 has attempted to investigate how this occurs.

The theory of emergent logic subsequently attempts to assist in the need to "develop dimensional typologies related to leadership relevant aspects of the self, and also to link individual positive self-complexity to more aggregate positive organisational processes" (Hannah, Woolfolk, & Lord, 2009).

## Cognition

The importance of cognition in the examination of organisations as complex, interconnected, living systems is presented most eruditely by Capra (1996) in assuring that an organisation is a living system. Capra considers that a living system possesses three totally interdependent qualities: 1) a pattern of organisation or relationships which determines its characteristics; 2) a structure that embodies that pattern, and 3) process which is fully contained within the living system and provides the linkage(s).

The pattern of organization can be recognized only if it is embodied in a physical structure, and in living systems this embodiment is an ongoing process. Thus, structure and process are inextricably linked. (Capra, 1996, p. 160)

Capra goes on to identify each of these three qualities in terms of concepts that are widely used in organisational complexity theory. The pattern of relationships is represented by the autopoietic network (Maturana & Varela, 1980), the pattern's structure is represented by the dissipative structures nature of organisational adaption (Nicolis & Prigogine, 1989) and the linking process is represented by cognition (Maturana & Varela, 1980). This argument has been taken up by Federman (2010) in his discussion on Valence theory and 'the organic organisation':

Cognition draws from Maturana and Varela's Santiago theory as the linking process. The Santiago theory posits that mind (cognition) is a process that links perception, emotion, and action, and therefore applies equally to all living entities, irrespective of the presence of a brain or nervous system. It does not necessarily involve thinking in the human sense. Essentially, it recognizes that cognition, as distinct from thinking and abstraction, involves environmental perception, a resultant change in structure and behaviour ("emotion"), and a (non-deterministic, and therefore unpredictable) response, through which the system adapts to changes in its environment through autopoietic processes of self-generation and self-perpetuation. Cognition continually links pattern and structure. (Federman, 2010, p. 207)(Emphasis added)

## Logic

The concept of an organisation having a 'dominant logic' was first outlined in the work of Prahalad and Bettis (1986) who defined the concept as:

The way in which managers [in a firm] conceptualize the business and make critical resource allocation decisions. It is stored via shared schemas, cognitive maps or mind sets and determined by the managers' previous experiences. Furthermore, it is largely unrecognized by the managers themselves (Prahalad & Bettis, 1986, p. 490)

In their later work these authors further described dominant logic as "an adaptive emergent property of complex organisations" which provides "a set of heuristics that simplify and speed decision making" (other emergent properties included political coalitions, values, informal structure, and sub-optimization). Because it contains heuristics it:

Puts constraints on the ability of the organization to learn. In other words it is a primary determinant of organizational intelligence. Heuristically we have found it useful to think of the bandwidth (or aperture size) of a particular dominant logic as a measure of the tightness of the constraints imposed. The problem organizations often face can be conceptualized as increasing the bandwidth or tuning (moving) the filter to a different band (location) (Prahalad & Bettis, 1995, p. 8)

For Prahalad and Bettis this meant that when conditions change "a new local optimum (new dominant logic) must be developed quickly (including unlearning the old dominant logic) if the organization is to survive". Such a need to change underlying logic in order to be adaptive, including unlearning the old dominant logic, is analogous in pattern to Chaordic systems thinking's cross in the chaos of allowing dissipation to occur in order to move from old thinking and doing to new thinking and doing (Kira & van Eijnatten, 2008). They propose that for strategic change to be successful, the necessity to change dominant logic "is likely to occur in discontinuous bursts" (which in complexity terms aligns with jumping to the next level of complexity).

The concept of emergent logic uses 'logic' in a different way, in that it is the use of emergent logic itself that allows such movement. Letting go of the old occurs through emergent logic's non-linear character and intuitive understanding of leading the emergent process of organisational maturation, which involves the holonic growth in complexity and coherence of a complex adaptive human system (van Eijnatten, 2004a).

## Introducing Emergent Logic

“There is nothing so practical as a good theory.” – Kurt Lewin

Emergent logic is not a new definition of leadership. It is a development and extension of current theory which attempts to incorporate the elements identified in the field research into a rich and multi-faceted construct around how leaders of adaptive organisations think. It is a synthesis which frames and marries the major concepts of high level cognitive complexity, social neuro / cognitive skills and leader skill maturation, complex decision making informed by expert level intuition and empathy, and an advanced expression of systems intelligence and the intuitive understanding of organisations as complex adaptive human systems. These cognitively based factors are well tuned to real time information and outcome requirements by extensive operational experience and managerial competence.

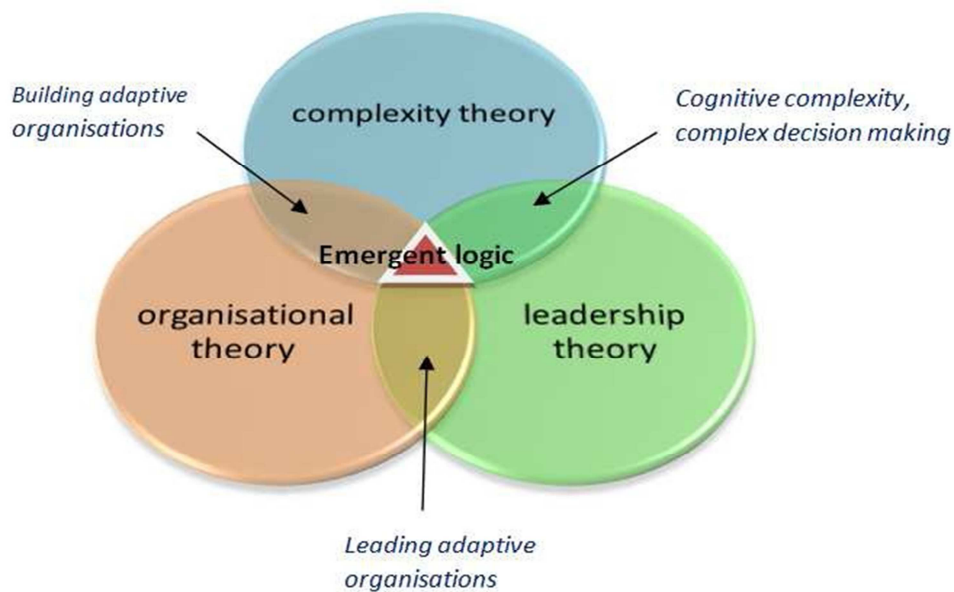


Figure 29: A Visual representation of Emergent Logic

The empirical study that informs this thesis has distinguished a number of cognitive elements and the nature of their potential entanglement. The theory of emergent logic attempts to frame these in a way which assists in the understanding of the nature of human and cognitive dynamics involved in the practice of shaping and leading an adaptive organisation. Whilst those elements are well researched individually, and associated with various ‘types’ of leadership, combining them into one framework endeavours to develop a rich picture of the complexity of both the thinking of an emergent logic leader, and of how that translates into action. The thesis applies these findings to both the direct and indirect effect of their thinking and their doing.

## The leadership jigsaw of Emergent logic

Emergent logic combines systems intelligence aspects of bifocal capability to work within a technical system, and also work with the emotional elements of the human system. It means that the leader understands that both he/she and other individuals are complex systems in a real time, dynamic situation and lack ability to control variables, unknown outcomes, required resources and information needed to make the 'best' decision. Yet most of the time individuals perform well. In organisational life such performance can be maximised by the emergent logic leader through exhibiting pragmatic optimism, building and showing trust and faith, and creating a shared mental model of both the purpose and values of the organisation, which glows clear and bright, beckoning people forward.

Emergent logic leaders trust their intuition, the expert cognitive instinct built over time and experience which combines analysis and intuitive capability, takes in all forms of information that are relevant (including disconfirming information) and looks at the real-time requirements. Unlike purely analytical thinkers, they allow the emergence of an intuited answer to occur (Patton, 2003). This process merges high quality analysis of real-time information with emotion and intuitive expertise, and such a leader is comfortable with a lack of 'linear traceability' by which to explain an intuited outcome.

Part of the reason an emergent logic leader is capable of trusting intuition is a high level of tolerance for ambiguity and uncertainty through the interplay of cognitive complexity, neural systems for evaluating general uncertainty, social intelligence, maturation of meta-cognitive processes, emotional regulation and leader identity. This is critical for leading a complex (uncontrollable) system as it allows leaders to listen to the system, tend and tweak where required and recognise points of innovation. They are more comfortable with heterogeneity (needed for adaptation in a CAS) (Uhl-Bien & Marion, 2009), and with trialling a number of initial options rather than needing to push for early closure to feel at ease. Instead effort is centered on ensuring sufficient clarity to allow the emergence of the most suitable outcome over time.

The emergent logic leader's comfort with intuiting as part of complex decision making in ambiguous situations utilizes their network style patterns of information storage and 'retrieval, and allows this information to self-organise and combine. It enables them to tap into abstractly organized expert knowledge structures which have greater depth and more coherence among conceptual subcategories (Dawson, Zeitz, & Wright, 1989). In linear, analytically driven decision making, this process is stifled by conscious testing for validity at too early a stage.

Such abstractly organised expert knowledge and ability to intuit allows the emergent logic leader to bring a wider range of responses to a problem, in a timelier manner. It also frees up their working memory so that they have a greater capacity to accurately scan, looking for perking information (pg 105), weak

signals and disconfirming information, then efficiently testing options as they have already grown many patterns of meaning (like the chess master) (Patton, 2003).

Emergent logic leaders have mature social neuro / cognitive skills and emotional regulation. This allows them to recognise the validity and importance of empathy and emotion as valid leadership skills, but not to be driven by them. Their ability to empathize works on a number of levels. It means that their (complex, ambiguous) decision making becomes driven by values and the longer time-frame of consequentialism instead of personal appropriateness (Wenstøp, 2005).

Empathy assists in the creation of trust and dynamic resonance as the genuine affection that emergent logic leaders have for people, and the strength of their core values, means that they will arouse trust responses in their staff. This in turn elicits higher brain activity in terms of extrapolative intuiting in those staff. The positive feelings (and humour) elicited by such leaders increases creativity and nimbleness of responses from those they lead, and builds a shared picture of purpose through neurogenesis (Boyatzis, 2008).

