Boundary weaving:

The social structure and processes of organizational boundaries

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It is wrong to look for boundaries between pre-existing social entities. Rather we should start with boundaries and investigate how people create entities by linking those boundaries into units. We should not look for boundaries of things but for things of boundaries.

Andrew Abbott (1995)

Abstract

Boundaries are an important field of study because they mediate almost every aspect of organizational life. They are becoming increasingly more important as organizations change more frequently and yet, despite the endemic use of the boundary metaphor in common organizational parlance, they are poorly understood. Organizational boundaries are under-theorized and researchers in related fields often simply assume their existence, without defining them. The literature on organizational boundaries is fragmented with no unifying theoretical basis. As a result, when it is recognized that an organizational boundary is "dysfunctional" there is little recourse to models on which to base remediating action.

This research sets out to develop just such a theoretical model and is guided by the general question: "What is the nature of organizational boundaries?" It is argued that organizational boundaries can be conceptualised through elements of both social structure and of social process. Elements of structure include objects, coupling, properties and identity. Social processes include objectification, identification, interaction and emergence. All of these elements are integrated by a core category, or basic social process, called boundary weaving.

An organizational boundary is a complex system of objects and emergent properties that are woven together by people as they interact together, objectifying the world around them, identifying with these objects and creating couplings of varying strength and polarity as well as their own fragmented identity. Organizational boundaries are characterised by the multiplicity of interconnections, a particular domain of objects, varying levels of embodiment and patterns of interaction.

The theory developed in this research emerged from an exploratory, qualitative research design employing grounded theory methodology. The field data was collected from the training headquarters of the New Zealand Army using semi-structured interviews and follow up observations. The unit of analysis is an organizational boundary. Only one research context was used because of the richness and multiplicity of organizational boundaries that were present.

The model arose, grounded in the data collected, through a process of theoretical memoing and constant comparative analysis. Academic literature was used as a source of data to aid theory development and the saturation of some central

categories. The final theory is classified as middle range, being substantive rather than formal, and is generalizable across medium to large organizations in low-context societies. The main limitation of the research arose from the breadth of the research with multiple lines of inquiry spanning several academic disciplines, with some relevant areas such as the role of identity and complexity being addressed at a necessarily high level.

The organizational boundary theory developed by this research replaces the typology approaches, typical of previous theory on organizational boundaries and reconceptualises the nature of groups in organizations as well as the role of "boundary spanners". It also has implications for any theory that relies on the concept of boundaries, such as general systems theory.

The main contribution of this research is the development of a holistic model of organizational boundaries including an explanation of the multiplicity of boundaries – no organization has a single definable boundary. A significant aspect of this contribution is the integration of aspects of complexity theory and identity theory to explain the emergence of higher-order properties of organizational boundaries and of organizational identity.

The core category of "boundary weaving" is a powerful new metaphor that significantly reconceptualises the way organizational boundaries may be understood in organizations. It invokes secondary metaphors such as the weaving of an organization's "boundary fabric" and provides managers with other metaphorical perspectives, such as the management of boundary friction, boundary tension, boundary permeability and boundary stability.

Opportunities for future research reside in formalising and testing the theory as well as developing analytical tools that would enable managers in organizations to apply the theory in practice.

Keywords:

Boundary, boundaries, organizational boundary, organisational boundary, organizational boundaries, organisational boundaries, boundary objects, organizational identity, organizational complexity, emergence, interaction, objectification, identification, boundary weaving, knowledge management

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Statement of original authorship

The work contained in this thesis has not been previously submitted to meet the requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Signature:

Date: 24 September 2010

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1. Introduction

1.1. Introduction to the research

This research is focused on gaining a deeper understanding of the nature of organizational boundaries. The concept of organizational boundary is important because it is a powerful metaphor that permeates organizational life and influences almost every interaction. However, organizational boundaries are poorly understood, being under-theorized (Heracleous, 2004, p. 99) and researchers in mainstream organization theory often simply assume their existence for theoretical purposes without defining them empirically (Hernes & Paulsen, 2003, p. 8), characterising them as "stable and unambiguous" (Hernes, 2004, p. 9) when in fact they are dynamic and multi-faceted. As a result, when an organizational boundary is recognized as being dysfunctional there is little recourse to theoretical models on which to understand the issues involved and then to formulate possible remediating actions (Vallas, 2001).

In addition, boundaries are becoming increasingly important as economic pressures are driving changes in organizational forms from stable structures to post-bureaucratic forms where "boundaries and meaning are fluid, emergent and ambiguous" (Kellogg, Orlikowski, & Yates, 2006, p. 23). In these post-bureaucratic forms, cross-boundary issues are likely to arise more as boundaries arise and change with greater frequency and rapidity.

Merali (2002, p. 47) said:

> *A clear understanding of the boundary phenomenology and its role in intra- and inter-organizational knowledge processes is important in developing effective strategies for managing organizational transformation in relation to the dynamic, interconnected, competitive economic context.*

In particular, a wide range of researchers support the proposition that "boundary spanning" should be a key organizational competence (Heracleous, 2004; Kogut & Zander, 1992; Levina & Vaast, 2005; Merali, 2002; Orlikowski, 2002) that, if fostered, will have a positive impact on organizational performance (Teigland & Wasko, 2003). These same researchers have called for further investigation of organizational boundaries and the justification for this is outlined in section 1.3.

Previous research on organizational boundaries is somewhat fragmented with a wide variety of approaches (Lamont & Molnar, 2002), detailed in Chapter 5. Much of this research simply assumes organizational boundaries are "multi-dimensional" and discusses possible dimensions, often without justifying them (see section 5.2.1). It has been recognised this approach is flawed (Hernes, 2003, p. 50) because the number of possible dimensions and sub-dimensions is almost infinite. While a small number of researchers have moved beyond this simplistic view to examine the nature of boundaries themselves (see section 5.2), there is no dominant theory in this field as yet. In particular there appears to be a lack of a holistic model explaining the nature of organizational boundaries that is grounded in empirical data and which synthesises the existing related theory.

1.2. The question

In light of the fragmented nature of the body of knowledge relating to boundaries it was decided that a very general guiding question should be posed. The guiding question is:

> ***"What is the nature of organizational boundaries?"***

This question allowed the researcher to pursue multiple lines of inquiry as understanding of the boundary phenomena evolved. The general nature of this question is in line with the grounded theory methodology adopted (detailed in chapter 2) which stresses the importance of not being overly influenced by existing literature – of "grounding" the development of theory in the data.

The researcher needs to remain in a questioning frame of mind, able to change the focus of inquiry as it unfolds. In that sense it is more of a guiding question than specific research question to be answered regardless of the results. In particular, the design of a hierarchy of very specific questions right down to the investigative questions is avoided.

It will be argued in chapter 4 that organizational boundaries can be conceptualised using elements of both structure and of social process. The structure of organizational boundaries consists of mediating *objects*, the *coupling* that ties people to them, *properties* that enable and constrain *interaction* and the *identity* of individuals and groups. Social processes include *objectification* – the process by which *objects* are

(re)created; *identification* – the process by which people couple with *objects*; *interaction* – the way in which people act on each other; and *emergence* – the complex process by which higher-order *properties* of boundaries are created. All of these elements of boundary are integrated by a basic social process called *boundary weaving* in which people *navigate* the elements of boundary structure at the same time as they *(re)create* them.

These elements are developed into a comprehensive model of organizational boundaries as shown in Figure 1 below:
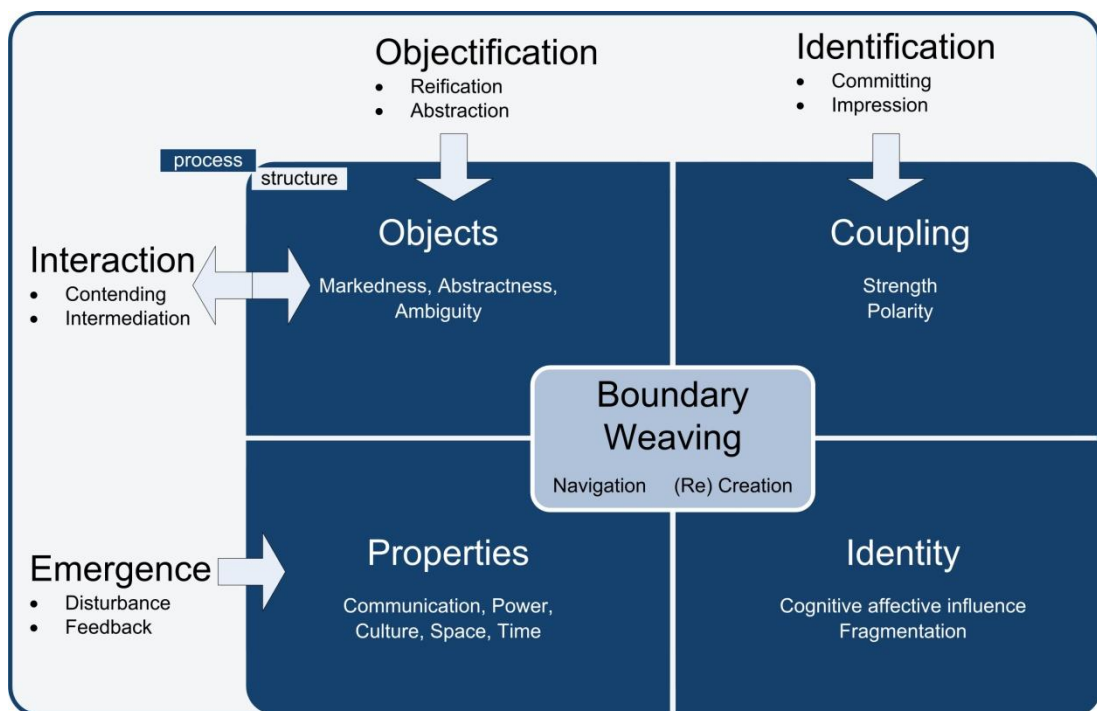
Figure 1: The social structure and processes of organizational boundaries

This model is the major contribution of this research and the core category, *boundary weaving*, is a powerful new metaphor for reconceptualising the nature of organizational boundaries. Other novel contributions relate to explanation of the *multiplicity* of boundaries and the articulation of a number of new attributes for the key elements of the theory. A number of significant advances on existing theory are also made, particularly around understanding the role of *identification* in organizational boundaries and the *emergence* of enabling and constraining *properties*.

1.3. Justification

1.3.1. Call for research

Recently a number of researchers have called for a greater empirical research focus on the nature of boundaries (Heracleous, 2004; Lamont & Molnar, 2002) along with a synthesis of the many different research disciplines that address the topic. They argue that boundaries are one of the most fertile areas for research because they "capture a fundamental social process, that of relationality" (Lamont & Molnar, 2002, p. 169). In other words, boundaries and the associated knowledge processes are fundamentally related to the way in which individuals and groups of individuals relate to each other.

However, "clear definitions of boundaries remain implicit or absent" (Heracleous, 2004, p. 99) in much of the current research relating to boundaries. Much of the research is focused on the "macrosociological perspective, looking at political boundaries rather than interactional ones" (Bechky, 2003, p. 721). While there has been much research on boundaries relating to social inequality, there is a lack of research on boundaries that is specifically aimed at assisting people manage boundaries in organizations (Heracleous, 2004, p. 3; Vallas, 2001).

Another issue is that much of the research on organizational boundaries has "been driven by theory more so than by reality. When theory needed stable and unambiguous boundaries, the system was attributed such boundaries, but mainly for analytical purposes. ... There is a need for perspectives that form complementarities with systems thinking; perspectives that allow boundary selection from realities rather than analytical neatness" (Hernes & Paulsen, 2003, p. 8).

The above calls for research and the related issues have lead to the grounded theory approach introduced in section 1.4 and detailed in Chapter 2.

1.3.2. Personal motivation

The focus of this research originally arose from the researcher's interest in the discipline of knowledge management and the recognition that there is a lack of a theoretical basis for explaining the difficulties of facilitating knowledge processes, such as information sharing or innovation, across organizational boundaries.

The basic relationship between boundaries and knowledge is concisely summarised by Carlisle (2002, p. 442), who said:

> *I start with the premise that knowledge in organizations is problematic; specifically, in new product development, knowledge is both a source of and a barrier to innovation. The characteristics of knowledge that drive innovative problem solving within a function actually hinder problem solving and knowledge creation across functions. It is at these "knowledge boundaries" that we find the deep problems that specialized knowledge poses to organizations. The irony is that these knowledge boundaries are not only a critical challenge, but also a perpetual necessity because much of what organizations produce has a foundation in the specialization of different kinds of knowledge.*

The critical importance of knowledge boundaries, illustrated by the above quote, has resulted in a large volume of literature on "boundary spanning" (Bartel, 2001; Carlile, 2002; Chai, 2003; Cranefield & Yoong, 2007; Currie, Finn, & Martin, 2007; Johnson & Chang, 2000; Levina & Vaast, 2005, 2006; Star & Griesemer, 1989; Tushman, 1977). However, this literature is remarkable for its focus on the practicalities of facilitating knowledge processes across boundaries while taking their existence for granted.

As this researcher began to survey the literature it was noted that the concept of an organizational boundary was also inherent in some key management theories, such as general systems theory, as well as being implied in a number of management practices such as supply chain management and customer relationship management. The researcher began seeking out explanatory literature on the role of boundaries in management theory but with little success.

1.4. Methodology Overview

In section 1.1 it was noted that the body of knowledge about organizational boundaries is very fragmented and there appears to be no unifying theory. The goal of this research is thus to develop a generalised and unifying theory of organizational boundaries.

As such, the overwhelming characteristic of this research is that it is exploratory in nature. The grounded theory (GT) methodology is ideally suited to this research problem (Glaser & Strauss, 1967). In chapter 2, we discuss how grounded theory

underpins a research design involving a large complex organization. This design is chosen to develop an in-depth understanding of boundaries, as the unit of analysis, in a single organizational setting.

The context chosen for the research is the training headquarters of the New Zealand Army's main training unit (HQ LTDG). This unit consists of some 40 people, with another 400 reporting through to it, and its role is to manage the Army's training system. This context includes a multiplicity of boundaries at all ontological levels including those between individuals, between cells of the organization, between different units or structures in the Army (both formal and informal), between different services of the wider defence organization and with other organizations outside the defence force, both military and civilian.

An important aspect of theory development in this research is the embracing of inter-level causality and the use of hermeneutics as a narrative-based method of explanation, rather than the development of propositional laws characteristic of cause-and-effect philosophies (Juarrero, 1999). Also, it was decided to pitch the theory development at middle-range, so substantive theory is developed that is focused on boundaries in organizations rather than a theory of boundaries in general.

The analysis approach taken is an adaptation of the traditional GT approach with three phases of coding – being open, selective and theoretical –applied in an iterative manner so that the theory develops like a "patchwork mosaic" (Dey, 2004, p. 86). Two main methods of data collection are used – semi-structured interviews and a review of the literature. The use of literature as data is somewhat unusual in qualitative research but it is within the guidelines of ground theory methodology. The core category, a basic social process, is unusual in that it has non-linear causality and hence does not have the clearly defined and sequential stages suggested by Glasser (1978, p. 95).

Analysis of the data follows the usual pattern of reduction, display and conclusion drawing (Miles & Huberman, 1994, p. 10). The only unusual aspect is the extensive use of a multi-dimensional mind-mapping tool to assist in theory generation. Quality considerations were broken down into three main areas – those relating to qualitative research generally, those relating to grounded theory methodology and issues relating

to the generation of "good" theory. Ethical clearances were obtained in order to conduct the research.

Delimitations are set out in section 1.7 below and limitations that arose during the research are discussed in section 6. 5.

1.5. Summary of contributions and implications

The overall contribution of this research is the development of a holistic model of organizational boundaries which is markedly different from any other theory of boundaries, in organizations or otherwise. Within the framework of this general contribution are a number of significant novelties and advances on existing theory. In particular, this research breaks new ground through the application of both complexity and identity theory to organizational boundaries. This approach allows the research to better explain the multiplicity of boundaries, which has bedevilled most other dimensionally-based theories of organizational boundaries.

The theoretical model developed in this thesis has major implications for any research studying the field of organizational boundaries. The assumptions underpinning most extant boundary-related theory will need to be examined in light of the integration of complexity theory and identity theory outlined in chapters 3 and 4. In particular, approaches to boundaries based on typologies may need to be revised.

In a practical sense, this research has a number of implications for managers and analysts in organizations. At a fundamental level, the boundary theory developed in this thesis provides a basis for analysing dysfunctional relationships in organization. The development of a new root metaphor, that of boundary weaving, and related surface metaphors (friction, tension, permeability and stability) will help managers in organizations conceptualise and approach operational problems in new ways. The argument put forward in chapter 6 is that becoming adept at managing organizational boundaries will lead to better control of organizational outcomes such as efficiency and innovation.

In summary, this thesis takes a wide range of disjointed theory that is either directly or indirectly related to boundaries, synthesises it and adds new insight arising from the empirical findings of this research.

1.6. Chapter outline

The order of chapters in this thesis reflects the methodology employed –grounded theory. In brief, the methodology is explained up-front in chapter 2 followed by a presentation of the findings in chapter 3. Chapter 4 is devoted to development of the theory and comparable theories are discussed in chapter 5. Conclusions and implications are outlined in chapter 6. Following is a more detailed outline.

Chapter 1 - Terminology, acronyms and conventions are set out in the remainder of this chapter so that the reader can fully understand the rest of the thesis.

Chapter 2 is focused on reviewing the methodology, rather than the literature review that is generally expected in many other qualitative approaches, and this structure is guided by the grounded theory methodology. This approach is so that the data speaks for itself and the reader is not overly influenced by pre-existing theories (Glaser & Strauss, 1967).

In **chapter 3** the study site (HQ LTDG) is described and the findings are organized in sections that correspond to the key elements of the theoretical model shown in figure 1 and also relate to the actual development of the theory, with the introduction of each section explaining out the findings and theory developed iteratively. The chapter starts with the four elements of structure (*objects, coupling, properties* and *identity*) followed by the four elements of social process (*objectification, identification, interaction* and *emergence*) and finishing with the basic social process of *boundary weaving*. The chapter presents evidence for each of the major elements of organizational boundaries as well as a number of attributes for each of these. This structured display strategy was adopted to allow the reader to easily absorb the evidence presented and follow the chain of logic that led to the development of the theory.

The structure of **chapter 4** mirrors that of chapter 3. In this chapter, the theoretical categories and attributes are defined along with an explanation of how they relate to each other. In addition, a range of insights that arose during the research are presented in the form of a general discussion of each category.

In **chapter 5** the findings and developed theory are compared to existing theory. In particular, related literature is examined including the typology of boundaries, the

concepts of group and boundary spanning, symbolic boundary theory, knowledge boundaries, emergent coordination structures, the psychoanalytic view, boundary infrastructure, activity theory and general systems theory. This chapter closes with a discussion of the metaphorical nature of the term "organizational boundary".