High levels of trust lead to another fundamental enabler of adaptability – courage. An emergent logic leader's courage is based in self-awareness and self-control. It manifests as a compassion for uniqueness, an ability to seek feedback and learn from experience, and the valour “to act on something never done before to bring the future into the now” (Greenleaf, 2002). Courage requires trust: in themselves, their people and the possible future. The open display of such courage from one considered capable is the best way to nurture the same in others, and augment the positive feelings required for the neurogenesis process.

The resultant shared neural nets (Goleman, 2006) create clarity on what is ‘tight’ and what is ‘loose’ in regard to permissions, boundaries and activities. Such clarity acts as a rudder and allows for flexibility in how to steer a course for the shared destination. This allows emergent logic leaders to let their most capable people loose on a problem, task or process in order to get the best outcome. It results in such people remaining committed to the organisation, each other and the leader as they are not only fulfilled in what they do, but cognitively, able to utilize and increase their complex cognitive capability as the adaptive system reaches the next level of complexity and coherence (van Eijnatten & Putnik, 2004).

In this way the emergent logic leader enables increased cognitive complexity in the people of the organisation. S/he builds enabling structures and infrastructures to expose people to activities such as script building through brainstorming and complex problem solving activities, job enrichment at lower levels and distributed decision making. These leaders also act at an interpersonal level by modelling and mentoring the ‘intuitive complex thinking’ of emergent logic as the dominant organisational logic. This further equips people to work comfortably in unknown situations and unknowable futures, and to deal with complex problems (Kira & van Eijnatten, 2008).



The high level of connectivity and interdependence (required for complex adaptive behaviour) (Uhl-Bien & Marion, 2009), along with shared intention, goals, values, and less formal regulation, means that the organisation can be more nimble and flexible. Direct management of the present is minimised and this frees the leader up to listen, watch the system, and scan the future so that people are as safe as possible while they are creating the best way forward.

A high level of connectivity, interdependence and trust also allows the emergent logic leader to apply the 'adaptive tension' which pushes and holds people in the space of possibilities, yet minimises anxiety through a culture of being supported but not rescued (Heifetz, Grashow, & Linsky, 2009). People are gently challenged by a call for elaboration of mental models and the leader's stance that the future will be different, but safe. Reframing it as a challenge rather than a threat is a basic skill of the leader who thinks emergently.

Lastly the emergent logic leader reinforces this gradual holonic growth of complexity and coherence by building enabling structures and processes that facilitate emergence, self-organisation, connectivity and interdependence. The operational structures are minimal, in order to maximise 'guided self-organisation', with rules based on clear steerage to preserve direction and consistency through dynamic flux. The culture allows for dissipation to occur through making it safe, enabling evolution and supporting people through the change process with systems that regulate the stress and manage avoidance systems. The organisation is able to cope with the multiple states of stability that occur across the different parts of the system and remain coherent and focused.

As this explanation of emergent logic leadership contains a sizeable list of traits and actions, it may assist the reader to look at what emergent logic leadership is not. In order to illustrate some of the effects of a leader who does not utilize emergent logic, here is a synopsis of the more linear traits observed in the empirical case study work. They predominantly reflect L4, but also much of the inconsistent behaviour of L3.

### 'Linear logic leading' – the impact of a lack of emergent logic

- The style of leadership was autocratic, or highly paternalistic.
- The structure was highly organised, siloed and hierarchical.
- Interaction was based around 'tight' processes and rule based formats, minimising interdependence, connectivity and the ability for self-organisation.
- Rules were many, yet they did not offer clear steerage and consistency through flux, but 'locked in old behaviours'.

- Organisational risk management was based on simplistic yet highly complicated compliance based responses aimed at avoiding blame. In so doing, learning was minimised and quick fix solutions were rewarded.
- Roles were tightly defined and output quantitatively measured.
- The leaders were (over)confident in relation to issues or situations where they did not recognise the complexity or the interconnections. Their apparently more limited cognitive scripts and lower level of intuitive knowledge chunking led to premature diagnosis and decision making (picking up the hammer too soon and looking for the nail).
- The major heuristic biases appeared to be around recent success, the illusion of control, selective perception and hindsight bias.
- There was a degree of functional fixedness in both L3 and L4 in their areas of domain knowledge and expertise.
- There was a higher percentage of functionally fixed staff that had spent too long in the same space without script building exposure, and had formed strong heuristics which ruled out alternative thinking. Instead they maintained their detailed, highly invested-in model which was culturally reinforced.
- L4, and sometimes L3, were difficult to 'move' conceptually as they either filtered out disconfirming information or actively discouraged or denied it.
- Both leaders were more concerned with losses than potential gains when making decisions, confirming this trait in those with lower 'expert meta-cognitive monitoring' (Tom, Fox, Trepel, & Poldrack, 2007) and an individuated leader identity.
- The organisational culture was low risk, high blame.
- Organisational learning and the capacity for reflection was minimal.
- There was no 'information cascade' with all formal information tightly controlled and based on power differentials ('information chastity belts'), (Wheatley, 2006).

From this list it can be seen that not only was there a lack of elements that were present in the adaptive organizations, but in many cases the opposite elements, activities or situations existed. These were actively built or passively reinforced by the more linear, command and control style leaders. This leads us to examine the dominant logic model (and potential capacity) of the leaders in the thesis, and in particular, to summarize the way in which 'emergent logic' aligns with a comprehension of complexity.

## The complexity elements of Emergent logic

Emergent logic leaders are complex (human) systems thinkers. Emergent logic intertwines the cognition of intentionality, pragmatic optimism and complexity with the connectivity and reciprocity of interaction between individuals, groups and the organisation as an open system. It is an intuitive understanding of dealing with people and organisations as complex beings. This understanding was discussed in Chapter 2's section on systems intelligence in regard to the bifocal capability to work within the paradox of technical and human systems.

While this is fundamental to leading emergently, the empirical studies enabled a deeper and more nuanced understanding of the more abstract elements of complexity science, as explored in theme 2 of chapter 5 (how leaders of adaptive organisations worked with complexity). Even though L1 and L2 did not use complexity science language, both showed a pragmatic insight into the nature of an organisation as a CAHS, with chaordic, holonic and panarchic features – all of which are relevant to organisational resilience and adaptivity. Some of the relevant concepts are listed below, though this is by no means a complete list of the alignment of complexity theory and emergent logic, but an illustration.

Chaordic systems. As elucidated in chapter 2, van Eijnatten and Fitzgerald (Fitzgerald & van Eijnatten, 2002) describe an organisation as a “complex, dynamical, non-linear, co-creative, far-from-equilibrium system which is chaordic in its essence” where things cannot be repeated, yet “enough happens in a tidy enough way to preclude complete anarchy”. In complexity theory we find the concept of a chaordic systems thinker who sees organisations as a dynamic flow as it journeys towards and away from equilibrium, with their thought “informed by the fundamental principles of consciousness, connectivity, indeterminacy, emergence and dissipation” (Fitzgerald & van Eijnatten, 2002, p. 414).

Whilst not using these conceptual terms, emergent logic leaders are well aware that the different parts of the organisation are at different stages of stability or change (multiple equilibrium states). Such leaders manage them accordingly, and even drive different parts of the organisation towards or away from these states by creating adaptive tension and ‘nudging’ appropriately. They also ensure that at the strategic level there is an integration of effort across the areas in flux.

Emergent logic leaders understand connectivity – calling it such things as L1’s ‘hotwiring’ the organisation and L2’s “increasing interdependence by pushing up contact between parties, ensuring tacit information flows”.

They also balance dissipation constantly by understanding the human element of having to let go of an old idea or habit before being able to grasp a new one. They expend effort on reassuring people out of their comfort zone in order to allow room and energy for transformation and emergence of the new. Bifurcation can be even more daunting for people as the change is faster paced and more overt. This

jumping to the next level in complexity terms is often referred to as 'step change' in organisational terminology, and emergent logic leaders work to ensure the runway lights of the shared vision shine bright in order to guide people through the changing landscape. This minimises the anxiety that makes people push for 'settling things down' which effectively halts adaptation. Thus the emergent logic leader is conscious of treading the fine line between adaptive and unhealthy stress, and can listen, tend and task accordingly through the transitional phase. This is built on a foundation of high trust, support and shared purpose.

The concepts of holonic change (each entity is a whole in its own right yet nested within some greater whole) and panarchic change (a set of nested adaptive cycles caused by interaction of large and small scale events and time frames (Holling & Gunderson, 2002) may sound daunting to non-complexity theorists. However, both concepts describe the nested quality of being part of the local present, yet also part of something that is larger in scope and longer in time frame. Human beings intuitively understand such a concept as we all live in such multiple time frames and scopes. Emergent logic leaders recognise that organisations are made up of nested parts, and that an organisation operates over a number of different time frames that impact each other in various ways. This goes beyond the time frames of a 5 year strategic plan broken into yearly operational plans. Instead it moves them into the mind-frame of strategic adaptation and innovation through the leader's capacity for accurate scanning and the 'picking up of weak signals (van Eijnatten, 2004a), perking information and sensitivity to initial conditions (Aaltonen & Sanders, 2006). Further, it is about understanding the co-evolution of the organisation with its environment (Mittleton-Kelly's (2003a) Complex Co-Evolving System).

The bifocal capability outlined in the systems intelligence aspect of emergent logic is described at different levels by various complexity theorists. Saarinen and Hämäläinen (2007) describe it in terms of the leader being able to work both within the system to enhance it, and at the same time operate from a whole of system perspective. Van Eijnatten (2004a) describes the chaordic system thinker's mindfulness of being aware of what is being thought as it is being thought, and Meadows (2008) sees the highest level of capability as being aware of the system as a system. All of these describe a person capable of seeing the forest as well as the trees, and emergent logic sees these views of bifocal capability as intertwined with a collective, mature leader identity and high level social cognition, allowing the leader to choose to act for the good of the whole as well as seeing the parts.

Other types of balancing complexity are described by complexity theorists. These include balancing the technical and adaptive aspects of an organisation (Heifetz, Grashow, & Linsky, 2009), the socio-technical parts of the system, and the flux and stability of states (Kira & van Eijnatten, 2006), balancing control and emergence (Saarinen & Hämäläinen, 2007) and channelling or sustaining emergence (Hunt, Osborn, & Boal, 2009). Emergent logic leaders intuitively work with these different forms inherent in the organisation as a system, and the application of a 'loose-tight' style while maintaining underlying consistency as a vital part of this style of leadership.