Chapter 6 sets out the contributions of this research and discusses the implications for theory and practice, followed by limitations and recommendations for further research. The implications for theory primarily relate to the fields outlined in the previous paragraph while implications for practice relate to general management and knowledge management. It is argued that management can be improved by paying closer attention to the metaphor of boundary, particularly in relation to their friction, tension, permeability and stability.

Finally, it is worth noting that a system of numbered sub-headings (down to six levels) is employed. This system was adopted because of the hermeneutic style of explanation (see sections 2.3.2 and 3.4.2.1.2) which involves extensive cross referencing of finding and theory. The numbering system thus enables the reader to easily move around the thesis as required.

1.7. Terms and Conventions

1.7.1. The boundary metaphor

It should be noted at the start that an "organizational boundary" is a metaphor. Metaphors are figures of speech (a type of analogy) in which a commonly understood entity is used to highlight aspects of another entity. For example, the metaphor of the "organizational pyramid" highlights the hierarchical nature of organizations and the way the number of staff (like blocks) making up the levels gets smaller towards the top. However, organizations can for example also be seen as machines, organisms, jungles or wars. Any number of metaphors may be used to highlight different aspects of organizations and the term "organizational boundary" serves to highlight a phenomenon that people intuitively and commonly accept as being real but is hard to explain with literal language.

Metaphors are often used in research to express and explore ideas, prior to the development of a formal theoretical language (Cornelissen & Kafouros, 2008a). In

particular, other research may be used as a theory-constitutive metaphor (Boyd, 1979, cited in Cornelissen & Kafouros, 2008a) by which aspects of the emerging theory are understood by analogous comparison with the constructs of the established theory and this tactic is employed by this research project.

The term "boundary" is often thought of as a fence, marking a sharp division or limit. However, as shall be seen in this research, boundaries have as much to do with connection as they do with division and they are often blurred rather than distinct.

The basic problem of the "boundary as a fence" analogy is that it hides far more aspects of boundaries than it reveals. As will be seen in this thesis, there are other fundamental aspects that deserve to be highlighted. In particular, it will be argued that the fence analogy's emphasis on a membership-based conception of boundaries, where people are either "in or out" of some social group, is a simplistic view of the reality of organizational boundaries.

Boundary researchers have paid too little attention to its metaphorical nature. This has led to a naivety that flaws much of the existing literature on boundaries. If one does not understand the nature of metaphor then it is difficult to understand the nature of organizational boundaries. Section 5.4 provides a detailed examination of the boundary metaphor and this is a key feature that differentiates this research project from others.

In light of the above discussion, it makes little sense to offer a definition of "boundary" or "organizational boundary", particularly at the start of this research. Rather, the reader is asked to put aside any preconceptions of what an organizational boundary might be and allow the findings and analysis of the research to speak for themselves as this very interesting metaphor is explored.

It will be found that the core category, *boundary weaving*, is a powerful new metaphor that has the potential to change the way ordinary people in organizations conceptualise the nature of organizational boundaries. This metaphor emphasises the active role people take in (re) creating the "fabric" of boundaries and it also suggests, via a number of secondary metaphors, how people may successfully "navigate" and manage boundaries. Secondary metaphors explored in section 5.4.3 include boundary "friction", "tension", "permeability" and "stability". Development of these metaphors

may lead to a reconceptualization of the role of "boundary spanners" to one of "boundary architects" – actively designing "boundary infrastructure".

1.7.2. Conventions

A number of conventions are used in this thesis as follows

- **Categories are in special fonts**: It should be noted from the start that any mention of the theoretical categories used in the development of theory are italicized, including their linguistic derivatives – e.g. *identify* and *identification* both refer to the same category. In addition any codes used in the data, such as reputation, are displayed in Arial font as shown. These conventions assist in developing comprehension of the theoretical model. The only exception to this convention is that the category is not italicized in its own section and this is in order to avoid excessive italicization of the explanatory text.

- **Interview data**: In order to provide clarity of a key data source, all interview data is displayed using indented and italicized font and does not follow the APA guidelines for quotations. This data is broken out from the normal text regardless of length and employs quotation marks. By contrast, data from the academic literature follows the APA convention for quotations.

- **"Attributes" rather than "properties" of a category**: The term *properties (*or *property)* mentioned throughout this thesis is a category of the research. It should not to be confused with the grounded theory term of the same name relating to attributes of a research category. In this thesis, the term "attribute" has been chosen to replace the grounded theory term of "property" to avoid confusion with the research category identified in the data.

- **Collapse of the individual/social**: Throughout this thesis, the term "people" is used as much as possible rather than the terms "individual" or "group" and a few sentence constructions employ a "slash" to avoid making any ontological differentiation between individuals/groups (note the slash). This is an attempt to avoid the historical split between the individual and the social, with all the attending conceptual difficulties (see Stacey, 2001, p. 61). As such, this theoretical model supports the duality of the individual and the social, assuming they are at the same ontological level.

- **American spelling**: American English has been adopted as the spelling convention including the use of "z" in terms such as "organization". In order to maintain consistency, original quotes from the literature have been altered to fit this convention where necessary. The reason this convention is adopted is that the vast majority of literature on organization theory also uses this convention. Future researchers of organizational boundary theory are advised to use both English and American spelling in their search terms.

- **Snipping and paraphrasing**: Ellipsis points are used to indicate omission of words and generally this is done to illustrate the point of the quote more clearly. Square bracketing indicates the paraphrasing of words within a quotation paraphrasing (e.g. [altered words]) to either express the point of the quote better or to avoid easy identification of individuals, as per the ethical agreement.

1.7.3. Acronyms

The interviewees often used acronyms in their actual linguistic expressions and these are preserved in the interview quotes as much as possible. Unusual acronyms are spelled out in the context of the quote. Following are some common acronyms that the reader should be aware of.

- 0, 1, 2, 3, 4, 5, 6, 7, 9 – Branches of military units relating (in corresponding order) to command, personnel, intelligence, operations, logistics, planning, signals (information systems), training and finance.
- Civy - Civilian
- CO, COMD – Commanding officer
- DFO – Defence Force Order
- G-list, Green – regular army soldiers or officers as opposed to civilian employees of the army or "specialist officers" who are civilians in uniform with limited training.
- HQ – Headquarters
- HQ LTDG – Headquarters of the Land Training and Doctrine Group
- KM – Knowledge Management
- NCO – Non commissioned officer
- OO – Orderly officer

- PDT – Pre-Deployment Training

- PSO – Principal Staff Officer

- SME – Subject matter expert

- WO – Warrant Officers

1.8. Scope

The main theoretical delimitations relating to the research are as follows:

- The focus of the research was restricted to boundaries in and between organizations. Much of the theory on boundaries actually applies to a wider range of social entities including class and national boundaries but this is out of scope.

The practical limitations relating to the research methodology are as follows:

- The research in the NZ Army was limited to unclassified interactions and information. Research activities relating to higher security classifications was not permitted.

These delimitations are explored in more detail in section 2.7.3.

1.9. Summary

This chapter laid the foundations for the thesis. It introduced the background to the research and introduced the research problem, questions and related issues. The research was then justified and the methodology was outlined. Terminology was defined or discussed to assist the reader understand the thesis and the delimitations were set out. The information in chapter 1 provides the reader with a foundation and context to better understanding a more detailed description of the research.

The next chapter will begin this detailed discussion with an examination of the research methodology.

2. Methodology

2.1. Introduction

2.1.1. Structure of chapter 2

The previous chapter outlined the context of the research including the historical background leading up to the identification of the guiding research question and briefly summarized the overall thesis including the methodology. The aim of this chapter is to describe the methodology used.

Firstly the research approach is discussed and justified. This is followed by a discussion of what is meant by theory and what makes good theory. The chosen research design, grounded theory, is then discussed in more detail. Quality considerations are discussed concluding with some principles that need to be followed in the research design.

The research design is then outlined including details of the data gathering and analysis techniques. Lastly, the delimitations of the research are discussed followed by ethical considerations.

2.1.2. The Research Journey

The research originated with a general interest in the nature of boundaries in organizations. A preliminary literature search was conducted confirming the need for research on boundaries as outlined in section 1.2. During this literature search an early insight quickly emerged – that most of the research relating to boundaries either took their existence for granted or simply stated they were multi-dimensional with little attempt to justify the examples of dimensions quoted.

Two separate courses on research methods, one relating to quantitative techniques and the other to qualitative techniques, were completed by the researcher. Initially, the researcher decided that a traditional case study methodology was most appropriate and that the research should focus on developing a more robust typology of boundary dimensions. However, shortly after data collection began the researcher realized that existing theories of boundary, particularly the typology approach, were

problematic. In particular, the range of possible boundary dimensions and their sub-dimensions was possibly infinite and problematic in fitting them to any particular typology. The researcher began taking notes on these difficulties and it became clear that an alternative approach to conceiving boundaries was required. This led the researcher to consider alternative methodologies. It was realised that the notes being taken were in fact the same as theoretical memos typical of grounded theory. After a brief reconsideration of possible methodologies, grounded theory was chosen because it allowed the researcher to develop an alternative model.

The early data collection was guided by an interview protocol (see Appendix A1) that was influenced by the initial case methodology. However, this was not considered to be an issue from a grounded theory perspective as the questions asked were deliberately open ended and are considered as a starting point for data collection only.

Prior to the start of data collection, the researcher worked at the HQ LTDG (the study site) for a period of ten months in the capacity of a business analyst and project manager and also at the parent organization (a higher level headquarters) for the previous 18 months. This first 10 months of employment at HQ LTDG corresponded with the writing of the research proposal and the early stages of the research itself including the preliminary literature search and refinement of the research question. During this period no data was collected but the researcher did benefit from developing a deep understanding of the study site's context.

Formal research commenced and initial data collection took place in the last 5 months of employment at HQ LTDG. All staff were informed that the research was commencing and interviewees were given detailed information sheets, including the option not to participate.

During the interviews it was made clear to the staff that the research was not related to the contract work that the employee was undertaking. The nature of the contract work (configuring an intranet) meant that this separation was relatively easy to maintain and no conflicts arose during the research. No information gathered during the research process was used in the contract work and vice versa.

Other elements of the research journey, including details of the research methodology, gathering of data and the analytical development of the theory, are

outlined in this chapter. Detailed information on the way in which each category was conceived is outlined at the start of each section in chapter 3.

2.2. Justification of Research Approach

There are a wide range of approaches to research and the aim of this section is to briefly discuss the options considered and justify the approach chosen.

2.2.1. Qualitative versus quantitative

A key question facing all researchers is whether their mode of inquiry should be primarily quantitative or qualitative or a mixture of both. Giddens (1924, cited in Gerring, 2007, p. 29) said quantitative methods "follow the distribution of a particular trait, quality, habit or other phenomenon as far as we can" while qualitative methods "ascertain as completely as we can the number and variety of traits, qualities, habits, or what not, combined in a particular instance".

Quantitative approaches are usually statistical in method and have assumptions underpinned by a positivist philosophy, whereby social phenomena are considered objectively real and separate from the observer. In the quantitative approach, theory is generated deductively and its quality relates to its falsifiability – propositions must be made that can be tested (Miles & Huberman, 1994; Yin, 2003).

By contrast qualitative approaches are underpinned by constructivist or interpretive philosophies where it is assumed that observers construct their own reality as they interpret phenomena around them (Klein & Myers, 1999). Detailed and rich descriptive data is preferred and theory is generated inductively from this data.

Both approaches have their strengths and weaknesses and it is increasingly accepted that the methods can be mixed (Johnson & Onwuegbuzie, 2004). The key question facing researchers is to understand the strengths of each and design a research method that is most appropriate to the nature of the research.

One of the key differences in these approaches lies around the exploratory nature of the research. Quantitative research is considered more appropriate for testing of theory while qualitative research is more appropriate for exploratory research because it is "more likely to lead to serendipitous findings and to new integrations;

they help researchers get beyond initial conceptions to generate or revise conceptual frameworks" (Miles & Huberman, 1994, p. 1).

As this research is primarily focused on developing new theory about the nature of organizational boundaries, it was decided that the qualitative approach is most appropriate.

2.2.2. Strategy

Research strategies may be loosely designed or tightly constrained, prior to the start of research. Miles and Huberman (1994, p. 17) note the argument that social phenomena are too complex to be approached with the pre-conceived ideas that usually accompany tight research designs. On the other hand, if the phenomenon under study is better understood then a more structured research design is more efficient and facilitates cross-case analysis.

The preliminary literature search revealed that much of the literature was devoted to the study of how people dealt with issues created by boundaries, such as difficulties in coordination or knowledge sharing. No existing theory that explicitly modelled the nature of organizational boundaries could be found. These early findings indicated that a loosely structured research design is appropriate. Loosely structured designs place an emphasis on the importance of reflexivity, "where the researcher remains in an asking or questioning stance" (Miles & Huberman, 1994, p. 8).

Also, research strategies need to balance breadth of inquiry – from wide, incorporating multiple sites, through to in-depth on a single site. Qualitative methods tend to focus on a small number of people "nested in their context and studied in-depth" (Miles & Huberman, 1994, p. 27). Within the context of the study site, a number individuals and clusters of individuals are selected for detailed observation and interviews. Also, at the start of the research, it was decided that the unit of analysis for this research is an "organizational boundary" and that any given organizational unit may have multiple such boundaries. So the general approach adopted for this research, subject to sampling considerations outlined later in section 2.4.4, was to focus on a single organization but to examine as many different boundaries within that context as possible. This is also in line with the call for a greater emphasis on critical inquiry outlined at the end of section 2.5.2.

2.2.3. Qualitative options

Within the field of qualitative research there are a wide range of traditional approaches. This section briefly examines the options and justifies the chosen approach.

Miles and Huberman (1994, p. 8) summarize the variety of approaches into three general categories –interpretivism, social anthropology and collaborative social research. Interpretivism relates to developing a deep understanding of the subject of inquiry and is characterised by methods such as semiotics and hermeneutics with strong focus on the interpretation of text. Social anthropology is characterised with a concern with the details of ordinary activities and the identification of regularities through extended contact with a given research context, as exemplified by its prime methodology, ethnography and its variants such as grounded theory, life history and narrative studies. Collaborative social research is again undertaken in a social setting but in this case the researcher works with cooperative "protagonists" to initiate institutional change and observe the results – which is typical of the main approach, that of action research.

Collaborative social research was not considered necessary as the focus was on identifying the general nature of boundaries, rather than developing methods for improving the nature of boundaries. Similarly, the interpretive approaches, as defined by Miles and Huberman (1994, p. 8) with its focus on interpretation of text, were not considered appropriate as the focus was not on developing an in-depth understanding of meanings and actions in a particular environment, rather the focus was on developing a theoretical model on the nature of boundaries. According to Miles and Huberman (1994, p. 8), of these three general approaches, the one most concerned with the genesis of theory is social anthropology and this lends itself to the goals of this research.

In all of these approaches, the case study is often used as a base methodology, with variations in technique. However, traditional case studies are typically used when a reasonable amount is already known about the research subject and the aim is to validate or extend existing models (Gerring, 2007, p. 39). In particular, the traditional case study approach requires the development of theory prior to data collection (Yin, 2003, p. 29).

By contrast, social anthropology approaches are used when little is known about the topic prior to research commencing. As noted in section 1.3, it was found that little is known about the exact nature of organizational boundaries. Once the decision was made to develop new theory, the grounded theory method was adopted as the primary approach, albeit informed by the techniques of the traditional case study.

2.3. The nature of theory

In her discussion of the nature of research on information systems (IS), Gregor (2006) notes that the discipline has struggled with a limited understanding of the role of theory. She said (2006, p. 3): "Many IS researchers who use the word 'theory' repeatedly in their work fail to give any explicit definition of their own view of theory."

A particular feature of IS research is its focus on technological artefacts, which has some resonance with this research and its focus on boundary *objects*, so it is assumed that this research be open to similar weakness. Therefore this section is aimed at defining what is meant by theory.

2.3.1. Elements of theory

Gregor (2006) proposes different types of theory with the following attributes. Some theories simply involve "analysis and description" of a phenomena while others are more "explanatory", delving into causality, or even "predictive", offering testable propositions. Higher level theory includes all of these elements and the most ambitious are those that also include prescriptions for "design and action". Gregor offers a model of four key components common to all theory including:

- Means of presentation – the devices used to present the theory, such as words, diagrams and tables
- Constructs – the phenomena of interest in the theory
- Statements of relationship – the relationships between the constructs
- Scope – the degree of generality of the above statements and their limits.

In addition, theory will include one of the following elements, depending on its purpose:

- Causal explanations – statements of relationships that show causal reasoning

- Testable propositions – statements of relationships that can be tested empirically
- Prescriptive statements – statements that specify how people can accomplish something in practice

Whetten (1989) provides a very similar list of elements relating to four essential elements including what, how, why and who-where-when. Similar to constructs, the "what" relates to the factors, e.g. "variables, constructs, concepts" (p. 490) and these should be compressive and parsimonious. "How" relates to the relationship between the set of factors, typically illustrates with arrows connecting boxes. "Who-where-when" relates to scope and the "temporal and contextual factors [that] set the boundaries of generalizability, and as such constitute the range of the theory" (p. 492).

Whetten (1989) diverges slightly from Gregor's model in placing greater emphasis on the importance of "why". Theory is not really theory, Whetten says, unless it explains the logic underlying the model, including all assumptions, and "theorists must convince others that their propositions make sense..." (p. 491). It is important to note that empirical research can develop testable propositions and make predictions about phenomena without actually understanding "why". Therefore a theoretical contribution should explain why as well as what and how. This view is supported by a range of scholars including Kaplan and Merton (1964 & 1967, cited in Sutton & Staw, 1995).

Adding a what or how to an existing theory typically "are not of sufficient magnitude to substantially alter the core logic of the existing model" (p. 492). Rather, theoretical contributions "commonly involves borrowing a perspective from other fields, which encourages altering our metaphors and gestalts in ways that challenge the underlying rationales supporting accepted theories" (p. 493).

The above models offer a useful starting point for the development of theory which is adopted by this research. Where theory is descriptive, as is the case for this thesis, Yin (2003) says that the focus should be on understanding the purpose of the descriptive effort, the full but realistic range of topics that might be considered and the likely topics that will form the essence of the description.

Theory may be "paradigmatic" (variable-oriented), with explanations involving the interplay of well defined concepts, or "syntagmatic" (process-oriented), with explanations following events over a period of time (Miles & Huberman, 1994, p. 91). The researcher started with an open mind in this respect. As the research unfolded it was found that a paradigmatic approach was found to be more suitable as the developing theory comprised of a number of inter-related elements. Miles and Huberman (1994, p. 91) note that the approaches can be combined and it may be useful in future research to conduct a syntagmatic study of an organization's boundaries over time.

2.3.2. Causality

A key notion that underpins much of the discussion about theory is that of causality. Much of theory has traditionally been intimately linked to causation as a means of explanation – that is, establishing the cause of a phenomenon (Gregor, 2006). According to Gregor, causation normally relates to regularity in phenomena with a clear causal pattern that never varies or to one event being a necessary precondition of another event, so called "cause and effect". Causation also relates to probability or the increased likelihood of an event by other factors, as well as the teleological analysis of intentional behaviour.

Causality often relates to prediction whereby theories can be tested and their accuracy or reliability is thus determined (a positivistic approach). However, as Gregor (2006, p. 11) said, "some theories can focus on one goal, either explanation or prediction, at the expense of the other. That is, it is possible to achieve precise predictions without necessarily having understanding of the reasons why outcomes occur".

Recently, the entire philosophical basis for traditional notions of causality has been challenged (Juarrero, 1999). Juarrero argues that such traditions are based on a flawed conception of "efficient" cause arising from a range of philosophers influenced by the rise of Newtonian science, whereby cause is related to the push-pull impact of external forces on inert matter. She argues that advances in the understanding of complex adaptive systems show us that phenomena can "emerge" that have no efficient cause and arise rather as higher-order *properties* from the *interaction* of lower-level components. These emergent *properties* then constrain and

enable the behaviour of the lower level components. In effect, the "inter-level causality" of complex systems serves as an alternative model for theory development to the traditional "cause and effect" approach.

These insights have significant implications for the development of theory that seeks to explain complex phenomena or systems. Rather than looking for covering laws, theory must instead seek new ways of explanation. Juarrero advocates a return to Aristotle's concept of phronesis and specifically highlights the value of hermeneutics as an alternative method for explanation. Hermeneutics refers to the idea that the whole can only be understood by understanding the individual components and that the individual components can only be understood in terms of the whole. This requires some cognitive gymnastics as the researcher (and the reader) jumps between levels. Explanation then can be reframed in terms of a narrative process, which can only explain something in terms of the full context – both the detail and the big picture.

In essence, Juarrero argues that the science of complex adaptive systems can serve as a theory-constitutive metaphor (Boyd, 1979, cited in Cornelissen & Kafouros, 2008a) that permits a reconceptualization of cause and a different logic of explanation. As will be shown in chapter 3, boundaries in organizations appear to involve complex processes of *interaction*, so Juarrero's recommendations are taken up by this research.

2.3.3. Theory levels

There are a number of levels of theory ranging from so called grand theory, which purports to explain universal phenomena, through to the working assumptions that allow people to go about their everyday activities. In between is a category of theory known as middle-range (Merton, 1957), which purports to explain a manageable subset of the wider reality of a social situation. Middle-range theories are common in the social sciences and typical of grounded theory.

Glasser and Straus (1967) divide middle-range theory into two subsets – substantive and formal. Substantive theories are developed around a specific context of social inquiry, with data collected only in the one context, and are "more immediate, specific and practical in their orientation and anticipated effects" (Dey, 2004, p. 83).

As such, substantive theory only purports to explain phenomena in that particular setting.

By contrast, formal theory, while still focused on a specific avenue of social inquiry, gathers data across multiple social settings in order to develop more generalised theory, at a higher level of abstraction (Dey, 2004; Glaser & Strauss, 1967).

The purpose of this research is to understand the nature of boundaries in organizations and to develop a theoretical model of this. It is clear from reading the literature that boundaries exist in all facets of life including, for example, those between social groups, cultures or ethnic groups. By restricting the study of boundaries to organizations only (and only one type of organization) it is clear that this research is substantive in nature. The type of organization studied is noted in the delimitations of the research in section 2.7.3.

2.4. Grounded Theory

2.4.1. Introduction

"The term 'grounded theory' (GT) refers to both a method of inquiry and to the product of the inquiry. However, researchers commonly use the term to mean a specific mode of analysis" (Charmaz, 2005, p. 507).

Grounded theory is a research method for developing rather than testing theory (Glaser & Strauss, 1967). GT is grounded in data and theory is "systematically worked out in relation to the data during the course of the research" (Glaser & Strauss, 1967, p. 6). A key point is that "the source of ideas, or even 'models,' can come from sources other than the data"(Glaser & Strauss, 1967, p. 6).

In other words, ideas from the literature and other sources may be used to inspire the researcher in conceptualizing the elements of theory. This is an important point as literature was used extensively in the later stages of the research. Glaser (Glaser, 1998, p. 67) specifically endorses the use of literature as a data source in the later stages of the research.

A key point is that while "a strong empirical foundation" is required for achieving credibility (Charmaz, 2005, p. 512), a focus on the collection of validating data

should not curb generation of theory (Glaser & Strauss, 1967, p. 28). Rather GT methodology involves continual exploration of ideas as they arise, balancing the need to fully understand key categories versus following up leads on new categories.

Glaser and Strauss (1967, p. 46) also advocate that researchers need to become "theoretically sensitive" through reading widely on related topics and not committing "exclusively to one specific preconceived theory". They say (p. 37) "an effective strategy is, at first, literally to ignore the literature of theory and focus on the area under study, in order to assure that the emergence of categories will not be contaminated by concepts more suited to different areas." Due to the fact that grounded theory methodology was not chosen until after a preliminary literature search had already been undertaken, this advice of Glaser and Strauss was not able to be taken literally. Fortunately, there was no dominant theory of organizational boundaries to sway the researcher and once the grounded theory methodology was adopted, the researcher then ignored the extant boundary literature until the theory development was well underway

2.4.2. Categorisation

The key elements (Glaser & Strauss, 1967) of grounded theory consist of:

- Conceptual categories and associated properties (called attributes in this thesis) of the conceptual categories
- Hypotheses or generalized relations among the categories and their properties and the integration of categories, concepts and hypothesis

Grounded theory is most closely associated with its methods of coding (Dey, 2004, p. 84) and this also differentiates it from other qualitative methods. Underpinning this coding is the process of constant comparison whereby "while coding an incident for a category, compare it with the previous incidences in the same and different groups coded in the same category" (Glaser & Strauss, 1967, p. 36). This process helps generate theoretical insights, particularly through identification of similarities and difference.

At times the researcher may feel tension between a developing idea and the desire to code the next incident in which case the researcher should "stop coding and record a memo on your ideas" (Glaser & Strauss, 1967, p. 36). The researcher thus develops a

"memo bank" that captures the initial freshness of ideas and these memos may be used as data.

When Glasser and Strauss first developed GT the coding process was focused on two phases – substantive and theoretical. According to Dey (2004, p. 81), "substantive coding refers to first-order coding closely related to the data; theoretical coding involves second-order conceptualization of how these substantive codes might relate to each other as hypotheses to be integrated into theory."

However Strauss and Corbin (1990) later developed another approach involving three phases – open, axial and selective. The open phase corresponds closely to substantive coding and Dey (2004, p. 84) describes the process as follows:

> *Open coding [should be a] close and detailed inspection of the data. How close is demonstrated in Glaser's injunction to code data 'line by line', asking some very general questions of the data without presuming the analytic relevance of any theoretically derived variable or hypotheses... The creative process lies in confrontation with evidence, allowing it to invoke or provoke ideas without any particular preconceptions on the part of the analyst... Analysts must come to open coding without preconceptions, but not entirely without ideas... Analysts can and should draw upon the widest possible range of sources, including a full range of coding families, but also ideas from other fields and other disciplines.*

This description corresponds closely to the process undertaken in this research including a detailed, line by line coding process, generating more than 300 codes. Some of the early codes were influenced by the prior reading of the literature but the majority were simply observations of phenomena related to boundaries. Later in the process many of the codes were influenced by following up ideas by examining the literature.

The axial coding phase involves selecting as "a general frame of reference the context, conditions, strategies and consequences that characterize interaction" (Dey, 2004, p. 85). This involves using "coding families" to make connections between categories. Families include causality (such as causes, consequences, covariance), process (such as stages, phases, progression), classification (such as type, form, kinds) and strategy (such as tactics, mechanisms, strategies) (Dey, 2004, p. 85).

According to Dey (2004), Glaser argued that Strauss and Corbin's approach to coding forced data "to fit a preconceived paradigm, so losing sight of what he called 'the myriad of implicit integrative possibilities in the data" (p. 81). As the researcher

moved on from open coding, he was swayed by Glaser's argument. At this stage the first glimmers of a potential model were appearing in the researcher's mind and it was felt the above coding families would have pulled the modelling process in a direction different from that indicated by the data.

In addition, Dey (2004, p. 89) argues that while axial coding is suited to identifying single causes, it can be problematic as most scenarios rapidly devolve into multiple factors and in social situations variables cannot be controlled or isolated. The researcher already suspected that organizational boundaries were complex phenomena and noting Juarrero's argument in section 2.3.2 that there are alternative models of explanation than linear cause and effect, it was decided not to undertake axial coding.

In the final (selective) phase, coding becomes increasingly abstract. Dey (2004, p. 85) said:

> *This final phase involved integrating analysis even further around a 'core' category – that is a central concept selected to act as a fulcrum around which others can be brought together into a coherent whole... Selective coding could thereby deepen and enrich analysis, while also forming a framework around which to weave a 'story-line' that conveys its central import.*

In the end, the researcher chose to combine and adapt the two approaches because in practice it was found that the coding involved multiple and iterative phases. The first phase corresponded closely with the substantive or open coding process and the term "open coding" was chosen to describe this. A second phase then occurred in which some codes were set aside, being seen as less relevant, and a smaller number of codes were examined in more detail to determine how they might fit together. This was called the selective coding phase of the research and included comparison with relevant literature. In the final phase, a small number of highly abstract categories were chosen to integrate all the other (lower-level) categories and a number of attributes were developed for each theoretical category. This last phase was called theoretical coding and included identification of a core category (a basic social process) and eight key supporting categories.

This less formulistic approach to coding is supported by Dey (2004, p. 86) who argues theory is developed more like a "patchwork mosaic" slowly emerging as a composite picture as pieces become available. He said [this metaphor] "is perhaps a

more apt way of conveying the process of analysis, since it does not distinguish so sharply between different phases of 'coding'."

2.4.3. Theory generation - the core category

Hypotheses are "generalized relations" among the categories and normally "multiple hypotheses are pursued simultaneously... In the beginning, one's hypotheses may seem unrelated, but as the categories and properties emerge, develop in abstraction and become related, their accumulating interrelations form an integrated central theoretical framework" (Glaser & Strauss, 1967, p. 40).

The core category becomes the basis of the emerging theory and "accounts for a pattern of behavior which is relevant and problematic for those involved" (Glaser, 1978, p. 93). The prime purpose of the core category is to integrate other categories in the theory and resolve the problematic nature of studied behavior. In the context of this research, boundaries are problematic for people and, as we will see, are created by these same people, thus counting as a pattern of behavior.

According to Glaser (1978, p. 95), the core category should be central, occur frequently in the data, relate meaningfully and easily to other categories, not lead to dead-ends and be completely variable, being dependent on its relation to other categories.

The core category in this research, *boundary weaving* (outlined in section 4.4), is also a basic social process. A key point to note is that while *boundary weaving* complies with Glaser's criteria that a basic social process has at least two stages, clearly defined in time, it does so in a non-linear fashion. As shall be seen, *boundary weaving* has at least two processes which occur simultaneously, relating to the way people *navigate* boundaries and how boundaries are *(re)created*. While a boundary is woven over time, it's not possible to identify a start or end point. Regardless, it is argued that it is clearly a basic social process that summarizes the other social processes identified in the research. The issue of concern here is Glaser's unspoken teleological assumption of cause and effect – that one thing follows another. However, as was discussed in section 2.3.2, this is not necessarily the case in complex systems.

2.4.4. Sampling and saturation

In addition to the coding and theory generation process outlined above, there are a number of key techniques characteristic of grounded theory that are designed to ensure the quality of the research. These techniques relate to the sourcing of data, also called "theoretical sampling", and the "saturation" of categories. These are discussed below.

In grounded theory, the concept of theoretical sampling is used to guide the researcher in deciding what data to collect. As data are analyzed, gaps are identified and the need for elaboration is identified – thus guiding the selection of where further data will be sourced. This allows "theory to germinate and grow by continually moving backwards and forwards between ideas and data" (Dey, 2004, p. 84).

In this research the sampling was initially focused on the interviewees in the organization and the researcher iterated between the initial development of the theory and collection / analysis of data from the study site. As the research progressed the researcher began visiting the literature as a source of data to support developing ideas. Towards the end the researcher iterated exclusively between the literature and the theoretical model as the main theoretical categories were "saturated" (see below in this section).

Theoretical sampling differs between substantive and formal theory. For formal theory, sampling is normally conducted in completely different contexts in order to maximize the differences and similarities in the constant comparative process (Glaser & Strauss, 1967, p. 55). For a formal theory of boundaries, a researcher might study boundaries between different segments of society in addition to those in organizations. For substantive theory though, sampling generally occurs in the same context, although cases may differ.

Ideally, in this research, different organizations would have been studied (in the same context i.e. the same types of organizations). However, a decision was made to study multiple boundaries within a single study site because, as Dey (2004, p. 84) said, "the potential gains of such abstracted comparisons [between different cases/contexts] are gained by trading off depth of knowledge for breadth of inquiry." It was decided that the goals of the theory were better served by the in-depth study of

the multiple boundaries within a single study site. This is in line with the call for a greater emphasis on critical inquiry outlined at the end of section 2.5.2. Future research may formalize this theory across different organizational contexts.

A related aspect of theoretical sampling is that of data sourcing. While many researchers will collect data using only one methodology, other sources may be helpful and legitimately used as data. For example, Glaser and Strauss (1967) suggest the use of surveys, articles as well as the sociologist's own experiences. Research by others obviously falls into this category and, as noted above, this was a key source of data used in this research.

A final technique used to ensure quality in GT methodology is to "saturate" the key categories.

> *Saturation means that no additional data are being found whereby the sociologist can develop properties of the category. As he sees similar instances over and over again, the researcher becomes empirically confident that a category is saturated. He goes out of his way to look for groups that stretch diversity of data as far as possible, just to make certain that saturation is based on the widest possible range of data on the category (Glaser & Strauss, 1967, p. 61).*

All categories are obviously not equally relevant, and so the depth of inquiry into each one should not be the same. "Core theoretical categories, those with the most explanatory power, should be saturated as completely as possible" (Glaser & Strauss, 1967, p. 71).

In this research, the nine key categories were saturated as much as was feasible, given the vast pool of related literature that was used as a source of data. These saturated categories make up the model outlined at the start of chapter 4 on theory and discussed in depth in the findings outlined in chapter 3.

2.5. Quality considerations

One of the issues with qualitative research is the possibility that the proposed conceptual framework that is derived from the research is "just plain wrong" (Miles & Huberman, 1994, p. 2). This section outlines considerations for the quality of this research. Two perspectives are examined. Firstly the issues related to qualitative research in general are considered. Secondly, the quality issues for the grounded

theory methodology in particular are discussed in more depth. This discussion finishes with an analysis of what makes good theory good.

2.5.1. Qualitative research issues

Theorists of qualitative research suggest very similar criteria for judging the quality of research designs in qualitative research (Gerring, 2007; Klein & Myers, 1999; Miles & Huberman, 1994, p. 234; Yin, 2003, p. 34) as follows.

A general concern of qualitative study is the **validity** of the findings and any theory built on these. Internal validity relates to whether the findings makes sense to the subjects of the study. To address this, HQ LTDG was invited to comment on the findings and theory. The person doing the checking was not one of the interviewees and was in a senior role that afforded a high degree of familiarity with all sections of the organization. External validity relates to whether the findings can be generalized. While multiple sites were not employed, HQ LTDG is typical in that it has hierarchical reporting lines with common functions found in many organizations such as human resources and finance. So the theory generated by the research should be generalizable to any hierarchical, functionally-based organization. As noted earlier, this research is theory building rather than testing and thus it does not aim to test it in a range of different organizations.

Another quality concern is that of **objectivity**, which relates to freedom from researcher bias whereby the researcher's own values may overly influence interpretation of the data (even considering the general interpretive approach). Three issues were considered. The first issue relates to the researcher's preconceptions of the military and the potential for misinterpretations due to bias or simply lack of understanding. A second issue relates to the researcher's ability to separate out their role as a contract employee from their role as a researcher. A third issue relates to any growing familiarity with the organization that may result in sympathetic or other biased interpretations of the data.

Preconception was considered to be an unlikely issue as extended contact with the context (3 years) meant that the researcher had reached a high degree of familiarity with the language, culture and nuances of the organization. As such it is believed that few misinterpretations of conversations occurred. One particular risk arose from the

fact that the researcher was civilian while most of the individuals interviewed had lengthy military service ranging between 10 and 30 years. If the researcher had been in limited contact this would have undoubtedly caused an issue. However, the extended contact once again mitigated this issue.

The researcher's dual role as a contract employee was similarly considered to be a minimal issue as the work was not directly related to the research. The work involved configuring an intranet system. This did involve understanding the nature of the work of each cell of the organization being studied, which aided the research but did not involve any formal investigation of the nature of the boundary. Also, by the time the data collection for the research began the design work for the intranet was finished, thus creating a natural separation of the two tasks.

Familiarity was also considered to be a minimal issue as the researcher was only employed by the organization as a temporary contractor and, as such, was always seen as an outsider. The researcher also felt this way and this helped retain a degree of objectivity.

Another issue is that of subjects saying what they think the researchers want to hear or to impress them. It is believed that this was not a large issue due to the extended period of time and the fact that the researcher was half-time employed to undertake work unrelated to the study. Because the researcher was only present as a temporary contractor, it was felt that employees did not feel the need to greatly influence or impress the researcher. In addition, the questions were open ended and asked primarily for descriptions rather than opinions.

Research must also be **reliable**, meaning that sufficient detail of the procedures undertaken must be provided so that "the operations of a study (such as the data collection procedures) can be repeated, with the same results" (Yin, 2003, p. 34). Full details of the study procedures are outlined in section 2.7.

Klein and Myers (1999) outline a number of similar principles that influence the conduct of good interpretive field research. The principles include the **hermeneutic circle** (see section 3.4.2.1.2) which emphasises the need to understand boundaries in terms of their detail and the wider context; **contextualization** (critical reflection of the social and historical background) which was relevant as HQ LTDG was undergoing a restructure; **research/subject interaction** (reflection on the social

construction of data) which was important as interviewees did at times verbally hypothesize; **abstraction and generalization** (relating detail to theoretical concepts) which is essentially provided by the GT method; **dialogical reasoning** (sensitivity to contradictions between preconceptions and findings) which is not generally an issue in grounded theory as the whole methodology is aimed at avoiding preconceptions generated by knowledge of other theories; **multiple interpretations** (sensitivity to possible differences in interpretations among the participants) which was noted in at least one of the internal boundaries of the organization; and **suspicion** (sensitivity to biases including false consciousness or delusion) which relates to the objectivity points above. Where issues relating to these principles were identified (as noted above) they were primarily dealt with by asking for more extensive examples and cross referencing for similar evidence from other interviewees/boundaries.