Another major complexity concept relevant to the emergent logic leader is the use of leverage points (Meadows, 2008) in order to be able to steer the organisation as a system. The empirical study suggests that such a leader's capacity to 'think emergently' allows them to recognise these patterns and intervene appropriately, using the system's momentum rather than trying to push against it.

Thus, the emergent logic leader has an intuitive understanding of an organisation as a CAS, and a cognitively complex, networked logic style which allows them to be comfortable with ambiguity and to understand that complex outcomes emerge within a well steered process.

## Conclusions regarding research question 2 – what do leaders of adaptive organisations do?

The next section of this theoretical implications chapter offers a synthesis of what leaders of adaptive organisations do, enhanced by observation of other successful leaders over a number of years and the current literature and theory building in Chapter 2. It is represented as “the bicycle path of adaptability”, a model which reflects the empirical results from the case studies in regard to the practice of emergent logic leadership in the field.

### The Bicycle path of Adaptability

“All models are wrong, but some are useful”. G.E.P. Box

Models of practice tend towards over-simplicity and therefore add little value, or complicate and lose all who are not of the same mindset, and they therefore become hard to apply (Federman, 2010). The emergent bicycle path model is based on empirically observed practice, and potentially assists practitioners to create and lead adaptive organisations. The elements in the model have been empirically shown to be critical to building an adaptive and resilient organisation in practice, and the increasing alignment (steadiness) of the bicycle ride offers a metaphor for practitioners.

### Why a bicycle path?

This metaphor has been successful when attempting to discuss the concept of emergent logic leadership with senior decision makers as it is a practical example to which they can easily relate. It fits well with Voorhees (2008) concept of virtual stability as the state in which we ride a bike, and a complex system exists, in terms of frequent self-monitoring and small corrective actions to gain maneuverability through synchronising with external fluctuations.

## ADAPTIVE, RESILIENT ORGANISATION

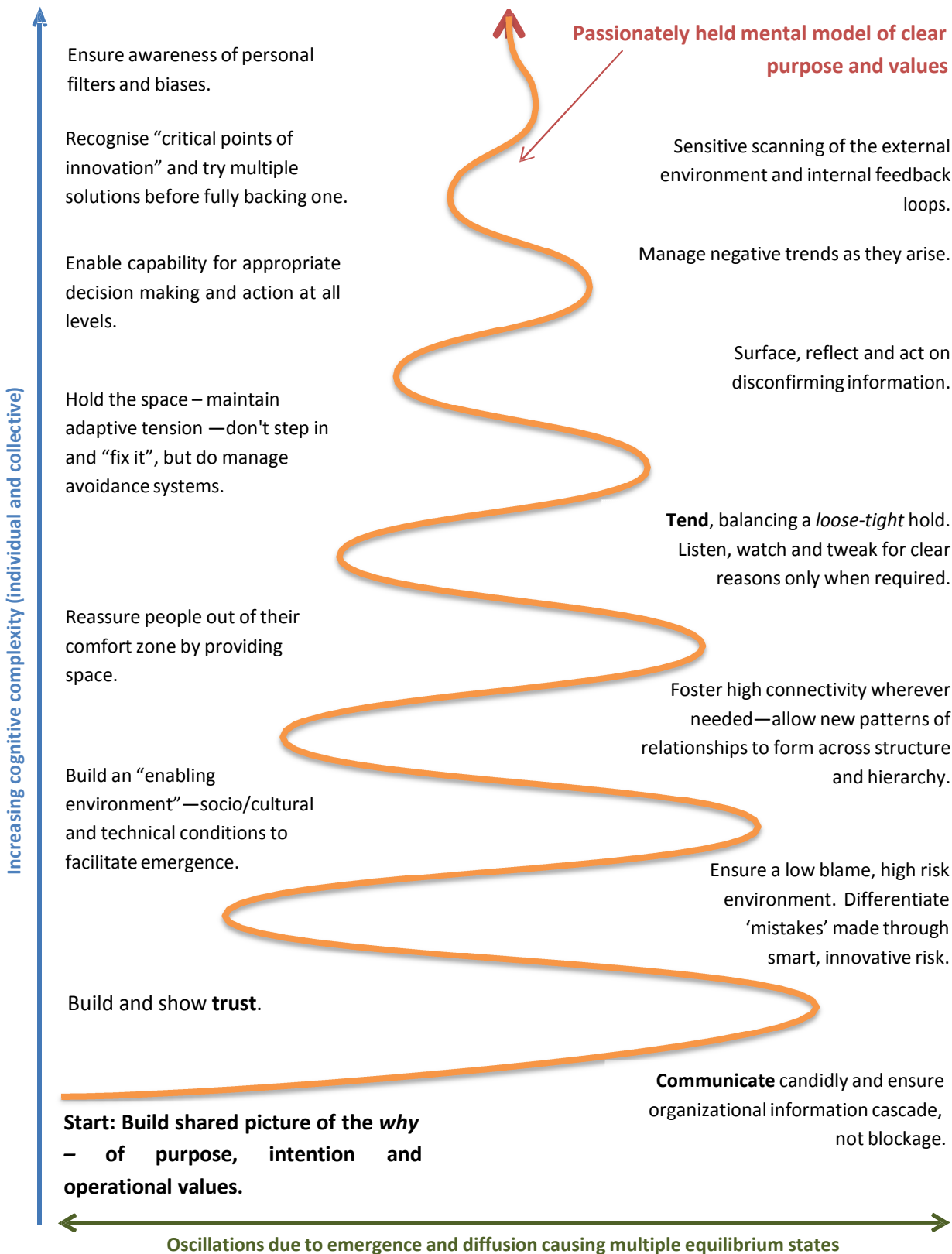


Figure 30: The bicycle path of adaptability.

The model works on a number of levels in regard to the conceptual lens of complexity, and the practitioner lens of leadership.

## The bicycle ride through the complexity theory lens

In the figure of the bicycle ride, the arrow represents equilibrium and the bicycle's track shows the organisational oscillations towards and away from that equilibrium.

- At the start these oscillations are large as there is little in the way of shared mental models and alignment concerning purpose and a directional map.
- Such oscillations can also represent the aligning of the organisation with its environment through co-evolution (Mitleton-Kelly, 2003a).
- The leader can steer towards (near to) equilibrium and it is a 'straighter' ride – in chaordic terms it is the linear change phase.
- However, various real time impacts cause flux in parts of the system (and multiple equilibrium states). This sends the bicycle away from the 'straight' equilibrium path and out towards the turnings – (the *chaord's* area of non-linear change, far from equilibrium).
- At the turns there is system amplification and higher sensitivity, making it more work to steer people back to the path through the skill of leading an emergent process.
- At the turns there is also the greatest possibility of innovation / creativity (the bike may go off in another direction) or even diffusion and dissipation (it will stop or crash).
- The re-alignment by the rider sends the bicycle back in towards the centre (equilibrium) and the pattern continues, with ever smaller oscillations, due to growing alignment and understanding of shared purpose, captured in a mental map through neurogenesis.
- Smaller oscillations are also due to increasing cognitive complexity in both individuals and the group, leading to increased capability to deal with complexity and emergence (van Eijnatten, 2004a).
- A third reason the oscillations decrease may be the reduction in the number of multiple experimental solutions being tried as the best solutions emerge, thus 'honing' activity and the track of progress.
- The diagram could potentially be scale invariant in a similar fashion to the chaordic S curve in the holonic growth in complexity and coherence (van Eijnatten, 2004a).

- On the micro-level of the individual learning to ride the bike, there is heterogeneity in regard to the different parts of both the bicycle and the body, along with interdependence, adaptive tension and dynamic interaction capability, all of which are requirements for a CAS to adapt (Uhl-Bien & Marion, 2009).
- In the case of recursion (wherein a process is repeated in a self-similar way), so it is with the recursive bike ride, on which the rider does not take this new path (the path less travelled) but instead gets nervous and takes the well-worn path back where they came from, leading them in circles and never moving forward.

## The bicycle ride through the leadership lens

At the simplest level, for the novice bicycle rider endeavouring to ride along the 'arrow path':

- If the rider holds on too tight, or they let go, they will crash – this relates to too tight a grip (autocratic) or too loose a grip (laissez faire) on the organisation or an individual – both block the process of learning.
- Instead the rider has to make many small adjustments while trying to stay on the path – this involves listening to, and getting a feel for, the system, building up skills and cognitive 'chunks' of expertise.
- As they become more expert, the rider can relax their grip – the same is true of the ever maturing leader, staff and the organisation as a whole.
- The rider then only needs to correct progress when the bicycle is veering off track –this reflects the tending and tweaking of ongoing emergent logic leadership.
- Once confident the rider stops looking at their feet, the bike or the path directly in front of them, and can look further ahead – in the same way once the shared mental model of purpose and values becomes entrenched the leader can stop managing today and concentrate on the horizon of weak signals and perking information which help them to create the future.
- Simultaneously, as the rider looks further ahead they automatically ride steadier on the path – in the same way actions will naturally align better without local 'rules' when the direction ahead is clear.
- The pattern of the bicycle's progress is similar to the winding track of adaptability as the rider becomes more adept at steering – in the same way people and activities become aligned to the shared understanding of why they are there, and veer off the path less often and to a smaller extent



- Physically, there is learning at a 'micro' agent level in that many different senses have to form, build, co-ordinate, integrate and improve 'connectivity', resulting in the (scale invariant) 'whole person' being able to ride the bike in the right direction without having to think about everything the body does, all of the time. This occurs organisationally in terms of appropriate centralised and distributed decision making which allows connectivity to build, and integration / coordination to occur
- The rider requires the operational infrastructure (the bike) to enable them to get to their destination. It must have the necessary parts, working together as needed or the best will in the world will not transport them where they want to go. The same situation occurs in the organisation in that if there is not an enabling structure to allow interdependence progress will be slow or stop altogether.

## The elements of the Bicycle Path

Two roads diverged in a wood, and I--  
I took the one less traveled by,  
and that has made all the difference<sup>62</sup>

During the case studies there were consistent actions and activities practiced by leaders of adaptive organisations. Chapter 5 captures these in detail and groups them into the four high level themes of how the leaders conceived their role; what their understanding of complexity looked like in practice; the types of enabling structures / infrastructures and processes they built and why; and how they managed themselves, their people and the organisational dynamics in order to channel emergence and turn their clear sense of purpose and deeply held values into an adaptive and resilient organisational culture.

The elements listed in Figure 30 alongside the emergent bicycle path attempt to summarize the empirical findings and distil them into an itinerary for those shaping and leading an adaptive organisation. Whilst each has been individually discussed in prior sections of the thesis findings, for the sake of clarity and cohesion each is briefly described below as it was embodied in the empirical case study activity. The elements are listed from the 'starting point' upward, but the order and direction is not prescriptive and should be adapted to the circumstances.

## Clear vision framed by deeply held and articulated values

L1 and L2 ensured a clear and shared understanding of both vision and values, and promoted them as visible operational drivers. They shaped complex problem solving by acting as a 'rudder' for people to navigate through decision making in ambiguous conditions. Clear and shared understanding freed the

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<sup>62</sup> From The road less travelled, by Robert Frost.

leaders up to tend from a higher level, holding the boundary and providing space for coherence and chance taking (Eflin, 2003). Deeply understood values created a focus that allowed for minimal regulation, thus creating flexibility and paring down structures and systems. High connectivity was grown and supported through the creation of a shared mental model of why the organisation exists. The how became open to innovation, imagination and passion.

## Trust

L1 and L2 built trustworthiness and showed trust. Trust allowed neurogenesis to occur and risks to be taken as people stepped into the unknown. It required honest communication as well as listening to both confirming and disconfirming information and ideas. It fostered high connectivity where needed, often ignoring formal hierarchical control patterns. Candour was a key factor in building trust as it will only grow when perceived to be shown by others. Both trust and candour were time consuming to instil but critical to contribution and creativity.

## Communication

L1 and L2 ensured that both supportive and disconfirming information flowed adequately in order for people to see new patterns that created shared learning (Wheatley, 2006). Those who were highly connected could think and talk together, and decide what information really meant. They stepped back to look at the big picture, generating different perspectives, new information, fresh meanings and wiser outcomes.

Communication had particular traits in these organisations dominated by emergent logic. They included a high level of honesty, listening, and the support of information 'cascading' through the organisation with minimal controls and blockages. L1 and 2 were accessible and provided adequate and timely feedback, explaining why (as opposed to how). They enabled the existence and use of multiple forms of information flow.

## Low blame, high risk environment

Conversations were held in adaptive organisations on what risk, mistakes and virtue looked like in order for people to be aligned in terms of both their intent and practice. This allowed for decoding meaning and mental maps (Meadows, 2008), encouraging people to try new things and learn from what did and did not work. It clarified the boundaries of safety and judgement which people could work within. Ensuring the existence of such a culture in combination with structural flexibility facilitated wisdom by

fluid movement between production and evaluation of alternatives. Error was not seen as failure, but as opportunity to learn about behaviour of a complex organisational environment.

## Build an enabling environment

Many of the elements listed were part of building an enabling environment. L1 and L2 ensured loose-tight steerage and distributed decision making, with processes that opened inquiry and cascaded information wherever required. Minimal structures and rules were built, with an infrastructure that facilitated technical and cultural collaboration, such as the staff designed data base in organisation 1 that allowed people to seek out their own mentors, build teams, and collaborate innovatively in ways that fitted the situation. The system also allowed for tacit and explicit knowledge flow. Co-ordination and connectivity was maximised by regulations which allowed for experimentation and reflection.

## Foster high connectivity

L1 and L2 tried to enable both structure and interaction to be flexible enough to allow a variety of interactions. They grasped the concept of connectivity determining the network of relationships and transfer of information and knowledge, and the associated importance of formal structures in encouraging or inhibiting needed interaction. L1 and 2 ensured that both formal and informal connectivity allowed rather than blocked participative decision making. Such connectivity was not constant or uniform, but varied over time and with the quality of relationships. These relationships were overt and covert, tacit and explicit, and were deeply affected by formal and informal power relationships and hierarchical structure.

High connectivity and coordination appeared to facilitate new and novel organisational and individual intelligence and an increase in cognitive complexity, both individual and collective, allowing people to work with increasing complexity. It supported people through the process of dissipation, helping them to let go of the old in order to adapt to the new.

## Reassure people out of their comfort zone

L1 and L2 described new possibilities and reframed what was possible. This allowed the exploration of the adjacent possible (which is one step away from what already exists) (Kauffman, 2000). Reassurance and nudging was faster than pushing, as once a step has been taken, another adjacent possible was only one more step. With faith, a clear goal and shared definition of achievement, people moved quickly as they felt stretched but supported rather than unsafe. Flexible approaches were

allowed which let people try different strategies to take their steps. Like being 'in between trapezes', people only let go of the first trapeze as they trusted the leader had put up a net, and they knew there was a second trapeze (the shared vision) to go to.

## Tending

L1 and L2 listened, watched, trusted and entered the process only when required. Tending is about small interventions, critical in calming anxiety about trying something new. Much of fostering positive behaviours was incremental but had a large effect - often people neither articulated nor formalized their reservations but doorway chats tuned in to how people felt, and allowed a two way exchange to establish a neural connection that made people feel safe and committed to the process. Tending was not about being an expert at task level or managing the present, but about asking questions when roadblocks arose and helping people to work through the problem.

Tending leveraged the power of steerage over attempts to control, profoundly influencing movement into new territory. A culture was created which fostered emergence and minimised recursion, with tight values and direction, and a loose, gentle hold which allowed emergence.

## Hold the space

As change naturally caused anxiety, this was managed in order to successfully maintain adaptive pressure on people to move. It required shared intentions and goals, grown through a high degree of connectivity and interaction, and was based on full and frank information. This allowed individuals to make judgements when moving into the unknown space, as they had something to assist them to navigate through it. The leaders minimised the recursion that comes from undue pressure (as in case study 4) and managed avoidance systems by ensuring clarity and safety, but not rescue.

## Surface, reflect and act on disconfirming information

"Much can flow into an empty vessel, but if it is full nothing else fits" (Confucius)

L1 and L2 encouraged reflection and surfacing with formal norms and practices which examined and revised beliefs and assumptions (Shaw & Perkins, 1992). They both modelled and allowed the sharing of such assumptions and mental models, as this reinforced cognitive flexibility and a willingness to redraw boundaries at all levels. L1 and L2 ensured this occurred for people of high status or expertise, as they often confused identity with the championing of an idea. The leaders practiced emergent logic

as the dominant logic, which both invited and visibly incorporated disconfirming information into analysis and decisions, thereby testing the balance of the positions taken on major decisions, practices and goals.

## Capability to decide and act

L1 and L2 ensured appropriately distributed decision making which neither disempowered those who were the appropriate people to decide, nor abdicated responsibility to those who should not have had to shoulder it. Instead a precise location of responsibility was maintained, with appropriate permission and opportunity to act. Clear overarching goals and values lessened confusion and ensured that people made relevant choices instead of exercising their free will and acting out of frustration. In order to increase problem solving capability and maximise the potential for raising cognitive complexity (Kira & van Eijnatten, 2008) the leaders ensured exposure to complex decision making at all levels of the organisation. They put in place appropriate delegation with simple rules to enable creativity (Brown & Eisenhardt, 1998) and reflect Handy's (1992) concept of subsidiarity in allowing people to be effective.

## Manage negative trends as they arise

L1 and L2 knew when to step in and 'leverage' or tweak the situation as not all of the emergent process was positive. At individual level some struggled with it and pushed strongly for order and stability, recursion and control. At organisational level, increased complexity brought more intricate and intertwined interactions, with more varied multiple states of stability, flux and diffusion across the system. The leaders stayed in tune with the system sufficiently to identify mal-adaption early, and to differentiate it from the inevitable bumps of dissipation, or the hurdles of a step change. Values based management ensured clear steerage of the situation.

## Recognise critical points of innovation

There is no obvious right way in an emergent process where the answer is only seen from the end point of the (unrepeatable) process. L1 and L2 allowed exploration and experimentation. They put in place multiple micro-strategies to observe progress in each as the processes evolved, rather than rejecting options or backing one choice too early. Pragmatic optimism was vital in this process in order for people to give it their best shot and utilize initiative. It required a low blame, high risk environment which also gave people permission to let go of things that were not working, no matter how wedded they were to them.

## Sensitive scanning of the internal and external environment

L1 and L2 scanned the environment in order to correctly identify challenges. This ensured safety in risk taking, and the wise trialling of alternatives. Sitting at the leader level of complexity within the organisation rendered the effects of co-evolution with the environment visible. It revealed the multiple states of flux and stability at play within and across the organisation. It allowed for judgement of technical, infrastructure and skill resource requirements, and the picking up of weak signals and new ideas with potential to move the organisation forward. It revealed the areas where recursion began to surface. The leaders built and monitored feedback loops which were critical to shaping actions and motivation. These were based on values and trust as they best shaped change and transformation, rather than on quantitative data. They steered the emergent progress more efficiently.

## Ensure awareness of filters and biases

The empirical evidence showed how central self-awareness is to leading an emergent process. L1 and L2 fostered a high level of awareness around filters and heuristic biases through self-checking and conscious testing of assumptions. This increased the ability to handle complexity and ambiguity. It lessened oversimplification of problem definition, relevant knowledge retrieval and decision making, and lent courage to act on something untried in order to realize goals even when the outcome was unclear, instead of reaching for the known fix.

## Conclusions regarding the interconnection of research questions 1 and 2: - The Emergent Logic Leader's Organisational Impact.

Synthesising the empirical findings and theoretical knowledge provides a basis for representing in visual form the integrated nature of the emergent logic leader's organisational impact. The final figure in this thesis attempts to summarise the findings from questions 1 and 2, and combine the identification of capacity to shape and lead an adaptive organisation with the examination of how such capacity was put to use. The figure also attempts to represent the entangled nature of these two aspects, and the outcomes that resulted from such entanglement on the adaptive organisations and their people. The empirical findings, supported by the current literature findings and theory building outlined in Chapter 2, suggest that L1 and L2, as emergent logic leaders, had a critical impact on the creation of adaptability at the macro-, meso- and micro-level (the individual), in both direct and indirect ways.

At the individual level, the emergent logic leader built an adaptive operational culture of shared purpose and values. Their passion, and their belief in what was possible, effected huge change in the perception

and core beliefs of others. Their positive enthusiasm pulled people out of a safe, conservative position by building sufficient shared understanding, respect, hope and trust to allow exploration of new ways to achieve the possibilities being vividly painted. These leaders showed realistic, hands on optimism which was vital to such positive reframing of core beliefs, and potentially stimulated neurogenesis in their people.