A final topic to be discussed in this section is that of **reflexivity**. Reflexivity refers to the way in which the researcher reflects on their inter-subjective interaction with research participants and any theory that is generated. According to Alvesson and Skoldberg (2009) reflexivity involves acknowledging the primacy of interpretation. Alvesson and Skoldberg (2009) said: "A fundamental hermeneutic element pervades the research process from beginning to end. Interpretation rather than the representation of reality on the basis of collected data then becomes the central element" (p. 12).

Good qualitative research, Alevesson and Sloldberg (2009, p. 12) claim, involves a systematic approach to interacting with empirical data imbued with awareness of and treatment of the role of interpretation, along with "awareness of the political-ideological character of research" and "reflection in relation to the problem of representation and authority" (p. 11).

Finlay (2002) describes a typology of five different approaches to incorporating reflexivity in research, including introspection; inter-subjective reflection; mutual collaboration; social critique, and discursive deconstruction. Introspection relates to the use of insights arising from the researcher's own experience in understanding the phenomena they are studying and this involves acknowledgement of where these insights come from. Mutual collaboration relates to situations where participants are enlisted as reflexive co-researchers capable of contributing to the theory under development and this involves acknowledgement of the way people may influence

each other. Social critique involves understanding and accounting for power relationships between the researcher and participants and this involves acknowledging agendas. Discursive deconstruction relates to understanding hidden meanings in language and this involves acknowledging they way in which the researcher represent themselves and the theory can influence how it is interpreted by others. Finlay says that researchers tend to incorporate reflexivity by choosing one or two of the above approaches rather than all of them. Of the five approaches, introspection was most relevant in this research.

In terms of introspection, section 1.3.2 outlined the personal motivation of the researcher providing an insight into the psychological underpinnings of the researcher's approach. A key psychological motivation of the researcher is one of professional frustration and a desire for a holistic understanding of the theory that underpins the practice of knowledge management. As such theory is not easily found in the literature the researcher was naturally motivated to develop it. This motivation may have influenced the determination of the broad research question, the choice of methodology and possibly the expansive development of theory. A certain amount of introspection was present in the memos, as the researcher related data to their own experience, although little of this material found its way into the findings chapter. In that sense, the researcher, like many others (Etherington, 2004), was also motivated by a desire to be seen as objective and professional in their research approach, to the extent of maintaining a third person voice throughout.

The personal experience of the researcher may also have influenced the interpretation what data was relevant to the theory. For example the researcher was already familiar with the concept of boundary objects and complexity theory, both of which became key elements of the theory developed in this research.

None of these considerations of reflexivity should detract from the relevance of the theory generated by this research. The researcher takes comfort that the recommendations for further research outlined in section 6.7 can address any and all of these concerns.

2.5.2. Grounded theory issues

The use of grounded theory method brings with it a number of specific issues that need to be examined. Charmaz (2005) studied these issues in her examination of the application of grounded theory in social justice research.

The first issue is that existing concepts that are said to be associated with the topic must be worked into the developing grounded theory (Charmaz, 2006, p. 48). Charmaz said (2005, p. 512):

> *"Any extant concept must earn its way into the analysis. Thus, we cannot import a set of concepts ... and paste them on the realities of the field. Instead, we can treat them as sensitizing concepts, to be explored in the field settings."*

This research does draw on a number of concepts from structuration theory, complexity theory and identity theory. However, none of these concepts are imported "as is". Rather they are used as metaphors and were substantially modified to reflect the data.

The second issue is the extent to which researchers focus on interactions versus their historical and social context. Charmaz said (2005, p. 529): "Grounded theory studies typically give little scrutiny to the past" and "minimize social context". "Relying on interview studies on focused topics may preclude attention to the context – particularly when our research participants take the context of their lives for granted and do not speak of it." Grounded theory provides methods for seeing beyond the present "by sticking closely to the leads and explicating the relevant process" allowing the research to "go deeper into meaning and action than given in words."

The nature of the theory developed in this research inherently takes context into account because the research is focused on describing the nature of organizational boundaries. The term "nature" implies the full context of boundaries. Also the method of explanation adopted is a hermeneutic one – describing both the parts and the whole picture of boundaries (see section 2.3.2).

A last issue worth noting is the controversy surrounding the positivistic versus interpretivist nature of GT. The strength of GT is that the developed concepts are those that are "indicated by the data". (Glaser & Strauss, 1967, p. 36). This view has led to what is known as the "concept-indicator" approach which has left the method

open to criticisms of it being positivistic at heart. Charmaz (2005, p. 522, 2006, p. 183) argues that grounded theorists should embrace constructivism and place a greater emphasis on the critical inquiry traditions of the Chicago School, which "can enlarge the focus and deepen the significance of grounded theory analyses... A grounded theory informed by critical inquiry demands going deeper into the phenomenon itself and its situated location in the world" (Charmaz, 2005, p. 529). It is argued that the researcher's extended involvement in the study site, as a contract employee, provided him with the necessary familiarity, understanding of meanings and close inquiry called for in the tradition of critical inquiry.

2.5.3. Good theory

The previous two sub-sections were concerned with the processes by which a good quality theory is generated. This section concerns itself with the characteristics of the theory itself. In other words, what makes a good theory good? For good theory to be theory at all, it must contain all the accepted elements that make it an actual theory and these were outlined in section 2.3.1. This section builds on the discussion of that section.

A key debate in research is around determining what is theory and what is not. Sutton and Straw (1995) argue that it is easier to determine what theory is not – pointing out that data, variables, references, diagrams and hypotheses on their own are not theory. However, Weick (1995b) notes that it is notoriously difficult to determine what is theory because many efforts are approximations of theory that are nonetheless important steps in the struggle towards theory.

Weick said (1995b, p. 387): "This difficulty arises because theory work can take a variety of forms, because theory itself is a continuum and because most verbally expressed theory leaves tacit some key portions of the originating insight."

Quine and Ullian (1980, p. 196) propose a number of "virtues" of good theory including conservatism (the fewer conflicts with established beliefs the better), modesty (makes believable claims), simplicity (of explanation), generality (the range of application) and refutability (is testable by some imaginable event).

One of the key tests of good theory is that of "utilisation" which relates to the "so what?" question. Will the findings make a difference? (Miles & Huberman, 1994;

Yin, 2003) It is argued that the research is useful because it provides a framework for analysing issues in cross-boundary interaction and in designing potential management interventions. Section 6.4 provides a number of criteria by which boundaries can be better managed and in particular discusses a range of practical implications for the practice of knowledge management.

A key influence of theory generation has been Thorngates's (1976, cited in Griffin, 1997) Postulate of Commensurate Complexity which states: " It is impossible for a theory of social behaviour to be simultaneously general, simple or parsimonious, and accurate" (p. 476). This has been used by many generations of theorists to explain the trade-offs they make. Weick (1979), with his Clock-Face Model placing General at 12, Accurate at 4 and Simple at 8, argues that a theorist may partially achieve two of the three aims but not all three.

Weick recommends "that theorists intentionally select their preferred position on the face of the clock and then relax gracefully with the problems that go with the territory" (cited in Griffin, 1997, p. 479). The theoretical model that is outlined in Chapter 4 is a typical 6 O'clock theory – it can explain almost any boundary phenomenon in its context. However, it is also reasonably complicated. While the diagram appears simple, a large degree of explanation is required for people to make sense of its nuances. In addition, any explanation of a phenomenon "depends" on the exact circumstances. None of this detracts from the theory. Readers just need to appreciate where it sits on Weick Clock-Face model of theories.

2.6. Research Design

The aim of this research is to address the guiding question of:

> *"What is the nature of organizational boundaries?"*

There is no established or dominant model to guide the research. This meant that the goal of the research was not to identify a narrow gap in existing theory but to start at a more basic level – establishing new theory and integrating related theory. Having considered the nature of theory, the possible research approaches and the range of quality issues, the factors contributing to the design of this research project can now be summarized.

The fragmented nature of existing theory on organizational boundaries led to the overall exploratory nature of the research. As such, it was decided that a qualitative approach was most appropriate because it is most likely to lead to new connections that leads to a more integrated model. Within the qualitative field there are a large number of options and strategies. It was decided that a flexible design was most appropriate firstly because there was no "blue-print" guiding the study that would inform a more structured cross-case approach and, secondly, because the topic under study appeared to be a complex phenomenon. Rather, it was decided to focus on a exploring a single site context in depth. It is argued this is appropriate because there are multiple differentiated examples of boundaries in the study site chosen i.e. in HQ LTDG. An organizational boundary is taken to be the unit of analysis.

When the researcher examined the range of qualitative methodologies available – grounded theory immediately stood out as being most aligned with the above thinking. In particular, GT is most concerned with the creation of new theory, which is a key aspiration of this research, and it is well supported in terms of theory on the methodology. However, when the background literature on GT was examined it was found that formulistic approaches were not conducive to achieving the desired results.

In general, a more constructivist approach was taken with a greater emphasis on the traditions of critical inquiry. A semi-structured interview technique was used to gain specific data and this was supplemented by a deep search of related literature in the later stages of the research. Lastly, while data was still coded using the constant comparison approach, it was decided not to use axial coding to avoid any preconception of the nature of boundaries.

The overarching research design can be described as exploratory and qualitative, employing grounded theory methodology. Further detail on the actual study procedures employed is outlined in the next section.

2.7. Study Procedures

In section 2.2.2 the general strategy for the research was set out. This section details the actual procedures used.

2.7.1. Data gathering

It is noted that when research is largely exploratory, as is the case for this research, then "heavy initial instrumentation or close ended devices" are inappropriate (Miles & Huberman, 1994, p. 34). Similarly, exploratory research aims to follow up all avenues of possible boundary types, indicating the need for a flexible approach. Because the research is only encompassing a single research context, as opposed to a large number of cross cases, the need for standardized instruments is less. As a result the early data collection employed was quite flexible in line with the theoretical sampling prescriptions of GT.

Two main approaches to data gathering were adopted, being semi-structured interviews and reviews of the literature, which are both outlined in the following two sub-sections. Consistent with GT methodology, a number of memos written by the researcher were also recorded which draw on personal insights about the context of the research as well as observations of the study site. In line with the GT tenet that "all is data", some of these memos are presented as evidence in chapter 3.

2.7.1.1. Semi Structured Interviews

One individual from each of the six sub-units under study (see section 3.1.2), normally the head of the sub-unit, were interviewed using a semi-structured approach as follows:

- The one hour interviews were designed to start with an open-ended style so as draw out any unique boundary dimensions or insights. In other words, the individuals were given opportunity to articulate how their boundaries operated in their own words.
- Each individual was invited to describe their boundaries from both a personal perspective, as a representative of their branch and as a representative of the whole organization.

- An extended organizational chart (including associated organizations) was used to guide the discussion and prompt discussion where necessary.

- A number of guiding questions[1] were employed to stimulate the interviewee as outlined in the interview protocol (see Appendix A1).

- It should be noted that it was not the objective of the interviews to identify all possible boundaries of a particular actor. Rather, the researcher was aiming to identify all key aspects of organizational boundaries.

- As the interviews progressed each interviewee was prompted to discuss possible boundary dimensions they had not already raised.

- After each interview, an edited transcript was created for each subject to review. The editing consisted of bullet pointing the key points they had raised with sub-bullet points noting supporting comments and evidence. (See an example of an edited transcript in Appendix A4).

- A follow up meeting was held with each interviewee to go through the transcript and discuss any questions raised.

A final note is that the total number of interviews (ten) may seem small compared to other qualitative research approaches that aim to test existing theory, as is normal in traditional case studies. However, this research is exploratory and, as Glaser and Strauss (1967) suggest, the researcher need only collect as much information as is needed to formulate the theory – further data collection detracts from the theory generation process. Also, the amount of data collected via interviews needs to be balanced with that collected using the literature reviews (discussed in the next section). In general, all the data that was collected was subject to very close (word by word) scrutiny and this generated a substantial amount of additional data in the form of theoretical memos, as discussed at the end of section 2.7.1.3. below.

2.7.1.2. Literature reviews

The final source of data was academic literature. As noted in section 2.4.1, literature may be used as a source of data as long as any one theory does not overly sway the researcher.

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[1] It should be noted the researcher initially began using a case study methodology and a number of investigative sub-questions were developed relating to identity, communication, power, culture, time and the physical world as is illustrated by the interview protocol.

As the researcher began to conceptualise possible theoretical models, including identification of key theoretical categories it was found that some areas of the emerging model needed to be investigated further, "saturated" in grounded theory terminology. A choice in the source of further data collection then arose – between a return to the study site or to data in the wider academic literature. Because the analysis was moving in a direction that was almost formal (in the grounded theory sense of the word) in its theoretical development, it was felt that more benefit would be gained by obtaining further data from the literature rather than the study site. Therefore, a decision was made to use literature as a source of data to saturate the key categories.

An in-depth literature review then followed focused on the emerging categories. The bodies of literature that were explored were dictated according to the principles of theoretical sampling outlined in section 2.4.4. In general, the process of reviewing the literature was an iterative one, being conducted before, during and after the final development of the theoretical model. As the researcher came up with new ideas, he would first examine the interview data and memo bank before looking at the literature to see if there was any data of relevance there. It was not felt that the literature overly influenced the development of the model. Once the theoretical model outlined in chapter 4 was developed, some further literature research was undertaken to saturate these new categories.

2.7.1.3. Information Management

In order to ensure the data gathering process was as effective and efficient as possible, a number of information management techniques were adopted as follows:

- **Recording**: The interviews were generally typed directly into a Microsoft Word document, using a laptop computer. According to Glaser (1998, p. 107) electronic voice recording inhibits theory generation and is not required because anything of relevance not captured in the field notes will be remembered later during the constant comparison process. However, some of the faster speakers were recorded as a backup.
- **Transcription**: Immediately after the interviews, the notes were edited to ensure an accurate recording of each interview. Paragraph markers were used

to separate each point the speaker made. Part of a transcript is provided in Appendix A4 as an example.

- **Open coding**: The information from all the Word documents was then transferred into a single Microsoft Excel spreadsheet – one row for each paragraph of the interview text. The codes were then interleaved directly into the text using [brackets] and colour coded to differentiate the coding from the original text. Part of coded Excel spreadsheet is provided in Appendix A5 as an example.

- **Analysis**: Initial analysis was completed in Excel using the filtering function. As selective and theoretical coding progressed, information from the excel spreadsheet was transferred to a multi-dimensional mind mapping program called PersonalBrain (ver 5.5). This is discussed further in section 2.7.2 below.

- **Selective and theoretical coding**: After the data was transferred to the mind map, all further coding took the form of establishing new nodes in the mind map and progressively transferring supporting data to the notes field of the node. During the course of the research new codes were developed corresponding to emergent themes in the data.

- **Record of interviews**: A record of all actors interviewed was kept and is included in Appendix A2.

The total word count of the interviews amounted to about 23000 words. More than 300 codes were developed in the course of the research and these were applied 1925 times to the interview data. In addition to these formal codes, approximately 1500 links were generated in the mind map, plotting relationships between the various codes, and each of these links was grounded in the interview data.

Each node of the mind map contained a range of information including a definition of the category, memos including theoretical insights, and examples from both the interview data and the literature data. As research moved through the selective coding phase, much of this data was re-coded in the course of identifying relationships with other codes. These selective codes were the basis of the network of connections in the mind map, with some core categories having up to 50 connections each.

In addition to the coding and mind mapping processes described above, approximately 3000 short theoretical memos were also recorded, each ranging between a sentence and a paragraph in length. In the final stages of the research a number of larger theoretical memos were written, drawing directly on relevant literature, in order to saturate some of the key categories relating to identity, complexity and the associated properties of power, culture and communication. These larger memos amounted to a total of more than 50,000 words.

2.7.2. Analysis

Miles and Huberman (1994, p. 10) describe three concurrent flows of activity in qualitative analysis that occur in parallel with data collection. These streams of activity are data reduction, data display and conclusion drawing/verification. Researchers normally iterate between these activities and data collection in the early part of the research project, because developing conclusions may influence data collection. These analysis activities are elaborated in this section.

2.7.2.1.   Data reduction

Data reduction refers the process of "selecting, processing, focusing, simplifying, abstracting and transforming the data that appear in the written-up field notes or transcriptions" (Miles & Huberman, 1994, p. 10). Data reduction is a part of the analytical process of deciding what data to collect, how to summarize the information and what to leave out or put in. All these activities involve analytical decisions on what is important to the research question.

In grounded theory, data reduction initially occurs during the opening coding process as researcher identifies phenomena that are considered of interest to the research question. Further data reduction occurs as part of the selective coding process, as the researcher discards categories that are not relevant to the emerging theory.

This research followed the above pattern. Extra data reduction occurred as it became apparent that some codes and categories overlapped or were different names for the same phenomena. In these cases the codes were either merged or a third code created to separate them and notes were inserted into the mind map to make a record of this.

2.7.2.2. Data Display

Data display is "an organized, compressed assembly of information that permits conclusion drawing and action" (Miles & Huberman, 1994, p. 11). In the early stages of the research the main purpose of displays is one of description – allowing researchers to "know clearly *what* is going on and *how* things are proceeding"(Miles & Huberman, 1994, p. 90). As the research progresses, data displays may change to accommodate analysis of *why* things are happening and finally to displays that explain and predict.

In this research the early display was in an Excel spreadsheet which enabled the researcher to filter the data so that it displayed only paragraphs containing the same codes. This was used to facilitate the process of constant comparison and draw out similarities and differences. As analysis progressed, theoretical categories along with supporting properties and associated data were moved to the PersonalBrain mind mapping tool. This tool permitted the drawing of connections between different categories and greatly helped in the conceptualization of theory. An example of the mind map created is displayed in Appendix 6.

The final stage of display is that of presenting the evidence to others, as in this thesis. Miles and Huberman (1994) say there are two basic types of display for qualitative research, being descriptive (traditional narrative) and explanatory displays. Both make complicated things more understandable by breaking them down into component parts. The difference between the two types of display is that the latter shows how the component parts work together according to rules of some kind. Miles and Huberman (1994, p. 95) strongly recommend the use of matrices or network diagrams. In this research no opportunity was found to use networks but a matrix was found to be useful for displaying the theory. A diagrammatic model of the theory was thus developed and a decision was made to display both the findings and discussion of theory according to the key elements of the model and this is reflected in the section headings of chapters 3 and 4.

2.7.2.3. Conclusion Drawing

According to Miles and Huberman (1994, p. 11), researchers are starting to draw conclusions about what things mean right from the start of data collection – "noting

regularities, patterns, explanations, possible configurations, causal flows and propositions". Researchers should hold these conclusions "lightly, maintaining openness and scepticism" with final conclusions appearing after the data collection is over.