The resultant shared road map of future possibilities served to minimise the adoption of “holding back behaviours and systems that trivialise reciprocity and decrease vitality”, (Hämäläinen & Saarinen, 2006, p. 24). When people felt that the leader was totally committed to achieving the outcome they stepped into the breach along-side with more certainty, reassured by a clearly envisioned goal. Their capability to do so was greatly enhanced by exposure to script building and the neural effect of positivism and trust. This in turn appeared to increase cognitive complexity, social intelligence maturation, intuiting and the ability to make complex decisions over time. The leader’s capability to understand the human intentionality requirement in a change process, along with high personal awareness, allowed them to recognise and regulate stress in themselves and others during the process.

At the organisational level, L1 and L2 built minimal structures with rules and power differentials that, wherever possible, did not interfere with self-organisation. In practice this was evident in an infrastructure which enabled interconnectedness, experimentation and learning, as it was accepted that the path of progress obeyed many of the rules of complexity, and thus outcomes would emerge from such ongoing interaction and experimentation. Establishing a high risk, low blame environment allowed people to explore possibilities, and to engage in candid communication and feedback. Their comfort with their use of good radar allowed L1 and 2 to pay attention to what was working, and to tend and support those things whilst minimising activities that detracted from the shared vision.

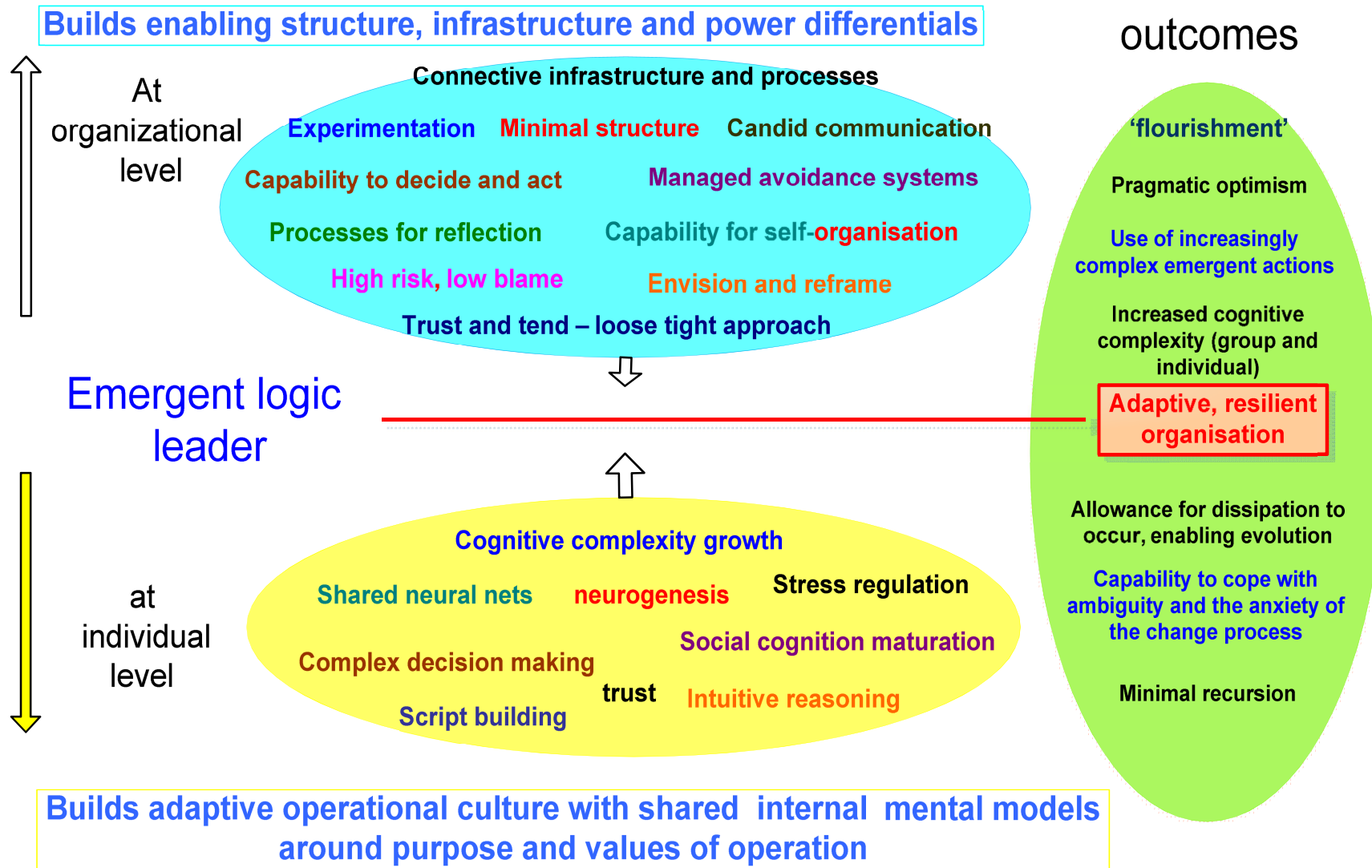


Figure 31: Organizational impact of the Emergent Logic Leader



As emergent logic leaders, L1 and L2 understood that an emergent process entails managing situations in real time without certainty of outcome or success. Thus, envisioning and passionate commitment to shared goals and intention became critical to maintaining momentum and lighting the path for people to find their own way forward. Another critical element was growing capability to make decisions and act upon them – increasing individual learning by building nuanced scripts and determining what did, and did not, work. This was further enhanced by installing and encouraging processes for reflection in order to allow learning from such experimentation and action before moving forward. Such reflection was done individually and in various groupings, enabled by a high degree of connectivity and interaction. This was further enhanced by full and frank information flow which clarified acceptable risk and enabled value judgments when working in the unknown or unknowable spaces, guiding people through complex issues and decisions.

The outcome of the emergent logic leader's individual and organisational level impact was the growth of an adaptive, resilient organisation. Dissipation was enabled as people were able to cope with the ambiguity and anxiety which accompanies it. Instead of recursion there was an attitude of pragmatic optimism and a capability to deal with, and apply, more complex thought and actions at individual and group level, resulting in the flourishing of the organisation and its people.

## Research conclusions

The results of this research provide a more detailed understanding of the dynamics of creating and leading an adaptive organisation. Each segment of the research provides a significant piece of insight and knowledge in regard to aspects of this process, particularly emphasising the integrated nature of the way leaders think and what they do in terms of shaping enabling structures to channel and sustain emergence, and to create a clear and deeply held sense of shared purpose, values and optimistic courage – all of which are required for the journey of increasing resilience and adaptability.

The research design used systematic combining (Dubois & Gadde, 2002) which created, by abductive means, empirical findings and theoretical insights which informed the research questions, cross-disciplinary literature review, theory building and ongoing case studies. Follow up field work was then carried out to focus on the critical test of a significant theory. In considering the conceptual implications of the findings, theory of emergent logic was introduced, shaped by the rich interconnected jigsaw of how leaders of adaptive organisations think in terms of shaping and leading an emergent process. A practice framework was presented as an operational roadmap of the 'bicycle path of adaptability', based on empirically observed practice in regard to leading an emergent process, in order to assist theorists in the field and form a base for work offered to leaders in regard to creating and leading an adaptive organisation in practice. In conclusion, these findings were elaborated in pictorial form to illustrate the emergent logic leader's organisational impact, summarising the effect of the intertwined elements and iterative processes on the creation of a flourishing, adaptive and resilient organisation.

## Major theoretical contributions of this research

There are a number of significant contributions to knowledge and understanding about the creation and leading of an adaptive organisation arising from this research. The thesis advances our understanding of the complexity and entanglement of elements involved in creating and leading adaptive organisations. To date, few studies have attempted to take such a broad view of the relevant components and endeavour to explain their interdependence. The complexity of the emotional relationship between leaders and their followers is no longer underestimated as it was twenty years ago (Kets de Vries, 1989), but most research, of necessity perhaps, make a deep study of one or two of the relevant components. The same can be said of the links between the neuro-cognitive and operational skills and practices in leading an emergent process.

While such works are invaluable in offering a thorough understanding of relevant individual aspects, there is a 'gap' left by such reductionism as in any analysis of complexity, in that it is the interactions of components that tell us how it works. This thesis has attempted to examine such interactions through empirical case study observation, research of the current literature and an abductive process of theory building. It has generated a theory of leadership cognition called emergent logic, especially relevant to leading complex human systems in emergent environments.

The empirically based practice framework of the 'bicycle path of adaptability' assists theorists in the field of organisational resilience and adaptability to understand the translation of theory into practice, and it forms the basis for a future practitioner's model on the creation and leadership of adaptive organisations. Lastly, a visual representation of the emergent logic leader's organisational impact on the growth of adaptability and resilience is offered, with an exploration and explanation on how the multiple variables explored in questions 1 and 2 are inextricably interwoven.

## Major Practical Contributions

The outcomes from this research have clear implications for the practice of creating and leading an adaptive organisation. Among the major findings the study reveals that a critical success factor is the leaders' capacity to create and guide a complex human system by establishing and maintaining a shared mental model of its collective purpose, guided by deeply held and articulated values.

The cognitive constructs of complexity and emergent logic have a direct and indirect effect on individuals and the organisation. They facilitate the creation of an adaptive operational culture and organisational mind, and the building of enabling structures that allow for ongoing evolution through emergence, transformation and diffusion as required. Thus the organisation and its people can progressively build more complex emergent mental models and solutions in the face of increasingly common unpredictable situations, leading to organisational adaption and evolution over time.

In contributing to the theory of creating and leading adaptive organisations, supported by empirical research, this study has improved our understanding of the effect of the leaders cognitive capacity on organisational adaptability and the level to which these two characteristics are enmeshed. It has revealed the links between the creation of adaptive organisational structures and the existent culture, as well as examining the growth of both an individual and collective capability to manage the increasing complexity and emergence of successful adaption and evolution.

The thesis has identified common elements of various types of complex systems which were empirically found to be relevant to adaptive change. In researching how leaders of adaptive organisations think it introduces a theory of emergent logic. In regard to what leaders of adaptive organisations do it describes a practice framework in the form of the 'bicycle path of adaptability', based on both theory building and empirically observed practice in regard to leading an emergent process. These two aspects are combined into a model of the emergent logic leader's organisational impact. These findings will not only assist theorists in the field, but also inform practical contributions from leaders, on the operationalisation of the thesis' results and implications regarding the leadership of an adaptive organisation.

Other practical contributions include cases as illustration of successful adaptive practice, as well as factors which hampered or blocked such adaptation, and a synthesis of literature on what makes an organisation adaptive from a variety of disparate fields.