These recommendations are broadly in line with GT methodology and quite descriptive of what actually happened. Early in the research a number of categories emerged as central to the theory, including *interaction*, *objects* and *identity*. These categories were "saturated" using the constant comparison process, drawing out attributes and making connections between other categories.

A number of conceptual breakthroughs were made by integrating insights from the literature, particularly those relating to complexity theory and identity theory, resulting in the formation of categories relating to *emergence*, *properties*, *identification* and *coupling*. A key observation was then made that some of these central categories could be thought of as aspects of structure while others were clearly processes. This led directly to the conceptualization of the matrix model of figure 1. In this model, a few new theoretical categories were created, including *objectification* and *coupling*, as the researcher developed the relationship between structure and processes. A brief return to the literature was undertaken to saturate these new categories.

With these conceptual breakthroughs, the attributes for each category were developed using the grounded theory process of constant comparison. This involved a close examination, in the mind map, of all the codes associated with each of the theoretical categories, including the many examples from the data for each code. In some cases the attributes arose primarily from the interview data (e.g. for the *objects* category) and in other cases it arose from the literature data (as in the *properties* category). However, data from both the interviews and the literature was used to support the attributes chosen.

The remaining task, then, was to explicate the relationships between the elements of the model. This was achieved by reviewing the memo bank developed during the research to integrate a wide variety of "insights". In addition, the rest of the codes in the mind map were reviewed to ensure that all relationships identified in the data could be explained by the theoretical model.

A key element in explicating the relationships between the categories was the development of the core category – *boundary weaving*. The development of the core category arose primarily through insights captured in theoretical memos, as the researcher struggled to understand how different categories fitted together. For example, the question of how individual objects made up a whole boundary preoccupied the researcher for some time and generated several memos. These memos usually appeared in the mind map as "questions" that needed resolving. Connecting memos such as these to data from the literature prompted the initial conceptualisation of boundary weaving as the central category.

However, there were a large number of codes (such as noticing) that seemed central to the theory but did not fit under any of the main theoretical categories developed so far. In addition, the literature was yielding a range of disparate concepts that were clearly related to the nature of boundaries and needed to be accounted for. Resolving these tensions in the research led to the development of the attributes of the core category. It was found that many of the unaccounted for codes played a key role in connecting the newly formed core category to the other theoretical categories, thus fulfilling the function of explicating the relationships between the theoretical categories.

In the final stages of the theory development, the researcher worked primarily in the mind-map, ensuring that all questions raised in theoretical memos were addressed and all relevant codes were appropriately connected in support of one or other of the categories. In other words, it was ensured there were no loose ends.

2.7.3. Delimitations

Theoretical: The theoretical delimitations relating to the research are as follows:
- The focus of the research was restricted to boundaries in organizations. Much of the theory on boundaries actually applies to a wider range of social boundaries, such as those related to class, gender, race or ethnicity.
- A decision was made to only study one type of organization, namely large and functionally organized.
- In using grounded theory, a decision was made to focus on developing rather than testing theory. Therefore the theory outlined in this thesis is delimited to

> a suggestion about the nature of organizational boundaries and further research is required to test the theory (see section 6.7.1).

- The research was set in the cultural context of an individualistic, pragmatic, low-context society and as such the conclusions of the research must be viewed in that light. However, nothing in the research indicated that the boundary model could not be generalized to other societal contexts.

Practical: The practical limitations relating to the research methodology are as follows:

- The research was largely restricted to a view of each boundary from the perspective of participants in HQ LTDG only. Ideally, the boundaries would have been analyzed from both sides through inclusion of interviews with actors on the other side of each boundary (i.e. other units in the Army and also external agencies). However, this was practically difficult for a number of reasons to do with security clearances and the difficulties in gaining research permission across the entire defence organization and also from external agencies.

- Because of the cross disciplinary nature of this research, there were many lines of inquiry in the literature search that could not be practically carried out at any depth within the scope of a PhD research project.

2.8. Ethical Considerations

The organization under study had a clear policy for "personal research" in place already. Firstly, the senior army psychologist and the local commander both had to give permission for the research to proceed. Therefore a deed pro-forma for the conduct of research was signed between the researcher and the New Zealand Army. Secondly, each participant in the research was required to sign a declaration of informed consent and a sample form is included in Appendix A3. Following are the key points in these documents.

- The research was to be conducted in the researchers own time.

- Any recommendations arising from the research would be written up.

- A clear description of the research and its purpose was to be given to the participants.

- Participation by individuals was voluntary. They had the right to withdraw at any time.

- Individuals would have the opportunity to correct any errors.

- The organization would have to approve the thesis prior to publication.

The researcher also gained approval from the Research Ethics Unit of the Office of Research at the Queensland University of Technology (approval number 0800000363).

2.9. Summary

This chapter has outlined the research journey and methodology. The range of research options were discussed and the choice of grounded theory employing a single study site was justified. The nature of theory was examined along with a particular point of relevance to this research, that of causality. It was argued that a different form of causality is required to explain complex environments. The research was then positioned as substantive middle range theory. It was shown how the GT methodology was adapted to meet the needs of this research, including changes to coding process and a slight modification of the traditional theoretical sampling approach with a greater reliance on the literature than normally found in GT. The study procedures were summarized including a discussion of the analysis process. The chapter concluded with a brief discussion of the delimitations and ethical considerations. The next chapter outlines the results of the methods employed, being the findings of the research.

3. Findings

3.1. Introduction

3.1.1. Structure of the chapter

The previous chapter presented the methodology of this research. In this chapter the main findings of the research are presented. In grounded theory, findings refer primarily to the categories that were identified. Each category is presented in turn with data supporting their definition and attributes.

In keeping with the "all is data" tenet of grounded theory, relevant citations of the literature that directly support the proposed categories are presented in this chapter. However, related theories are not discussed in general until chapter 5. Similarly, any ethnographical observations that relate to a category are presented in this chapter in the form of memos.

For ease of comprehension, the findings are grouped together in sections relating to the overall theory that is presented in the next chapter. For convenience's sake the diagram of this model is outlined in Figure 2 below showing the corresponding sections in both chapters.
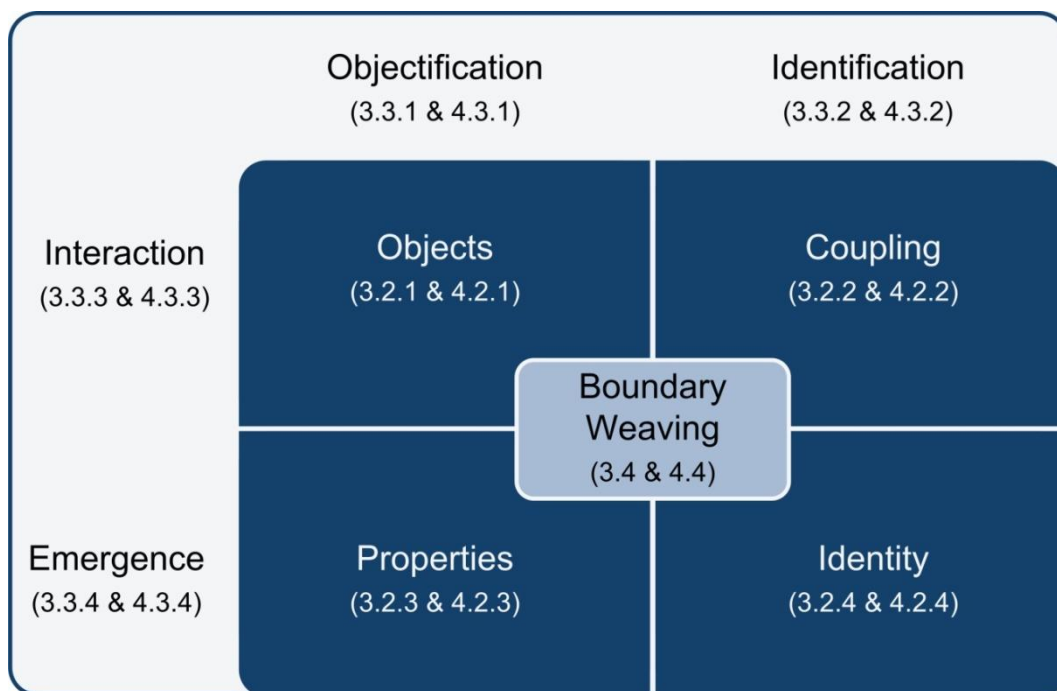
Figure 2: Section numbers relating to the model of organizational boundaries

A suggestion for the reader is to read one section of this chapter at a time followed by the corresponding section of theory in the next chapter i.e. alternating between the chapters. Reading the theory while the findings for that particular category are fresh in the mind may aid in following the chain of logic. However, it is not necessary as chapter 4 includes frequent references to the relevant sections of chapter 3.

The reader is reminded this thesis has adopted a hermeneutic style (see sections 2.3.2 and 3.4.2.1.2) of explanation that requires some "cognitive gymnastics" on the part of the reader. The whole can only be understood in terms of the parts and vice versa. Another suggestion to aid comprehension is to read the concise summaries of the theory (sections 4.1.2 and 6.2) first, to better understand the context of each of the following sections.

Lastly, the reader is reminded that any mention of categories (outside the section in which they are discussed) are *italicized,* including their linguistic derivatives – e.g. *identify* and *identified* both refer to the same category. In addition, any codes used in the data, such as reputation, that did not become a category are shown in an arial font. These conventions assist in developing comprehension of the theoretical model.

3.1.2. About the study site

The study site is the headquarters (HQ) of the New Zealand Army's main training unit – The Land Training and Doctrine Group (LTDG). This organizational unit consists of approximately 40 people with more than 400 reporting through to it.

The main function of the HQ is to manage the training system to ensure that quality courses are delivered to both soldiers and officers, as required. Key sub-functions include:

- Schedule courses and manage de-confliction processes to ensure that adequate resources, both material and human, are available to run each course.
- Manage evaluation processes to ensure courses are being run as designed and that the right courses are being run to deliver adequately trained soldiers and officers for the Army.

- Ensuring that lessons from exercises, deployments and training result in appropriate changes to the courses and the doctrine that underpins the training.

Its role is such that it liaises with other units in the Army on a regular basis as well as similar organizations in other armies. Geographically, HQ LTDG is on a base that is isolated from other formations in the Army and includes a large training area. Most soldiers and officers in the Army visit the base regularly, either for training or to help deliver training.

During the observation period, the organization was undergoing a restructure that was part of a wider Army improvement program and this included an expansion of its responsibilities. Reporting lines in the HQ are organized functionally and numbered from 0 to 9. These numbers represent functions common to all Army units including Command, Human resources, Intelligence, Logistics, Operations, Training and Finance. People in HQ LTDG frequently refer to these branches by their number and this is reflected in the interview data throughout this chapter. See section 1.6.3 for a list of what the numbers mean.

The next section begins the description of the findings relating to elements of social structure, starting with the first major category – *objects*.

3.2. Social structure findings

This section details the findings relating to elements of social structure – the categories corresponding to the inside four quadrants of the theoretical matrix, but not including the core category depicted in the centre of the diagram. The findings relating to elements of social process, found on the outside of the matrix, will be detailed in section 3.3. The first of the elements of social structure to be discussed is *objectification*.

3.2.1. Objects

3.2.1.1.   Introduction

The open coding process began with an
unconstrained mind about the nature of
organizational boundaries, although prior
knowledge of boundary theory had made the researcher aware of the possible role of
boundary *objects*. This is briefly outlined as follows.
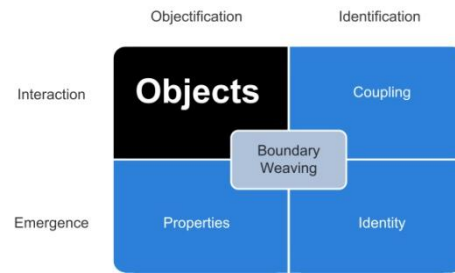
As individuals and clusters of individuals (i.e. groups) interact with each other it is
believed they create "boundary *objects*" that "serve to coordinate the perspectives of
various constituencies for some purpose" (Wenger, 1998, p. 106). Researchers often
use Star and Griesemer's (1989, p. 393) definition of boundary *objects* as a "broad
range of artefacts" that are:

> *"Both plastic enough to adapt to local needs and the constraints of the several parties employing*
> *them, yet robust enough to maintain a common identity across sites. They are weakly structured in*
> *common use, and become strongly structured in individual site use. These objects may be abstract*
> *or concrete. They have different meanings in different social worlds but their structure is common*
> *enough to more than one world to make them recognizable, a means of translation. The creation*
> *and management of boundary objects is a key process in developing and maintaining coherence*
> *across intersecting social worlds."*

A critical point in the Star and Griesemer's definition above is that boundary *objects*
are not necessarily physical *objects*; they can be abstract as well – a point taken up in
the attributes of the *objects* category below.

Star and Griesemer (1989, p. 410) identified four types of boundary *objects*:

- **Repositories** – ordered piles of indexed *objects* such as those in libraries or
  museums, which deal with the "problem of heterogeneity". "People from
  different worlds can use or borrow from the 'pile' for their own purposes
  without having directly to negotiate differences in purpose."
- **Ideal Type** – abstracted representations of something such as a diagram, atlas
  or a species. They involve "deletion of local contingencies from the common
  object and have the advantage of adaptability". A species describes no
  particular specimen but serves to communicate across different worlds.

- **Coincident boundaries** – *objects* that have a common boundary but with different internal content for each of the users. "They arise in the presence of different means of aggregating data and when work is distributed over a large-scale geographic area. The result is that work in different sites and with different perspectives can be conducted autonomously while cooperating parties share a common referent. The advantage is the resolution of different goals."

- **Standardised forms** – methods of communication across work groups. "The advantages of such *objects* are that local uncertainties ... are deleted."

As the initial data was coded the researcher attempted to keep an open mind as to the range of possible boundary object types i.e. not to be influenced by the above typology. It became apparent that boundary *objects* were everywhere. Virtually every *interaction* that was examined could be argued to have a boundary object present.

Initially, the researcher began to code the different types of boundary *objects* and it quickly became apparent that there were many object types that did not easily fit into Star and Griesemer's set of categories above. It seems the *objects* used to facilitate *interaction* in any particular context are unique to that situation and are reflective of the full range of human experience as the following examples show.

3.2.1.2. Examples

Below is a table of boundary object examples. Each example includes illustrative data from the research and memos that show how the example functions as a boundary object.

Object example	Interview quotes	Memos
Business Processes and procedures	*"If a piece of equipment is missing then we have a process set out in the DFOs for dealing with this."* *"We train people in the lessons learning process."*	A procedure or defined process is an object which enables people to negotiate how things should be done.
Conceptual	*A Battalion Cavalry Group ... is made up of people, doctrine, tactics, procedures – a fusion of*	A concept or idea may become a point of focus (i.e. an object) around which other

Object example	Interview quotes	Memos
models or ideas	*information, not just [a large number of] Light Armored Vehicles."*	activities are organized, as in this example. More generally it can be used as a communication object between individuals/groups.
Cultural artefacts	*"Our official culture is that of [X] We display [X] in the protocols in our [Y] and at parades and functions. We teach it, the history and protocols, to soldiers and officers as they go through their courses and increasingly so with the new leadership framework."*	A cultural representation can be a designed (or chosen) boundary object that is used by one group as a means of developing certain attitudes and behaviours in newcomers to the group.
Deadlines	*"[X] wants 45 days notice of a course being cancelled, rather than 2-3 days, so they can plan alternative activities. Same for [reserve soldier] courses as this can dick employers around. We have had to run courses sub-optimally simply because we couldn't afford to upset these employers."*	In this example, the deadline itself is an object around which other activities are organized. Specifying a deadline is the same as creating an object.
Events	*"In Exercise [X], we had seven courses using one field exercise."* *"A medium term lesson could relate to incidents on patrols or dealing with IEDs (improvised explosive device) and this may not happen in time for next deployment. For this kind of lesson we need to have approval from a wide range of stakeholders."*	An event can become a focus for a number of activities with different purposes, as in the first example. Alternatively, interpretations of the event itself may become a point of contention. In the second example, different people may have a variety of opinions on the ideal response to a particular incident but the facts of the incident become a common object helping facilitate the lessons process.

Object example	Interview quotes	Memos
Groups	*"We have not socialized the new HQ structure] as well as we should have. They don't understand where we are meant to be on this."*	Here, the function of the headquarters as a whole is treated as an object, something to be "socialised". Also, it was observed that the HQ acts as a boundary unit between the training schools and the rest of the Army. Officially, other units are not meant to interact directly with a training school without the permission of the HQ.
Issues	*"What should we do with people who finish [officer training] but have not passed the RFL (required fitness level)?"*	For a period of time a particular question or issue may become an object that is discussed and is the focus of efforts to resolve it.
Practice	*"We have developed ways to move stealthily through jungle."*	Aspects of practice are *objects* that can be discussed, debated as to their merit and used to design training for others, thus acting as a boundary object between current and future practitioners.
Roles	*"Some lessons will be put to the SMEs(Subject Matter Experts) formally."*	People can be treated as if they were an embodiment of their role and not as an individual with their own unique identity. i.e. they become an object. For example, subject matter experts become a boundary object between members of their profession/practice and non-members.
Symbols	*Badges of corps and rank.* *Medals.* *Warning signs on the training range.*	Symbols may be used to convey a message between individuals/groups, acting as an object. For example, insignia enable people to easily classify each other and convey a message as to how much experience and authority a person has.
Tools	*"The Army Training and Activity Planning System [X] is aimed at helping to synchronize and coordinate all activities."*	Tools become a point of focus to facilitate *interaction* between groups, thus acting as a boundary object similar to Star's concept in the introduction.

Object example	Interview quotes	Memos
Topics	*"We attend the International Lessons Learned Conference– There is a topic each year and this year we talked about processes to see if there are things we should be sharing and adopting."*	The topics at these conferences could range from IEDs (Improvised Explosive Devices) to techniques for travelling in convoys. Each topic is an object around which conversation and sharing revolves.
Vision	*"As a commander I have a vision and intent I need to annunciate. Vision is meant to be bigger and I will announce this in a formal way. I communicate intent with my staff on a day to day basis. My staff are the enablers of that vision. My role as a commander is giving vision, intent and direction."*	Vision, intent and direction are *objects* that the commander uses to facilitate communication with soldiers, officers and employees. From the last sentence, we can see that he views his job as a full time creator and contender of such *objects*.

Table 1: Examples of objects in organizational boundaries

From the above table we can see that there is a wide variety of possible *objects*. This notion is supported by Levina and Vaast (2006, p. 16) who said: "Objects (both tangible and intangible) are symbolic (discursive) representations of practice and relations produced through practice. Objects can take the form of institutions, markets, documents, procedures, roles, codes, terms, and so on."

Similarly, Bechky (2003) noted that it has been shown that *objects* as diverse as laboratory assays, automatic door closers and transportation systems can have social agency i.e. they become the focus of *interaction* and appear to be the "cause" of certain patterns of behavior.