Apart from the practical operational contributions, it is my hope that this study can assist leaders by offering a basis for more nuanced, productive conversation and contemplation within and across their organisations, and indeed, any relevant forum.

The scope of this thesis is as comprehensive as such a medium allows, but this is requisite to attempting an understanding of the complexity of such a multi-faceted topic. In 2010 Hämäläinen and Saarinen wrote:

It is in the dimension of actual conduct and behaviours with more and more complex humanly made technological and social systems that a more intelligent relation and "attunement" (Stern 1985) are urgently needed. The call comes in various guises yet echo the same basic message. We need what the Nobel Laureate Murray Gell-Mann called "a crude look at the whole" (Gell-Mann 1994), in order to bring "the necessary revolution" (Senge et al. 2008) of "healing our fragmented culture" (Goodwin 2007). (Saarinen & Hämäläinen, 2010, p. 19)

It is in this spirit that the theory building, conjecture, findings, and models in this thesis are offered.

## Directions for future research

This thesis highlights a number of avenues for future research.

### Thinking in networks and hierarchies

Research underlying this thesis suggests that it could be the case that cognitively complex thinkers lay down information in neural nets, whereas cognitively simple (linear) thinkers lay down information in terms of hierarchies. If this were found to be the case, it may potentially be a moderator for how leaders conceive of and build structures and processes – perhaps it is the case that autocratic linear thinkers build hierarchical structures and processes because that is how they conceive of the world, and emergent logic thinkers build networked structures and abstracted processes for the same reason. This would have far reaching implications in terms of hiring and utilizing senior people and specialists, especially if the capability to think in networks was not able to be ‘grown’ in some cognitive types, as the literature and empirical studies suggest.

### The ‘neuroplasticity’ of cognitive complexity

Chapter 2 questioned the assertion that, with training, a linear logic thinker can always learn to become a complex logic thinker, in terms of being able to move between different cognitive states at will and apply them to the appropriate type of problem (simple, complicated, complex or chaotic). Empirical evidence suggested that while complex thinkers could discern a problem’s level of complexity and use the appropriate decision process, a strongly linear thinker such as L4 did not appear able to move into the complex space but remained linear in their approach to complex problems. For the reasons outlined in this thesis such individuals did not appear to not have the ‘inherent potentials’ that are able to be shaped by experiences<sup>63</sup>, and appear to follow the same pattern outlined by researchers such as Patton regarding intuitive decision making capability (naturals, latent’s and never will’s). This would be a valuable area of future research as it potentially changes how and why leaders and various other categories of staff are hired, how they should be used and how their skills are grown.

### New kinds of support and education for present and future leaders

The thesis findings on the maturation of meta cognitive, emotional and leadership identity skill base indicate the need not only for long term, practical exposure to complex emergent situations, but also for particular types of support around the growth of expert level cognitive complexity and intuitive complex

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63 (Mumford, Zaccaro, Harding, Jacobs, & Fleishman, 2000); (Erikson E. , 1959); (Jacobs & Jacques, 1987); (Jacobs & Jaques, 1991); (Lewis & Jacobs, 1992)

problem solving capability. Future research could investigate how an organisation can, in practical terms, support senior staff who begin to engage with the complex nature of leading emergence but have not yet gained the essential 'emergent logic' skills and complex scripts to deal with such concepts, which can be overwhelming at this stage.

## Leadership by long distance

Existing literature and empirical evidence from this thesis highlight the importance of face to face interaction at times of critical engagement as this appears to be a moderator for neural and emotional changes in terms of such events as the neurogenesis of growing shared neural nets and mental models, the lowering of resistance to change and the engagement of empathy and even intuition when taking part in complex decisions in ambiguous situations. If it were the case that physical proximity is a necessary part of the connectivity required to foster trust, empathy & humour; bonding team mates; increasing information absorption, learning and nimble responses, and growing organisational cognitive complexity, there would be wide ranging implications for leading and managing virtual groups and those remote from the main physical location. These implications include less reliance on the use of such tools as video hook-ups as a substitute for face to face contact, and the need for much increased contact in times of flux.

## Relationship between neural sex differences and the effect of maturation, social cognition and cognitive complexity

It is interesting to consider the possibility that L2's shift in confidence supports findings by Hopkins and Bilimoria (2008) on neural sex differences which found that the common starting point of better 'radar' in women and higher social 'business' confidence in men decreased with high leadership success until it virtually disappeared. The follow up study in this thesis shows that there has been a marked shift in L2 who has gained expert leadership skill and success over time. Further, it is not evident whether the success led to the changes in L2, or whether the changes led to such success. Valuable insight would be gained by attempting to determine the role of increased cognitive complexity, leader maturation and social cognition in this change.

## Potential relationship between mature social intelligence, high social risk and lower neural sensitivity to loss

L1's strong leader identity and comfort with both entering and leading others into the space of possibilities appeared to be associated with the high social risk of mature social intelligence coupled with an extroverted personality. Future research could explore the potential link between this behaviour and the lower level of neural sensitivity to loss which Tom (2007) found in those with "risk seeking brains".

# Appendices

## Appendix 1: History of theory evolution and application to organisations as human systems

Theory base	Major features	Interpretation for leading and shaping the organization
Systems of control (1940s) - Cognitivism, computer language	Emphasis starts slowly to shift from the 'parts' to the interaction between them.	Interactions begin to take on significance, both between workers and their bosses, and within levels of work.
General systems theory (Boulding (1956), Von Bertalanffy (1968), Kast & Rosenzweig (1972), Katz & Kahn (1978), Mintzberg (1979), Osborn, Hunt & Jauch (2002), Hunt (1991), Fiedler (1978) Jaques (1976)	Homeostasis. Goes towards balance and stability. Systems characterised into 9 levels of complexity – open systems increasingly complex. Linear system returns to equilibrium by regulating self-maintenance across semi-permeable boundary.	Boundaries are what counts. Managers manage the boundaries. Clear structure and delineation shows in job specs, clear tasking, tight organisational structures, hierarchies. Synergism, differentiation and integration did focus on interdependence, but at boundary level. Non-initiating.
Cybernetics (Black (1927), McCulloch (1965), Von Neumann & Morgenstern (1944), Wiener (1948), Maturana, Varela, Atlan (1980), Bailey (1994)	"Study of control and communication". Goal oriented, self-directed stabilization through negative feedback loop (dampener). Linear. Will pull back to set point. Variance determines adjustment. ('new cybernetics' expanding this field)	Basis of managerial planning, budgeting and measurement. Quantified targets set in future, monitored for performance and variance. Emphasis on measurement – QM, BPR, incentive/reward, even culture change programs
System dynamics. (Forrester (1961), Bennett, Fox, Pugh (1958), Meadows (1968), Senge (1990), Sterman (2000)	Study of dynamic principles of complex systems. Engineers in 50s tackled finance and industrial issues at management level. Based on feedback and accumulation of flows into stocks and time delays. Introduces amplifier of positive feedback loop into chain of circular causality. Non-linear equations of system change. No longer drive back to equilibrium, self-influencing (good or bad; self-sustaining or self-destructive).	Doesn't move to equilibrium, so managers need to identify leverage points for change – the patterns and dynamics that cause them. Control dynamics, will control organization. Central to Senge's (1990) "learning organization - emergence occurs through learning. Causal loop diagrams and 'what if' mathematical simulations can be powerful in looking at systems as large as the decline of industry sectors.
Complexity theory Maturana (1997), Pascale (1999), Mathews, White & Long (1999), Kaufmann, (1993), (1995), (2000) Wheatley (1994), Holland (1995), (1998), Prigogine (1996), Marion (1999), Sterman (2000), Osborn, Hunt & Jauch (2002), Mitleton-Kelly & Papaefthimiou, Mitleton-Kelly (2003), Meadows (1972 – 2008)	Non-linear dynamics of dissipative structures leads to multiple transitions through series of set points, adaption & evolution, autocatalytic sets, autopoiesis (self-generation). Introduces unknowables and retrospectivity, chaos theory & disproportionate change (butterfly effect) due to interrelatedness so properties of system may emerge from within. Path dependence can occur	Self-induced transition influenced by history and learning. Emergence occurs through self-organization of interdependent agents, so leader enables them through structures and processes that allow this, holding the system out of the 'comfort zone', clarity of direction, and then ensuring the system doesn't slide into chaos (too few stable components) or rigidity (too highly ordered) where adaption / innovation stops.

Theory base	Major features	Interpretation for leading and shaping the organization
<p>Chaos</p> <p>Mandelbrot (1979), Gould (1989), Gleick (1988), Morrison (1991), Kaufmann (1993), (1995),(2000) Dooley and Van de Ven (1999), Marion (1999)</p>	<p>Non-linear and not random. Predictable in pattern, not in path. Deterministic but not predictable, thus less stable than complex systems. Sensitive to initial conditions. Critical to adaption / evolution. Causality is external. Iterative, formative (pattern is known) but at the micro (individual) level can look random.</p>	<p>In human systems meaning is the 'strange attractor'. Need right mix of 'loose-tight' chaos and order to "buffer adaptability and evolution" as poised (on edge of chaos) systems have ability to adapt rapidly (amplification) and innovate creatively, so give room to do so while creating stability rather than structure that impedes interaction</p>
<p>Complex adaptive systems</p> <p>Kaufmann (1993), (1995), (2000), Baker, M. J., T. Hansen, R. Joiner, and D. Traum (1997), Wheatley (1994), Holland (1995), (1998), Prigogine (1996), Marion (1999), Sterman (2000), Osborn, Hunt &amp; Jauch (2002), Schneider &amp; Somers (2006), Meadows (2003, 2008)</p>	<p>Don't reach fixed point or equilibrium. Dynamic network of agents constantly acting and reacting to each other. Dispersed and decentralized control. Coherence through connectivity and collaboration. Order is emergent, history is irreversible, future unknowable. The system can learn and adapt /innovate. Causality can be internal as human choice is a variable and can change the 'rules'.</p> <p>In the longer term, iterative adaption is evolution over time. There is an increase in relationship psychology as part of connectivity in complexity and systems theory.</p>	<p>Formative when form enfolded in simple rules driven by stable equilibrium and random chaos. Or transformative</p> <p>Leadership's role is evoking change. organizational identity and social movements serve as mediating variables between leadership and organizational emergence</p>
<p>Complex responsive processes of relating</p> <p>Stacey, Griffin &amp; Shaw (2000)</p>	<p>Combines complexity and relationship psychology. Action and interaction of people transforms their environment. Processes of communication and 'power-relating' enable and constrain action and are open to varying interpretations.</p>	<p>Managers and leaders need to "live creatively in the unknown", understand the power and unpredictability of individual identity and inter-relationships, facilitate creative conflict as a pre-requisite for novel change.</p>
<p>Complex evolving systems (CAS)</p> <p>Allan (1997), Mitleton-Kelly &amp; Papaefthimiou (2000), (2001), Mitleton-Kelly (2002) ,Meadows (1972, 2008)</p>	<p>Short term adaption leads to long term evolution. Driven by systems theory basics of emergence, connectivity, interdependence and feedback, but adds complexity science aspects of self-organization, historicity, path dependence and exploration of 'space of possibilities' when 'far from equilibrium'</p>	<p>Also very centered on inter-relationship of people through connectivity and interdependence. Organization needs to be an enabling environment with clear 'shape' and purpose which then allows learning to occur and be shared when system (or segments) in flux. 'holds the boundary' of being outside comfort zone &amp; supports exploration of possibilities at micro-level, tries out multiple emerging solutions</p>
<p>Complex co-evolving systems (CCES)</p> <p>Mitleton-Kelly (2003), (2005), (2006), (2008), Cilliers (2005), Aaltonen (2007a)</p>	<p>As above, plus aspect of reciprocal loop changes between external environment and system. CCES not only adapt to changes in their environment or ecosystem, but also influence and affect that ecosystem. The process is not unilateral but reciprocal or co-evolutionary. CCES's have a set of interrelated characteristics that influence each other and enable them to create new order.</p>	<p>As above, with the additional aspect of leader 'scanning the environment' as causes for change can come from within or without, and allowing input that shapes 'the emergent new and novel' from multiple sources.</p>

Theory base	Major features	Interpretation for leading and shaping the organization
<p>Systems Intelligence</p> <p>Hämäläinen RP &amp; Saarinen E (2006), (2007); Losada M &amp; Heaphy E (2004), Meadows</p>	<p>Connects the two leadership areas of 'rationally controlling, engineering and commanding complex structures' with 'sensing, experiencing and sharing the subtleties of one's environment through human connectivity and the subjective dimension' Includes bifocal leadership with recognition of being both within the system and actively able to work on it and also sitting outside it to observe the system as a whole. Combination of ST and CRPR. Frame of success leads to flourishing and the power of small actions, (leverage points, micro-behaviours that positively influence the situation (or system)</p>	<p>Hämäläinen and Saarinen note the ability to understand that people act within (complex) systems constantly, and are remarkably successful at it, as an immense, powerful source of leverage for leaders in building momentum and excitement to take on unknown challenges. Leaders need to be comfortable with the fact that they are immersed in an unfolding, emergent situation and understand the importance of the human, experiential, emotional and subjective aspects of an organisation</p> <p>Realistic, hands on optimism which is essential to positively reframing these core beliefs, counteracts 'holding back behaviours and systems that trivialise reciprocity and decrease vitality'. They require the bifocal capability to differentiate and manage both the technical and human aspects of the organisation at the same time.</p>
<p>Chaordic systems.</p> <p>Hock, 1996, Van Eijnatten, 2004, Kira and van Eijnatten, 2008</p>	<p>Adds a richness of introducing more nuanced understanding of organizational complexity. Combination of chaos and order - "a complex and dynamical arrangement of connections between elements forming a unified whole the behavior of which is both unpredictable (chaotic) and patterned (orderly) simultaneously. Organisations are CAS with multiple equilibrium states and oscillations due to emergence, diffusion and increasing complexity of a holonic nature</p>	<p>Dealing with stability and flux at the same time across different parts of the organisation, and at macro level an organisation that goes through changing states, and increases complexity. Manage the cross in the chaos of old thinking, old doing to new thinking, new doing. Cognitive complexity increases requisitely with the organisational increase in complexity. This is often of a nested, holonic nature which is both independent and interconnected.</p>
<p>Panarchic systems</p> <p>Holling &amp; Gunderson, (2002), van Eijnatten (2004)</p>	<p>Panarchy adds a further level of detail which is the different time frames of evolving hierarchical systems with multiple interrelated elements that sit within each other and act upon each other in an organisation, creating the possibility for a 'revolt (innovation) and remember' loop that allows small scale local change to quickly effect the much larger evolutionary path</p>	<p>Leading and managing of multiple time frames which affect each other, often in a holonic, nested way. Recognising patterns is critical, and the ability to see patterns over different time frames is a key part of highly skilled leadership and long term strategic adaptation. Understanding the innovation (revolt) loop allows critical jumps to be recognised and even pre-empted.</p>

Note. Though systems thinking originally did not specify the value of relationships and information as strongly as theories such as Complex responsive processes of relating and Systems Intelligence, the idea of connectivity in fact embodied many of the ideas and facets made explicit in these theories in the works of such authors as Meadows and Mitleton-Kelly.



## Appendix 2: Organisational Transformation History of Activities by Year

The following pages contain diagrams outlining the organisational transformation history of activities, divided by year.

Appendix 2a) Organisational transformation history of activities. Year 1.