It seems that almost anything used to facilitate *interaction* between individuals/groups may be construed as a boundary object. In other words, not all *objects* are boundary *objects* by Star and Griesmer's definition, but any object may become a boundary object if it becomes a point of focus in an engagement. This notion is supported by Levina and Vaast (2005, p. 354) who differentiate between "designated boundary *objects*" and "boundary *objects*-in-use". They say boundary *objects*-in-use must have both a local usefulness and a common identity in practice. For artefacts to acquire a local usefulness "agents must use and make sense of them in the context of each field". Similarly, artefacts need "to be used within a joint field

within which agents jointly recognize and value the artefact in question," otherwise the artefact does not become a boundary object-in-use.

In comparing the above table of examples to Star and Griesemer's (1989) typology, outlined in the introduction above, the researcher quickly established that some *objects* would not easily fit into their category system. It was realised that Star and Grisemer's typology was largely substantial in nature, reflecting the subject of their case study, being a museum.

As a result, the researcher quickly abandoned attempts to categorize the range of boundary object types. Instead the focus moved towards identifying the common attributes of all boundary *objects*. Other researchers had already proposed such a list of attributes. For example, Wenger (1998, p. 107) made an attempt to generalise Star and Greisemer's suggested categories as follows:

- **Modularity** – "the distinct parts of a boundary object which allows users to attend to one part or another of it."

- **Abstraction** – "deletion of features that are specific to each perspective" which allows users from different "worlds" to be able to use the object autonomously without having to renegotiate differences in purpose.

- **Accommodation** – "The object lends itself to various activities." which allows it to be used autonomously by all parties

- **Standardization** – "Information contained in the boundary object is in a prescribed form" which help reduce uncertainty among its users.

This categorisation makes it easier to apply the typology to a wider range of boundary *objects*, but it can be seen that they still reflect the basic findings of Star and Grisemer, with no attempt to empirically ground the attributes with fresh research data.

As a result the researcher began to examine the way boundary *objects* function in a variety of contexts. A variety of attributes were identified that are significantly different from those described above.

3.2.1.3.   Attributes

After the initial run of open coding, the researcher then began a process of constant comparison, as advocated in grounded theory methodology. By comparing the

different instances of *objects* a number of attributes began to emerge. Three key attributes were identified including *markedness*, *abstractness* and *ambiguity*. The findings relating to these attributes are outlined in the following three sections.

3.2.1.3.1. Markedness

In this section, findings relating to the following points will be discussed:

Object Attributes
Markedness
Abstractness
Ambiguity

- How physical *objects* can be marked;

- How other types of *objects*, such as events, can be marked

- How something is marked if it is meaningful to people; and a

- Summary of markedness.

The first attribute that emerged from the comparison process was that of *markedness* which was initially noted in the following memo:

> *Memo: It's interesting to note how a uniform **marks** out officers and soldiers (objectified roles) as being different from the large numbers of civilians that also work for these organizations.*

Markedness here refers to the unusual style and uniformity of the military uniform and is striking example of how soldiers and officers create a clear boundary between themselves and civilians, with the uniform as a very visible object.

While uniforms are physical and symbolic *objects*, other types of *objects* also display the attribute of markedness, such as events:

> *"I have just been dealing with a course that is two weeks away and we still don't have the support sorted out yet."*

In this example it is seen how *objects* can be *marked* by a sense of urgency – as in a deadline. This particular course thus becomes an object of focused attention for a period of time, more so than others, and hence is "marked" out for special attention.

Similarly in the example below, the severity of the incident marks it out from more routine incidents.

> *"Disciplinary incidents are dealt with by schools but severe discipline tends to come to the HQ due to levels of authority to deal with different types of incidents."*

Another interesting aspect of markedness arose from the literature on complexity theory, Capra (2002, p. 97) said:

> *"A message will get through to them not only because of its volume or frequency, but because it is meaningful to them."*

In this sense, something is marked if it has a greater meaning than usual for an individual/group. So people may notice *objects* that are marked for them and miss others altogether.

The following memo captures the moment of conceptualisation of this attribute.

> *Memo: I have this idea forming of how a boundary object becomes "effective" so to speak. Firstly it has to be noticeable, forming a break in time (like a deadline) or space. Next, they need to make more of an impression than other objects, like crafting a PowerPoint slide to get across the key message. Lastly they have to be seen by the people interacting around it, so important boundary objects should be visible to everyone in the organization.*

Summary: In this section it is seen how any kind of object may be marked, either physically or otherwise and that this may arise from what is meaningful to people. The essential nature of markedness is that it helps an object stand out from the background. Looking at the first few examples in section 3.2.1.2 it can be imagined how they may vary in markedness – some procedures are critical while others can be ignored; some ideas capture people's imaginations and others never see the light of day; some cultural artefacts are inviolable taboos while others have faded into background, forgotten by the majority.

Markedness struck the researcher as being one of the most important attributes of *objects* but it did not explain all of the common attributes, as the next section on *abstractness* shows.

3.2.1.3.2.   Abstractness

In this section findings relating to the following points will be discussed:

Object Attributes
Markedness
Abstractness
Ambiguity

- The conventional understanding of abstractness;
- How abstractness removes *objects* from their context;
- That *objects* may have high or low levels of abstractness;
- The usefulness of abstractness; and a
- Summary of abstractness.

Another attribute that arose from the constant comparative process was that of *abstractness*. The following example illustrates the general idea of abstractness which corresponds closely to the common understanding of the term.

> *"If you start talking to him in technical terms, his eyes will glaze over."*

Here the *objects* are the "technical terms" and relate to what might be called a "high level" of abstractedness.

It is important to note at this point that the term "abstractness" is used here deliberately as a noun to differentiate it from the verb "abstract" and the process of "abstraction", which is used as an attribute of *objectification* (discussed further in section 3.3.1.2.2).

The term "abstract" has several uses and corresponding definitions including "difficult to understand" or "an idea or term considered apart from some material basis or object" (*The Macquarie Dictionary*, 1991). In this research it was seen that both these definitions are related in the sense that most *objects* have some aspect of them that is removed from their context and the further they are removed, the harder it is to understand the term as in the example above. By contrast, consider the following:

> *Memo: The concept of a "soldier" is an abstract one that has a certain meaning in relation to that of an "officer".*

Here the concept of an "officer" is separate from the physicality of the person – a person could be either a soldier or an officer. So the concept of an officer is an object that is somewhat abstract but still understood by many people, hence having a low level of abstractness. Of course people working for the army would have an even greater understanding of such terms. One interviewee said:

> *"Capability is made of 7 branches including Manoeuvre, C4ISR, etc. Our role is to manage the training system. Capability sets the framework within which we are going to develop training... For us the important elements are Personnel, which leads to the training requirements, and ConOps, which leads to the doctrine requirements... [We] would then amend the AUTL, ICM and ITM (Army Universal Task List, Individual Competency Models, Individual Training Model)"*

In this last example, abstractions here are of a more "local" nature. It is not just a case of knowing what the acronyms stand for, it is about understanding what is meant by "manoeuvre", for example. A civilian may guess that it has something to do with movement but most Army personnel would be able to use the term in conversation

without getting bogged down in the detail of explaining exactly what they meant by the term.

Summary: In this section it is seen how removing *objects* from their context increases their "abstraction". The more the object has been removed from its context the more abstract it is. Abstractness is useful when all the participants understand the abstractions because it avoids the need to explain the full context, thus enabling a higher level of *interaction*. Looking at the first few examples in section 3.2.1.2 it can be seen how abstractness clearly plays a role – some procedures need to be explained "on the job" or with video while others can be conceptualised in a flowchart; some concepts or ideas may be mindboggling (like $E=mc^2$) and others may be a mundane suggestion for a slight improvement on what is already being done; and some cultural artefacts may be so obscure that only an experienced member of that culture understands them, while others may be obvious from the context, such as taking off muddy shoes before entering a house with carpet.

While *markedness* and abstractness explain much about *objects*, there is one more attribute worth exploring – that of *ambiguity*.

3.2.1.3.3.   Ambiguity

In this section findings relating to the following points will be discussed:

Object Attributes
Markedness
Abstractness
Ambiguity

- The relative levels of ambiguity in *objects*;
- How people use ambiguity on a daily basis;
- The usefulness of ambiguity; and a
- Summary of ambiguity.

As the constant comparative process unfolded, a distinction was made between abstractness and a similar attribute that was labelled *ambiguity*. The first two examples below show how some *objects*, like vision statements and policy, can be ambiguous.

> *"There are a number of generic statements made by [higher headquarters general staff] and they come out in the form of Army plans, directives, dispatches and in a lot of those there is not a lot of detail and we have a certain amount of interpretation. I'm concerned with 3rd and 4th order effects that are not considered. I'm trying to interpret them to ensure CA intent is met while minimizing the 3rd order effects. They are quite conceptual."*

"[Usually in our meetings] the COs are running something past me that is a bit different, i.e. not made clear in the [manuals]. So it is mainly direction or guidance, asking for my opinion or interpretation on what is the higher intent of the [policy]."

By contrast, some *objects* are designed specifically to be unambiguous.

"We interact with them in terms of course data sheets and the physical conduct of the course"

These course data sheets set out the detail of what any particular course is required to deliver in terms of training outcomes. The training cell of HQ will interact with instructors to ensure they are running the course as intended. The course data sheets are very clear boundary *objects* which mediate the *interaction*.

People seem to be intuitively aware of the role of ambiguity in the boundary *objects* they employ them in day to day *interaction*s as shown in this example:

"Everyone is so busy, it's hard to catch them. When you are asking people for something, a lot of people will ask you to send it (an email) through [the network]. However, written words can be [mis]interpreted while meetings give you the context. Also, they can result in information overload and the more information people get the less time they have for face- to-face. I think it's better to have a 10 minute face-to-face meeting to get agreement first."

The interesting observation of this quote is how people take steps, consciously or otherwise, to manage ambiguity such as the use of written messages and meetings.

The following memo captures how the researcher began to appreciate the importance of ambiguity as an attribute of boundary *objects*.

Memo: There is a fundamental principle here, I think – that if you want to capture all aspects of an activity or concept, then the reification of it needs to be more ambiguous, as in the "moral of the story" or an organizational "vision". It should be able to generate multiple meanings for different audiences and contexts. You could attempt to write a comprehensive manual of procedures in order to capture all aspects (of the training system in this case) for each audience and context but this is fundamentally impossible as the task becomes infinite as you get down to ever finer levels of detail. This cuts to the heart of a very practical issue of how best to communicate to staff. Procedures are a clear way of doing that but it has its limits.

The term ambiguity can refer to the "presence of two or more meanings [but] it can also mean ... a lack of clarity" (Weick, 1995a, p. 95). The former reference relates more to the equivocal nature of the object, which requires interpretation, while the second relates more to uncertainty which requires more information. While Weick favours the term "equivocal" in the context of sensemaking theory, the term ambiguity serves a wider purpose in the sense that there may indeed be many

circumstances where the ambiguity of an object can be minimised by further data collection. Equivocation is discussed in section 3.4.2.1.1.

Summary: In this section we have seen the difference between ambiguous *objects* that require interpretation and those with high clarity that have been spelled out in detail. People intuitively deal with ambiguity through various methods of seeking clarification such as emails and meetings. However, *objects* may also be left deliberately ambiguous in order to avoid having to explain every possible nuance and allow people freedom to take their own initiative. Looking at the first few examples in section 3.2.1.2 we can further imagine the role ambiguity plays – some procedures will spell out exactly what must be done while in other contexts a general guiding policy is more appropriate; some concepts are almost poetic in their articulation while others involve detailed diagrams; and some cultural artefacts are clear in their purpose while others require years of experience in a culture to understand their significance.

3.2.1.4.　　Connection

As we will see in chapter 4, *objects* are found to be a cornerstone of the emerging theory of organizational boundaries. It will be argued that *objects* are key to facilitating *interaction* and are the focus of the social processes of *objectification* and *identification*.

However, *objects* alone provide no structure. It makes intuitive sense to think that *objects* must be related somehow, before structure is created and boundaries begin to form. Since *objects* are inanimate and have no agency to actively form such relationships, then we must look to the relationships that people form with *objects*. To that end the next section on *coupling* examines the nature of these relationships.

3.2.2. Coupling

3.2.2.1.　　Introduction

Unlike the concept of boundary object, the researcher did not have any prior knowledge about the concept of coupling. It was during the

revisiting of the literature after the open coding phase that the category of coupling
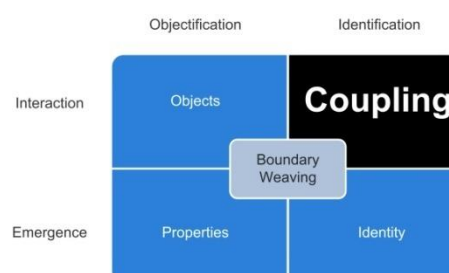
emerged. The term "coupling" first sprang to mind when reading the book "*Sorting things out : classification and its consequences*" (Bowker & Star, 1999), which discusses the nature of categories in society. Bowker and Star discuss two aspects of coupling relationships – membership and naturalization. Membership relates to the way that a person belongs to a group but they said (p. 299): "The relationship of the newcomer to the community largely revolves around the nature of the relationship with the objects and not, counter-intuitively, directly with the people."

Naturalization means "stripping away the contingencies of an object's creation and its situated nature." In other words, people adopt *objects* into their lives and they slowly become "taken for granted", coupled to them as a part of their ordinary way of life.

An important point they make (1999, p. 300) is that: "Both membership and naturalization are relations along a trajectory. In saying this, we do not want to recreate a great divide between people and objects... People-and-things, which are the same as people-and-society, cannot be separated in any meaningful practical sense."

The concept of coupling is also present in the literature on complexity theory. Using autocatalysis as a metaphor for cognitive processes Juarrero notes (1999, p. 124) that "organizational closure" differentiates the connections from the background "out of which it emerged, partly decoupling them and thereby conferring on the network a particular *identity*. The decoupling is not simply a physical demarcation; it is primarily informational." This is because "an autopoietic system's identity is given by the coordinated organization of the processes that make it up, not the primary material of its components." In other words the identity of a self-organized system is derived from the relationships among the parts, not the characteristics of the parts themselves. The implication is that it is the nature of the coupling that creates the *identity* of a system (discussed further in section 3.2.4 and 3.3.2).

The idea that the complexity sciences of the natural world and the role of coupling may be an appropriate theoretical metaphor for social systems is supported in the literature. Boisot and Child (1999, p. 238) said:

> *An important distinction between natural and social systems resides in the tightness of their coupling. Both might be open, but social systems are more loosely coupled than natural systems and thus inherently more complex. What do we mean by this? Simply that in the former[social] case, the interaction between the elements is primarily informational rather than energetic.*

They note that one of the major approaches to complexity defines it "in terms of the density and variability of interactions that take place among coupled agents," in effect a measure of "relational complexity" (Boisot & Child, 1999, p. 241).

The category of coupling made intuitive sense to the researcher as the following memo shows:

> *Memo: The moment a person objectifies something, they are recognizing or acknowledging its existence. It seems to me that, by accepting its existence, they automatically create a relationship with it, of one sort or another. They may have a positive or negative view of it and an attachment somewhere between weak and strong but an attachment nonetheless.*

This memo also captures the growing awareness of the key attributes of coupling, namely *strength* and *polarity*. These attributes are discussed in the following two sections.

3.2.2.2. Attributes

3.2.2.2.1. Strength

In this section findings relating to the following points will be discussed:

Coupling Attributes
Strength
Polarity

- How the strength of an attachment can vary;
- How *objects* relating to core *identity* may have stronger coupling;
- The example of attitude strength;
- The role of ego; and a
- Summary of strength.

Bowker and Star argue that a category "may be loosely or tightly coupled with a person". Some *objects*, such as gender, are so tightly bound to an individual as to be unbreakable. Other *objects* are only loosely associated and the coupling is easily changed or broken. This conceptualization suggests that a key attribute of coupling is the degree or *strength* of coupling.

This attribute is supported by the interview data. This first example shows how people can form a strong attachment to an object, in this case a course. It also shows how the strength of attachment can vary.

> *"Of the hundreds of courses we have there are only a few that everyone has an opinion on, for example the JSO (Junior Staff Officer) course. Of the rest, only a few or none have any interest. If it's not of great interest then it's a hard process getting them to a meeting – getting face time."*

Similarly people may be strongly attached to *objects* that are close to their core *identity*, such as their role.

> *"Each CO thinks their unit is the most important and should get all of the resources, all of the support and all of the action"*

There is also related evidence for this attribute in the literature e.g. the concept of "attitude strength". Boninger et al (1995, p. 61) describes the concept as follows:

> *Convictions on [a range of] political issues ... can sometimes become so strong as to take over people's lives for many years. Yet at the same time, numerous other people seem completely unmoved by these same issues. This variation in the extent to which people are invested in their attitudes on political issues seems true of attitudes toward social groups, consumer products, aspects of the self, and many other sorts of objects.*

Boninger said attitudes that people consider personally important are "firmly crystallized and exert an especially strong influence on social perception and behavior" (1995, p. 61) as well as being resistant to change and stable over time. However, also note the implication of the last quote – that coupling strength can vary, it is not set.

Lastly, it is important point to note a central idea in Social Judgment Theory, whereby it is natural and indeed essential for people to have strong connections (ego-involvement) with various *objects*, so that they are not overly influenced by every new idea that comes along (Griffin, 1997, p. 195).

Summary: In this section we have seen how the strength of coupling to any particular object can vary over time and across different people. This variation may be related to how close the object relates to a person's core *identity*. Strong couplings resist change, being stable over long periods of time, and help people anchor themselves so that they are not overly influenced by the vast array of competing *objects*.

Strength was not the only attribute of coupling noted. Another attribute was *polarity* , which is discussed in the next section.

3.2.2.2.2. Polarity

In this section findings relating to the following points will be discussed:

Coupling Attributes
Strength
Polarity

- How couplings can be positive or negative;
- Dialectical tension; and a
- Summary of polarity.

Another attribute of coupling is polarity, as the following quote from the interview data shows:

"Some relationships are positive... But if they think I'm a twat then they won't deal with me."

So not only can coupling strength vary in intensity, it can change polarity – from positive to negative or vice versa. Polarity relates not just to relationships between people but with other *objects* as follows:

"I cherish this part of the role. I like being given responsibility for making decisions."

"They like the camaraderie."

Here the *objects* are the idea of taking responsibility for decisions and camaraderie. These are obviously positive couplings. One can imagine other people who do not like making decisions. Some examples of a negative coupling are as follows:

"I hate open plan."

"I don't like these laptops [and other forms of electronic communication] – I think people hide behind them."