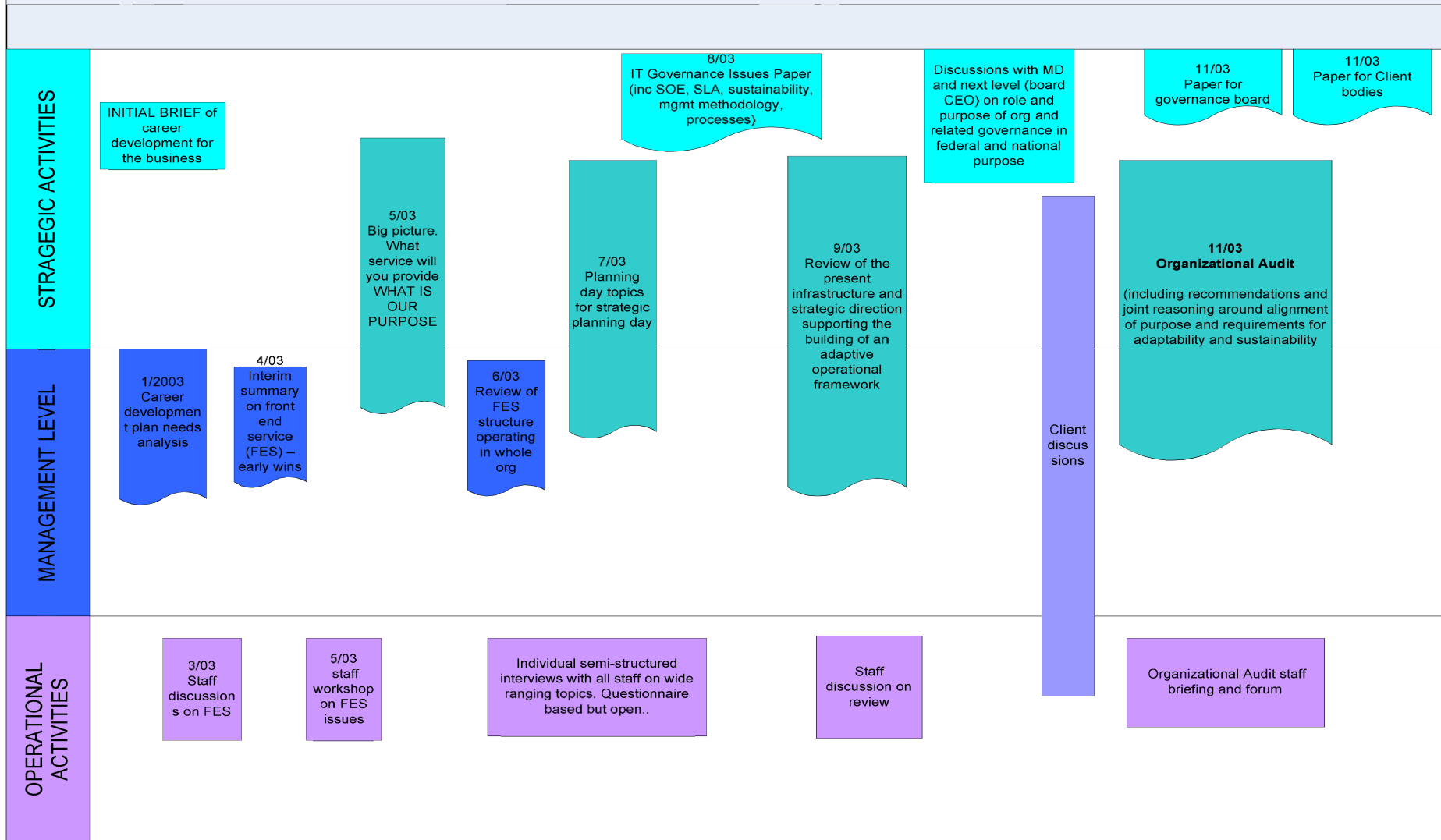


Figure 32: Organisational transformation history of activities Year 1

Appendix 2b) Organisational transformation history of activities. Year 2

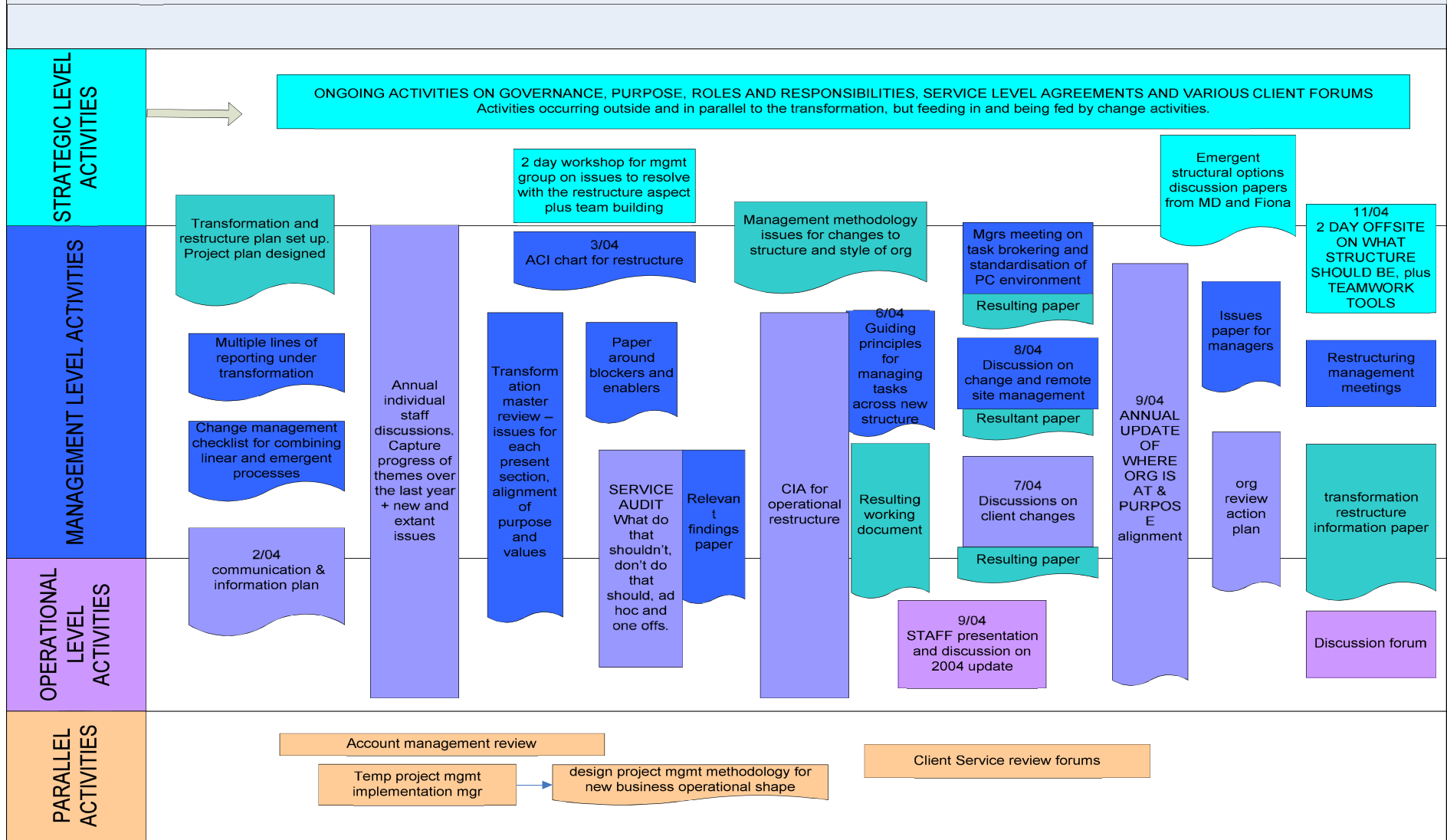


Figure 33: Organisational transformation history of activities Year 2

Appendix 2c) Organisational transformation history of Activities. Year 3

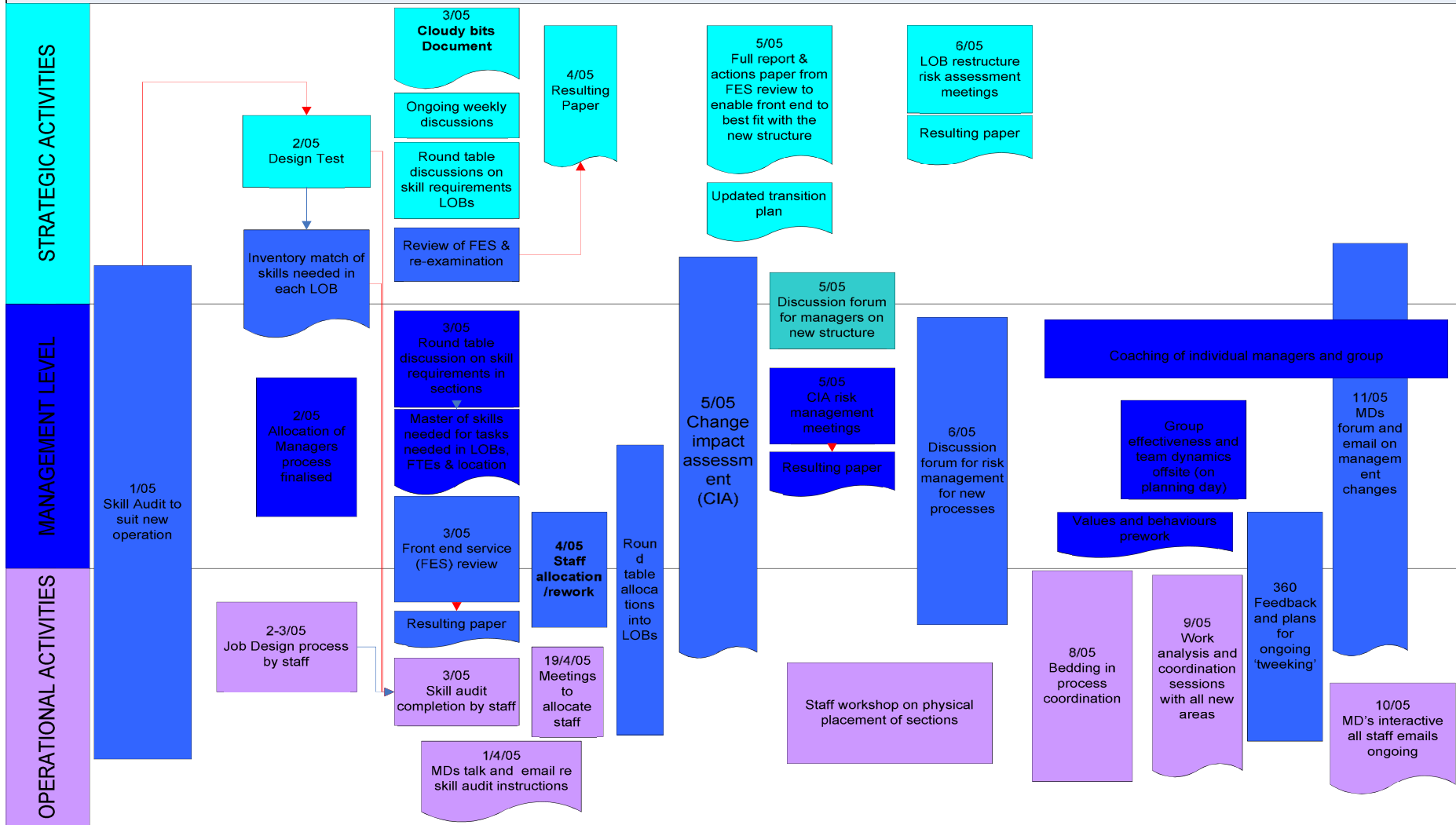


Figure 34: Organisational transformation history of activities Year 3

## Appendix 3. List of Questions for staff regarding human resource framework

- 1) Performance appraisal
  - Do staff see this as an opportunity to learn about their skills / competencies and test self-perception vs. reality?
  - Are managers skilled in giving candid performance feedback and engaging employees in discussions of skills and abilities
  - Are performance appraisals used as an occasion to discuss future plans and opportunities
- 2) Career paths
  - Are career path data readily available to managers and employees
  - Are managers able to explain career path data to employees
  - Is career path information up to date
- 3) Job descriptions
  - Are these accurate and up to date?
  - Are they written to include not only duties but also competencies and behaviours
  - Are they readily available for examination
- 4) Job posting
  - Do all employees have adequate opportunity to know about vacancies before they are filled
  - Is posting of jobs resisted by managers, who may want more latitude to make their own selection
  - Can potential applicants get enough information about posted jobs to learn how it fits with their past experience, abilities and goals
- 5) Recruitment, transfer, promotion policies
  - Are current ones understood by managers and employees and viewed as thorough and fair
  - general, recruitment, transfers, higher duties , acting, promotion
  - Do employees understand the policies about recruiting within vs. without

- Are appropriate systems available for transferring employees into positions that fit their qualifications

6) Training / development

- Are training and development activities equally available to all employees who show a need or want?
- Are training needs regularly assessed to update what is offered
- Are supervisors / managers able to counsel employees on training opportunities, including on the job training, and willing to support their efforts?

7) Remuneration practices and benefits

- Do employees understand the remuneration and benefits systems? Do they consider them fair and equitable
- Do remuneration policies support career movement other than simple advancement?
- Can reward systems be structured to recognise managers who actually support the career development of their employees

8) Strategic planning

- Where in the organization is the strategic planning function located?
- Is it a function of central staff or each department
- Is strategic planning information specific and up to date
- What information is currently disseminated to employees about the organization's future plans

9) Forecasting

- Is there a formal system for forecasting future human resource needs throughout the organization
- Is the forecasting system kept up to date and accurate short and long term

10) Planning for succession

- Are there plans for succession into key positions
- Is there openness about succession plans, so that staff can react to them and incorporate them into individual career planning

- Do recruitment and selection activities reflect succession planning
- 11) Skills inventories
- Is there a system in place for the storage, update and retrieval of information on skills, experience, training
  - Is information updated in skill inventories in a timely and consistent manner

## Appendix 4. Uses of the term emergent logic in the public domain

The term emergent logic has only entered the vocabulary over the past few years and the meaning is not yet coalescent. It is written about at both the macro and micro-entity level, as befits emergence as one of the scale-invariant elements of a complex evolving system (CES).

At the macro level emergent logic has been described as one of a 'range' of logics "underpinning the contemporary Australian academic field" (Wilkinson, 2009); and as the only type of logic "able to capture and reflect central elements of the initial vision of building institutions as a mobilizing agent for societal factors....which institutional logic misses" (Brown, de Jong, & Levy, 2009).

(Bloche, 2010) talks of the "emergent logic of health law" and there is a software company called Emergent Logic LLC ([www.emergentlogic.com](http://www.emergentlogic.com)) and a knowledge mapping group called Logic Emerging Markets Fund LLC that creates maps that let the user "instantly visualize and understand the relationships between important market players". (MarketVisual, 2012).

In their work on "emergent cyclist route choice in central London" Raford, Chiaradia and Gil (2005) use the concept of emergent logic at both the macro level to discuss how the 'map' of cycle routes evolves, and at the micro level of individual cyclists, pointing out that "individual cyclist choices may be effected by a wide range of variables... system level cyclist route choice follows an emergent logic based on mean angular depth minimization" (p 527-541).

Harmon (2008) describes William Goffman's (1959-2000) work on clinical decision making as an "application of the emergent logic of clinical decision-making in medicine as centred on true or false positive or negative diagnoses to illustrate corresponding similarities in information retrieval processes" (p 2).



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