The following memo, written as these attributes were first conceptualised, summarises the researcher's thoughts on polarity:

Memo: Polarity and strength cover a whole range of codes including the impression that people make on each other, the judgments that people make, the basic repellence or attraction that people have to various objects and the consequent resistance or inclination to support their promotion. These actions can lead to properties of objects that are similarly easily characterised by strength and polarity, such as the credibility or reputation of individuals and the associated levels of trust. In other words, people can have a good or bad reputation, a big reputation or none at all.

It is tempting to think that all couplings can be neatly categorised into positive or negative. However the concept of dialectic tension in relationship theory (Griffin, 1997, p. 179) indicates it may not be as simple as that. In relational dialectics theory, there is a constant tension between desire to be connected and autonomous, certainty

and novelty, closeness and privacy. People strive for both at the same time in their *interaction*s within one-to-one relationships. This means that personal relationships are always in flux. A similar dialectic tension operates within communities including the desire for inclusion/seclusion, conventionality/uniqueness and revelation/concealment. The implication is that couplings may have a similar dialectic tension.

Summary: In this section we saw how couplings to wide variety of *objects* can have a positive or negative polarity and this can manifest itself in many ways such as likes/dislikes, attraction/repellence, impression, credibility, reputation or resistance/inclination. We also saw how people can couple with the same object in multiple ways and that the polarity across these different couplings may vary, being positive in some and negative in others, resulting in dialectical tension.

3.2.2.3. Connection

As will be argued in chapter 4, *couplings* result from the social process of *identification* and are a key element in the social structure of organizational boundaries, providing the "glue" that holds them together so to speak. However, as will be argued in chapter 4, couplings are constantly changing *strength* and *polarity*, and this may drive the social process of *emergence* that leads to another key element of structure, being emergent *properties* – and this is the focus of the next section.

3.2.3. Properties

3.2.3.1. Introduction

During the selective and theoretical coding processes a large number of codes were

identified that were initially problematic in the sense that they did not easily fit into the early categories that were established. So a new category (*properties*) was created to accommodate them, as described below.

Examples (detailed in the next section) include trust, reputation and norms. The researcher was particularly interested in the category of relationship which appeared frequently in the data and appeared to strongly influence *interaction*. In one sense, relationship could be thought of as an object, something to be leveraged in
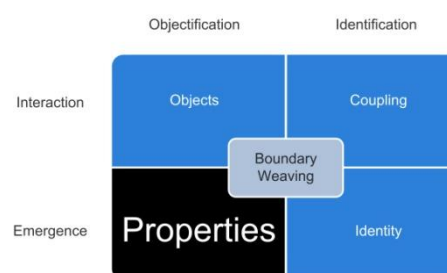
*interaction*s to smooth the way. However, it seemed to emerge only after *interaction* had already started, as people gained trust in each other.

As the researcher compared these problematic codes it was realised that they all had one common feature –they effectively enabled or constrained *interaction*. This sparked a connection, via the researcher's prior knowledge, with the field of complexity theory, in which higher-order *properties*[2] emerge in systems and are said to similarly enable or constrain *interaction*. The researcher then proceeded to investigate the subject of "emergent properties" in the literature.

Complexity theory is a discipline that, as the name suggests, has arisen from the study of complexity in a variety of settings. One particular school of thought has arisen from the study of natural systems in the environment and the mathematical models used to simulate these. In this school, a great deal of theory has developed around the concepts of "autopoiesis" and "complex adaptive systems" (CAS). Complex systems are said (Anderson, Meyer, Eisenhardt, Carley, & Pettigrew, 1999; Juarrero, 1999; Stacey, 2001) to be characterised by are number of features including the following:

- Large number of agents interacting frequently together
- The interaction is influenced by rules or schemata which are characterised by simplicity.
- Interaction is non-linear and impossible to predict; but
- Interaction revolves around recognisable basins of attraction, forming patterns
- The system is very sensitive to small differences in initial conditions
- The system evolves or changes through small disturbances that are amplified by positive feedback processes.
- The system self-organizes as it evolves to the edge of chaos, locking into a particular phase state.
- The system occasionally tips into chaos and undergoes phase change, resettling into a different order and regime of attractors.

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[2] Reminder: The term "properties" discussed in this sub-section are "emergent properties" of organizational boundaries – not to be confused with the grounded theory term relating to attributes of a research category. In this thesis, the term "attribute" has been chosen to replace the grounded theory term of "property", to avoid confusion with the research category identified in the data.

- The system differentiates itself from its surrounding by partially decoupling itself

- Complex systems are characterised by a hierarchy of levels with different properties at each level

Whether organizations are complex systems and whether the above characteristics apply to them has been the subject of much academic debate (Anderson, 1999b; Boisot & Child, 1999; Frank & Fahrbach, 1999; Goldstein, Allen, & Snowden, 2004; Stacey, 2001). Regardless of the applicability of natural science to organizations, these same researchers generally agree that, at the very least, the lessons of complexity theory may be used as metaphors to explain phenomena in social systems.

As noted earlier in the introduction, a key element of complexity theory that is relevant to organizational boundaries may be that of "emergent properties". In complexity theory, emergent properties constrain the behaviour of components at lower levels "by restructuring and relating them in ways they were not related before" (Juarrero, 1999, p. 129). Similarly these properties enable activities that were not possible before. In other words, "the overall hive can do much more than the individual bee". (Juarrero, 1999, p. 129)

At its most basic, order itself or a pattern of some kind is seen as an emergent property of individual interactions at a lower level of aggregation (Anderson, 1999b). New properties appear at each level in a hierarchy.

Stacey (2001) makes the key point that emergence in organizations is not related to the emergence of the social from the *interaction* of the individuals – which he argues is a common misconception. Rather, "components or agents interact with each other on the basis of their own local organizing themes and, in that interaction, their local organizing themes are reproduced and potentially transformed". (Stacey, 2001, p. 61)

Emergence thus relates to the way in which "social practices recursively form themselves" (Stacey, 2001, p. 62). In other words, Stacey views emergent properties as social practices. It's important to note that this is in agreement with Giddens' (1984) influential view of social practices as the source of structure in social systems.

Having developed an understanding of the above concepts, the researcher returned to the interview data in an attempt to identify possible emergent properties. Following

are criteria that were used to determine if an observed phenomenon is really emergent.

Properties are phenomena that:

- Emerge from the *interaction* of lower level components of the organizational system
- Simultaneously enable and/or constrain the actions and behaviour of individuals/groups
- Affects the operation, performance or state of the wider system in ways that individual system components cannot do alone.

3.2.3.2. Examples

Following is a list of examples of possible emergent properties identified in the research. The table is quite long but includes several important phenomena in the study site that the researcher felt needed to be explicitly acknowledge and addressed. To aid comprehension of why these particular examples are included the table includes references to other parts of the thesis where these phenomena are discussed. In addition to the specific references given in the table, most of these phenomena are discussed in the theory discussion sections relating to *properties* and also *emergence* (4.3.2 and 4.3.4).

Property	Interview Data	Memos
Authority This property is referred to in sections 3.2.3.3.2 (power) and 3.3.4.2.1 (disturbance)	*"Within the 7 shop there are a number of subject matter experts – e.g. the Master driver and Senior Weapons Instructor. Any findings of your analysis need to be sanity checked with these people."* *"There is that power thing as well. [X] Branch is headed by a [high rank] and he can ignore things happily if he wants to, resulting in inertia. That's why I need [higher ranks] to lead the process. There is an issue with my rank level. People I commonly deal with have higher rank. There is a little bit of relativity. My role should be a Major."* *This [change in line of command] requires a lot more liaison because I have to ask permission for support now rather than just ordering them. I'm still coming to grips with how much I can influence them.* *"If our commander doesn't have the authority it goes up the next level and they might have a different view – this is common for promotions and postings."*	It can be seen here that authority clearly constrains activity as well as enabling it by forcing people to interact in approved ways. The term authority relates both to subject matter expertise and to the ability to control. So authority may emerge from a wide variety of factors including experience, skill and the garnering of power through a whole range of influencing tactics (mentioned further in section 3.3.2 and 3.3.3) such as the development of coalitions. In addition, the power of authority only arises from the obedience of those subject to the authority. An individual has no authority if those around them choose not to recognise it.

Property	Interview Data	Memos
Awareness This property is referred to in sections 3.2.3.3.1 (communication), 3.3.4.2.1 (disturbance), 3.4.2.1.2 (hermeneutic knowledgeability), and 4.4.2.1 (navigation)	*"Most people I deal with are G-list people who understand what is going on."* *"You can't easily put an equivalent in from the Navy or Air Force and expect them to fully understand how things operate."* *"[Unit X] has very little military personal and don't understand how we work."*	Understanding "what is going on" is not just a matter of training or education. Over time people develop an awareness of the nuances of a situation that enables them to operate more effectively in that context. The last two examples show how this property can constrain activity. Overall awareness, i.e. understanding the "big picture", seems to arise from understanding multiple smaller components. Also, no one individual understands how an organization works, yet it could be argued that "group awareness" emerges from multiple individual's awareness.
Capability This property is referred to in sections 3.2.3.3.3 (culture), 3.2.3.3.4 (space), 3.3.4.2.1 (disturbance) and 3.4.2.2.3 (design).	*"To train an army combat captain takes about 6 years. You can't easily put an equivalent in from the Navy or Air Force and expect them to fully understand how things operate."* *"A Battalion Cavalry Group is made up of people, doctrine, tactics and procedures – a fusion of information."*	Capability is, by definition, an enabler of related *interaction*. It can be seen from these examples that it is something that emerges over time (from a mixture of training and experience) and from different components working together to create a capability. We can argue that the capability is emergent because none of the lower level components (sub-units) on their own would be capable of what the higher order property (i.e. the organization) is able to do. In this case the individual parts cannot do alone what a cavalry group can do – it is more than the sum of its parts. The term "force multiplier" is used to describe this effect in military circles.

Property	Interview Data	Memos
Familiarity / Comfort zone This property is referred to in sections 3.2.3.3.3 (culture), 3.4.2.2.2 (classifying), and 4.3.2.3 (identification)	*"Some of us have been institutionalized by the Army. We wouldn't cope very well on civy street. ... The longer you are in the organization the more you become part of the organization."* *"I think there are too many people who have been there too long – it's my perception that there is different attitude from those who have been there a long time compared to those who have been there a shorter time. Time has dragged on and they haven't met their own deadlines."*	Repetition and duration of activities seems to foster a level of familiarity or comfort with a context, so that people come to identify with a particular "way of doing things" for no better reason than "that is how it has always been done". Once in a comfort zone a person may be constrained in their ability to change the way they do things. The consensus on "the way things are done" by definition needs *interaction* among multiple people and diverging views in order to emerge.
Language and distinctions This property is referred to in sections 3.2.3.3.1 (communication), 3.2.3.3.2 (power), 3.3..3.2.1 (contending), 3.4.2.2.1 (action and belief), 3.4.2.2.2 (classifying) 4.3.2.2 (identification) and 4.4.2.1 (navigation)	*Memo: If you do not understand terms and acronyms, like PDT and G-list, then it will be difficult to follow a conversation in this Army. Such language evolves over time but newcomers to the organization need to learn the local language from scratch just to follow conversations. (PDT = Pre Deployment Training)* *"Your ability to write English is important. This has to do with interpretation of policy. i.e. there can be different interpretations of what people are entitled to."*	As discussed in section 3.2.1 on *abstractness*, local language and terminology emerges to facilitate easier communication and meet the need of coordination challenges. The language itself enables communication but also restricts our ability to communicate about complex topics until the language evolves to enable a higher level of communication. These aspects of language only emerge from multiple people using them in ways that become accepted.

Property	Interview Data	Memos
Norms This property is referred to in sections 3.2.3.3.3 (culture), 3.2.3.3.2 (power), 3.3.4.2.1 (disturbance), and 3.3.4.2.2 (feedback),	*"There are certain things that officers can't do, especially in terms of socializing with the other ranks, there is an ethos – conduct becoming an officer. It would be inappropriate for me to drink with private soldiers. If you did and there was an incident it would be hard for you to enforce disciplinary procedures because you were there."* *"[X] wants 45 days notice of a course being cancelled rather than 2-3 days. Same for [non-regular soldiers] as this can dick employers around. We have had to run courses sub-optimally simply because we couldn't afford to upset these employers."* *"Email generates an expectation that people will respond directly."*	Constraints arise from social norms about what is acceptable behaviour, as these examples show. In the first example, these norms would evolve historically as officers actually encounter the situations described. Similarly, the norms of the second example may have resulted from employers getting upset in the past. The expectation for fast responses to emails may well have evolved early on in its use as people actually did respond very quickly, being excited about the new technology.

Property	Interview Data	Memos
Policy and process This property is referred to in sections 3.2.3.3.1 (communication), and 3.2.3.3.2 (power)	*"We will present our recommendations to the SME and get feedback. Then the recommendations will be put in front of a board and then someone will be tasked to enact it."* *"When the need for a [new or changed] course is identified they go to 7 branch. 7 branch builds it and then it comes to 5 for planning, to work out how and when we are going to run it. This impacts on 4 and 9. If we get 5 right then the other jobs are easier because there is not as much crisis management."* *If a piece of equipment is missing then we have a process set out in the DFOs for dealing with this.*	All of these examples show how processes and procedures are designed to constrain activity so that things don't become chaotic. For example, SME's reviews moderate wild ideas; cross functional processes aim to constrain the development of "crises" and procedures for lost equipment aims to tightly control the use of sensitive military equipment. In each case they constrain the actions of individuals in prescribed circumstances. In the New Zealand Army, the policy and procedure regime was extensive, encompassing several volumes covering most situations and processes. Many of the specific document refer to a range of other documents that are similarly inter-related. In some cases they contradict each other as they have been built up historically with limited resources. By and large we can say that the policy regime has emerged over time in response to a wide range of *interaction*al requirements.

Property	Interview Data	Memos
Relationships This property is referred to in sections 3.2.3.3.1 (communication), 3.3..3.2.1 (intermediation), 3.4.2.3 (embodiment) 3.4.2.6 (multiplicity)	*"I am meant to go through [X] to the other formations but I don't because I know them. If I were new to this I would have to get liaison approval from [X]. In the Army it is all about relationships."* *"We work more closely with 5 because they have a former employee of my branch there."* *"I can't think of anyone who I can't ring up. E.g. I have just rung the CO's of both the battalions."*	These examples show how close relationships enable easier *interaction*. There are many other such examples in the data and they all point to how difficult *interaction*s would be if one did not have a "good working relationship" in place. As mentioned in the introduction, the nature of any particular relationship emerges after people begin interacting, not before.
Reputation and Credibility This property is referred to in sections 3.2.2.2 (polarity), 3.3.4.2.2 (feedback), and 3.3.3.2.2 (intermediation),	*"Coming in as a civilian has been easier than I expected. I think that's because I have credibility because of my previous military role."* *"Some members are more 'infamous' and not to be trusted to represent [the unit]."*	The reputation or credibility of an individual enables and constrains what they can do in organizations. It was clear from the participative experience in the organization that some individuals, by virtue of their credibility, were able to "open doors" that others could not. Reputation and credibility emerge from the actions of individuals / groups and, importantly, they are conferred by others. No one decides what their reputation will be. Rather, reputation arises from the myriad of corridor conversations held by others as they check with each other their view of various individuals and groups.

Property	**Interview Data**	**Memos**
Resource availability This property is referred to in sections 3.2.3.3.5 (Time) and 3.3.3.2.1 (contending)	*"[X] is asking for us to help which is beyond our capacity to deal with."* *"Everyone one is so busy, it's hard to catch them."* *"Comes down to the availability of the one (Video Teleconferencing enabled) meeting room for the whole camp i.e. 100 people who would tend to use it. Also people tend to try to book things only once or twice -- if they ... cant book it, then after a few times they wont even try."* *"There are always going to be power struggles because all of the units are fighting for limited resources. Today I may allocate something to one unit and the other commander says, I should have it, and I have to say, well no, the priority sits there and you don't necessarily see that bigger picture."* *"The reality is that most people do a superficial[planning] job and the resource requirements are not given sufficient attention... So we end up with resource and or time conflicts. The first issue is that Army officers struggle to say no. They have a 'can do' attitude which gets us into trouble. A second issue is the lack of skill in prioritization."'* *"This pressure is coming from Defence Transformation Program because replication of similar units is an issue. They want to take all of army training and compare it to how the other two services do things."*	Constraints on activity due to resource shortages were a common feature in the research and directly impacts on *interaction* as the first two examples show. A key insight arising in the research is that resource availability is not an absolute thing. For example, people are always juggling tasks in their work life and generally only have a shortage of time for a particular task because they chose to do other tasks as well, not because of the finite number of hours in a day. Similarly, organizations can normally always find money for things that are critical to them by cutting money available to other non-critical activities. So resource availability, as an enabler and constraint, emerges from the juggling of a wide range of factors by decision makers in organizations.

Property	Interview Data	Memos
Urgency This property is referred to in sections 3.2.3.3.3 (culture) and 3.2.3.3.5 (time)	*"We run crisis management and it was worse before I came. I have just been dealing with a course that is two weeks away and we still don't have the support sorted out yet."* *Memo: This reminds me of advice from previous managers that you need to create a "sense of urgency" in order to get people motivated to do something.* *"People issues are emotive and they have to be dealt with quickly."* *"For the lessons [process] to be effective we need to have information coming out of theatre, analyzed and (lessons) implemented in PDT before the next body goes over."*	Constraints also arise from a range of time related factors such as deadlines or the threat of *interaction*s spiralling out of control. While these constraints are often designed into business processes, as in the first two examples, they can also suddenly emerge through *interaction*s, as in the third. The last example reminds us that constraints ultimately arise from the desire to achieve particular outcomes. In other words, a sense of urgency, emerges from the context of a particular situation.
Technology This property is referred to in sections 3.2.3.3.4 (space), 3.3.4.2.1 (disturbance), 3.4.2.2.1 (action and belief)	*"The three services do things differently. The other services are more technology focused. Navy is platform based with rigid roles. Air Force has a very small sharp end focused on technology impact and the majority of the organization is there to support that. In Army our war fighting capacity is more about the bottom end of the pyramid. ... E.g. if we are on the streets dealing with a riot, equipment becomes secondary and the way our soldiers act is paramount."* *"Email generates an expectation that people will respond directly."* *"The commander and I, our lives are haunted by our cell phones, blackberries."*	These examples allude to the fact that technology may shape the way people go about their activities, enabling or constrain the way in which they are done. Technology is not a fixed property of the real world. It is something that we develop to meet particular needs and often it becomes useful for a range of other activities. In other words the technological environment we live emerges and is adapted to the activities we undertake, enabling and constraining what we can do.

Property	Interview Data	Memos
Trust This property is referred to in sections 3.3..3.2.2 (intermediation) and 4.4.2.2 (embodiment)	*"Communication is personality driven – relations with people I know tend to work better than those I don't know. I think this is just human nature. If you get on with somebody and you've got a good personal and professional relationship you will tend to achieve more. You will have a freer flow of information because you are not worried about upsetting anyone. If you don't know someone, you have to almost establish the parameters of the conversation first or how much you are willing to share, because you don't know what the underlying current of the request is. I think again that is just human nature. We will always chat and be communicative with people we know. If they are not then you tend to be just a bit more reserved."* *"I represent headquarters for a number of reasons because I am trusted as an officer of certain level. For example, I'm meeting an audit team from the [ministry]. In general, I am often being "pulled in" as a representative of the [headquarters]."* *"I am meant to go through [X] to the other [units] but I don't because I know them. If I were new to this I would have to get liaison approval from [X]. In the Army it is all about relationships."*	The role of trust and how the lack of it can create a boundary is clearly spelled out in the first example – a comment from a branch head. A common word that came up in the context of trust was "knowing". Similarly, a person with a certain reputation may be "known" to act in a particular way in a given context. In a sense the person with the reputation has been objectified. For example they may be known as an "expert" or "a difficult person". The impact of being known with a bad reputation is illustrated in the second example, while the more positive benefits are exemplified in the third example. The key impact of trust is that it enables or constrains *interaction*.

Table 2: Examples of emergent properties in organizational boundaries

The introduction (section 3.2.2.1) outlines the theory on emergent properties but leaves us with the question of what they actually are in organizations. A number of possible examples are set out in this section but it is clear that the more one looks, the more one will find other examples of emergent properties. So rather than trying to develop a comprehensive list or a mutually exclusive typology of properties, the researcher turned his attention to determining if there might be some key attributes present in every emergent property and this is the focus of the next section.

3.2.3.3. Attributes

Several researchers have made suggestions as to what emergent properties in organizations may be including relationships, political coalitions, values, informal structure, dominant logic information filters, organizational climate or norms (e.g. Bettis & Prahalad, 1995; Glick, 1988; Knoke & Kuklinski, 1991). However, this researcher was unable to find any dominant view or consensus in the literature on what emergent properties in organizations are.

In examining the examples above, a number of reasonably obvious attributes stood out for the researcher due to his prior knowledge of general organizational theory. For example, norms and trust seem to relate to culture, while authority relates to power and language relates to communication. This observation immediately sparked a connection with Anthony Giddens' (1984) theory of structuration, for which power, communication and sanction (or culture) are underpinning dimensions.

According to Giddens, the majority of social researchers view structure as "some kind of 'patterning' of social relations or social phenomena", which is in essence a source of constraint on the free initiative of the actor (1984, p. 16). However, in structuration, it is "thought of not as a patterning of presences but as an intersection of presence and absence, underlying codes have to be inferred from the surface manifestations" (1984, p. 16). In other words, the examples we observe above are only indications of deeper attributes.

Giddens says that structure exists only as instantiations in social practices and "as memory traces orienting the conduct of knowledgeable human agents". In other words, the rules governing social relations come from within rather than being imposed on social actors. In addition, structure arises from patterns of social relationships and exist only as properties such as rules, syntax and taboos.

Figure 3 below outlines the main dimensions of the duality as Giddens (1984, p. 29) saw it.

| structure | signification | ←→ | domination | ←→ | legitimation |
| interpretive scheme | faciity | norm |
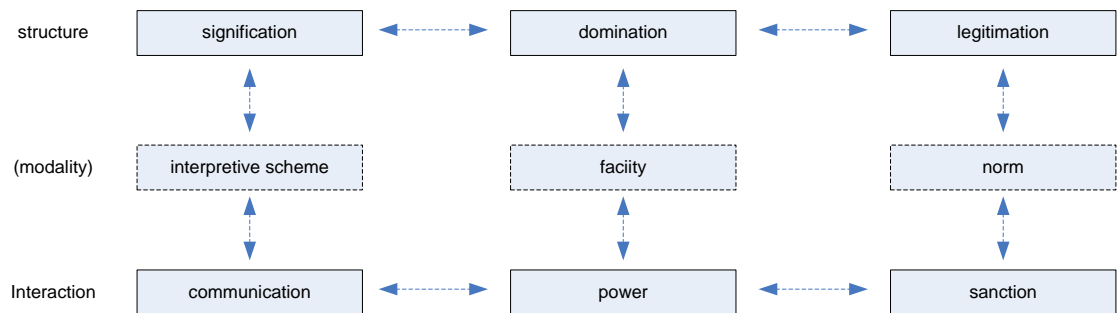
Figure 3: The Dimensions of Duality

It can be seen that three of the attributes suggested above (communication, power and culture) are supported by this model, with sanction being essentially equivalent to culture.

In addition, two other attributes are also supported by structuration theory. Giddens said the above "psychological qualities" need to be considered in "the situatedness of interaction in *time* and *space*" which are at "the very heart of social theory" and structuration (Giddens, 1984, p. 110). This is because they practically influence "the constraints that shape the routines of day-to-day life" (Giddens, 1984, p. 116). Giddens' emphasis on constraints has a natural link to the concept of emergent properties outlined in the introduction.

Revisiting the examples above, we can see that space (i.e. the physical world) is supported as a possible attribute by the example of technology while time is indirectly supported by other examples such as norms, which are essentially historical ways of doing things. Therefore, the researcher immediately began to consider if these five dimensions (communication, power, culture, time and space) could be used as possible attributes of the *properties* category. The remainder of this sub-section examines each of the suggested attributes in turn.

Note, the actual process of *emergence* is discussed in section 3.3.4.

3.2.3.3.1. Communication

In this section findings relating to the following points will be discussed:

Properties Attributes
Communication
Power
Culture
Space
Time

- The different approaches to communication;
- examples of the way aspects of communication can enable or constrain *interaction*; and a
- summary of communication as a dimension of emergent properties.

The field of communication theory is diverse. Anderson (1996) analyzed the contents of seven communication theory textbooks and identified 249 distinct theories but only 18 of these (7%) were included in more than three books. The only common thread is that many communication theorists believe it is the essence of human activity. For example it is believed that all actions are communicative (Stacey, 2001) and that communication is the central task of management and coordination (Griffin, 1997, p. 259).

As Craig (1999) argues, it is clear that there is no single cohesive theory of communication to draw upon to determine the key elements. Therefore, the challenge of this research is to determine the elements of communication theory that are relevant from the viewpoint of organizational boundaries and there are three major approaches to consider.

Firstly, communication can be considered from actual context of its employment, rising from the one-to-one scale through small groups to the level of mass communication. From an organizational point of view, the top end of this scale correlates to an organization's boundaries with other organizations (often called external boundaries) and the activities of its public relations/marketing function. The top end could also relate internally to the leadership/employees boundary in very large organizations.

Secondly, there has been a recent attempt to group theories of communication into several traditions which view communication in different ways – as the art of discourse; as inter-subjective mediation by signs; as experience of otherness; as

information processing; as expression and influence; as reproduction of social order; and as discursive reflection (Craig, 1999).

Lastly, it can be seen that the wide range of individual communication theories tend to focus on and explain the tangible and commonplace aspects of communication including, for example, personal communication skills, the nature of messages and meaning, the role of relationships, the dynamics of groups and intercultural *interaction*. These theories generally aim to explain specific enablers and barriers to communication and as such are quite relevant to this category.

Following are some examples from a communication theory text book by Griffin (1997) that may typically contribute to emergent properties in organizations. Note, this list is not meant to be exhaustive. The aim of these examples is only to demonstrate that communication is a valid attribute of the emergent properties category.

- **Group think** (p. 235) is "a mode of thinking that people engage in when they are deeply involved in a cohesive in-group, when the members' strivings for unanimity override their motivation to realistically appraise alternative courses of action."

- **Peripheral routes** (p. 221) "offer a shorthand way to accept or reject a message without any active thinking about the attributes of the issue or the object of consideration'" For example, people may respond using the peripheral route due to reciprocation (you owe me), consistency (we have always done it that way), social proof (everyone else is doing it), liking (love me and my ideas regardless of what you think) and scarcity (quick, before they're all gone).

- **Ego involvement** (p. 197) refers to "how crucial an issue is in our lives". People with high ego-involvement will have a fixed position or anchor where their attitude lies. Attitude shift will be small and only occur if arguments fall within or on the edge of their latitude of acceptance.

- The **interactional view** of communication refers to how "every communication has a content and relationship aspect such that the latter classifies the former and is therefore meta-communication." (p. 170) So who says it and how it is said (e.g. with anger), affects the cognitive outcome significantly. Verbal communication has a higher relationship component

(e.g. fear, sweating, looking at the ground) and it's hard to translate between verbal and non-verbal channels.

- **Reality construction** (p. 287) relate to how language is the medium through which social reality is produced and reproduced. The meaning we assign to words and metaphors comes to be used in a taken for granted way, thus constituting those things that we treat as self-evident and natural within our society. E.g. repeated use of "the bottom line", a metaphor arising from balance sheets, makes people in corporations believe that financial matters are all that counts. Ethical or environmental considerations are not the bottom line and thus communication and *interaction* around these is constrained.

- **Speech codes**: According to Gerry Philipsen (Griffin, 1997, p. 432), all cultural groups develop a speech code which involves culturally distinctive psychology, sociology and rhetoric. It is more than just distinctive individual words, the code is inextricably woven into speaking itself and may be identified by looking for patterns relating to cultural myths, social dramas and rituals.

The above list all have close links to communication and all enable and constrain *interaction*.

Beyond these specific examples of communication related emergent *properties*, *interaction* itself is enabled generically by language including syntactics, sign systems and semantics. Conventions and abstract systematic frameworks (Stacey, 2001) emerge over time that enable and constrain communicative *interaction*.

In addition, some individuals excel at making use of these enablers to become "competent communicators". However, being a competent communicator involves more than just practice and skill, it is also related to social bonds that motivate people to communicate and networks that provide people with different perspectives and alternatives (Gudykunst, 1993, cited in Griffin, 1997, p. 407). Thus communication competence itself can be seen as an emergent property.

Looking at the interview data, there is evidence that supports some of the above examples. One interviewee said:

> *"Others will ask 'who has done that analysis'. They will judge how good that analysis is based on who did it rather than the process that has been followed."*

This relates directly to the peripheral shortcuts example above.

There were also some more general constraints relating to communication. For example:

> *"There is a mental factor arising from the fact that our interfaces are still being established. People don't want to engage with us till they understand what it is we do."*

In this example, the suggestion is that the emergence of a general level of acceptance of a new function within in an organization has something to do with "understanding" which in turn has to do with communication.

Summary: In this section we have seen how various aspects of communication conforms to the criteria for emergent properties set out at the end of section 3.2.3.1. Firstly, we have seen from the brief review of communication how it enables *interaction* in several ways – obviously through the use of an evolved language but also at a deeper level, such as in the meta-communicative role of non-verbal expressions or the use of peripheral routes. We also saw how different aspects of communication may result constrain *interaction* such as in groupthink or ego-involvement. These higher order enablers and constraints all emerge in the course of normal communicative *interaction* where people may be conversing around the mundane aspects of every-day life. For example, groupthink is not a phenomenon that people would typically be conscious of. Certainly, any one individual cannot impose groupthink on others, it is something that just emerges. Lastly, we can see that these aspects of communication are inherent in several of the examples in table 2 of section 3.2.3.2 including language and policy/procedures which are used to used to communicate with others and awareness which is a key aspect of communication. It's important to note that the term "communication" is just a label used to describe a range of related emergent properties and is not necessarily an emergent property itself.

Communication is just one of the five possible attributes of *properties* identified at the start of this attributes section (3.2.3.3). The next section examines the evidence relating to the attribute of power.

3.2.3.3.2. Power

In this section findings relating to the following points will be discussed:

Properties Attributes
Communication
Power
Culture
Space
Time

- Different approaches to power
- The concept of disciplinary power
- The roles of language and knowledge in the exercise of power
- Summary of power as a dimension of emergent properties

A simple view of power is as a way of "getting things done" and it is argued that it should be viewed positively as little gets done without the exercise of power (Pfeffer, 1992). There is a very large body of literature on the subject of power and a variety of different approaches including the subjective (where individuals are seen to wield power consciously), objective (where structural phenomena constrain or oppress) and relational (where power lies in the interaction of groups or between subjects and structure) (Mingers, 1992).

In addition there are a range of specific frameworks (e.g. Clegg, 1989; Hallsworth & Taylor, 1996; Hardy, 1996) that deal with power at a number of levels including the individual (that of day-to-day *interaction*, where individuals jockey for position within the standing conditions), the organizational level (this refers to the "power-balance" in organizations – how ways of doing things are fixed by explicit or tacit rules, meaning and membership) and the environmental level (relating to how changes in the world, such as new technologies, techniques or events can change the power balance in organizations).

The aim of this section is not to review the literature on power. Rather, the aim is to identify those concepts of power that are relevant to and support the development of the *properties* category i.e. that which is relevant data.

One such concept that stood out was Foucault's (1980, cited in Clegg, 1989) theory of disciplinary power, which is achieved through controlling all aspects of daily life to the point that subjects come to apply it to themselves through corporeal internalization.

The essential nature of disciplinary power in organizations is the "set of practices and routines which constitute identities and experiences and in doing so provide unproblematic asymmetries, privileged knowledge, and expertise, located in some and not others, and in doing so instantiate inclusions and exclusions in decisional processes"(Deetz, 1992, p. 26).

The key question, Deetz (1992, p. 27) says, is around "describing the ways by which managers and workers both become obedient in their own structurally prescribed manner." This was apparent in the following example from the interview data.

> *"When CA or DCA says do it we are forced to do so even if there are conflicts. The big issue is when additional tasks come down above and beyond what I have already been tasked to do as part of our Output Plan."*

In Foucault's (1969) *The Archaeology of Knowledge,* discipline arises from historical processes that result in meaning systems enabling individuals to make sense of their world. As a result, individuals take things "for granted", accepting without question the way things are done in their particular cultural setting.

In this cultural reality the importance of language becomes apparent. The way things are done is reflected in the language of the organizational culture and reproduced by its continued use. As individuals continue to accept and use distinctions such as "workers/managers", then the organizational *culture* is produced and reproduced.

This is summarized well by Townley (1993), who said: "Knowledge is the operation of discipline. It delineates an analytical space and in constituting an arena of knowledge, provides the basis for action and intervention –the operation of power."

By defining the permissible space within which members of an organization may operate, it effectively constrains their freedom.

Foucault showed that meaning systems consist of historically derived sets of rules or codes that govern the nature of relationship or distinctions between different words and statements. The implication of Foucault's theory around disciplinary power is that language itself may be the key emergent property related to power. This is discussed further in section 3.4.2.2.2 on classifying and other attributes of the basic social process.

Foucault's concept of disciplinary power implies a dramatic shift away from power as an entity that is wielded occasionally by individuals. Rather, power is shown to be omnipresent. Deetz (1992, p. 38) explained this concept as follows:

> *"[Power is] manifest and produced in each moment. Power is thus not dispersed in modern societies to citizens who argue and vote, but spreads out through lines of conformity, common sense observations, in determinations of propriety. Disciplinary power is evidenced in the production of a normalized body and response which is produced, reproduced and supported by arrangement of the material world which results in coordination and consent, not only regarding how the world is but how it should be"*

This concept is directly relevant to organizations.

> *"In the modern context, disciplinary power exists largely in the new social technologies of control. These include experts and specialists of various sorts who operate to create a "normalized" knowledge, operating procedures and methods of inquiry, and to suppress competitive practices. These are the accountants with standard accounting practices, efficiency experts and personnel officers (Deetz, 1992, p. 39)."*

By emphasising the omnipresent nature of power, these quotations support the idea that power may be present as an aspect of every emergent *property*, not something that is separate from other aspects of *properties* such as *culture* and *communication*.

While meaning systems are historically constituted, they are not static. They continue to evolve and this is the result of power dynamics whereby 'truth" and knowledge are produced through conflict, creating new realities in any given culture. The exercise of power and associated interactions are discussed further in section 3.3.3.2.1 on an attribute of *interaction* called *contending*.

The above concepts of discipline, the role of language and knowledge are evident in the interview data. Following is one specific example:

> *"Unless you have worked with them in a different context or know them on a personal level, people will judge each other by their Corps. For example, I am a Sig and therefore a geek. Some people will just see me that way and think I don't understand combat... Army sees Sig officers as involved in anything to do with ICT technology... A lot of jobs I am given are because I'm a Sig."*

Here, the labelling of the person as being from the Signals Corps differentiates them from other corps in the Army. This stereotyping allows the individual to undertake certain activities but effectively restricts them from others. This particular interviewee was frequently being taken off their main role in order to participate in sig related projects, which effectively curtailed their ability to accomplish goals in

their role. While communicative *interaction* that allows people to "get to know" a person effectively extends the freedom of the individual, this is limited as postings to new roles are done formally and is subject to organization rules about prequalification.

Following is a similar example:

> *"[Unit X] has the worst customer service I've ever come across... They think we are here to support them rather than the other way around."*

By making the distinction of themselves as a "customer" this interviewee is asserting a privileged position in their power relations i.e. "They should be serving us because we are the customer.

The next example shows how language can also help define a position in the power structure.

> *"It is a true 5 task, doing planning or deep battle, that is not close battle, not those directly in front of you but those that are further over the horizon."*

This vivid use of language assists the S5 articulate his role. Being a new role in the unit, this is important because without the clarity of intent, role legitimacy is difficult.

Summary: In this section we have seen how phenomena relating to power conform to the criteria for emergent properties set out at the end of section 3.2.3.1. Firstly power is an enabler of *interaction*, allowing things to "get done" but also constraining people through the emergence of "discipline" in which people become obedient, accepting asymmetries of privilege. This higher-order property of *interaction* arises from a multitude of lower-level *interaction*s characterised by the distinctions we make and embed in language, the norms and accepted practices that build up historically over time, which themselves are the result of power struggles in which "truth" and "knowledge" are produced. We can see that these aspects of power are inherent in several of the examples in table 2 (section 3.2.3.2) including authority, language, norms, policy and procedure.

Power is just one of the five possible attributes of *properties* identified at the start of this attributes section (3.2.3.3). The next section examines the evidence relating to the attribute of culture.

3.2.3.3.3.   Culture

In this section, findings relating to the following points
will be discussed:

Properties Attributes
Communication
Power
Culture
Space
Time

- How assumptions enable and constrain behaviour
- The idea that organizations may have several sub-cultures
- How it may be more appropriate to think of culture as fragmented and issue-specific and possibly manifesting itself as an aspect of emergent properties
- Common examples of assumptions (that may be the cultural dimension of properties) in organizations relating to mission (e.g. strategy or goals)
- A whole variety of other possible "dimensions" of culture relating to factors such as nationality and risk orientation, that may need to be accounted for in any analysis.
- Summary of culture as a dimension of emergent properties

As with the subjects of communication and power, the body of literature on culture is very large with many different approaches. The diversity of approaches relates to the different levels at which culture may be examined as exemplified by Schein's (1992) three tier model covering artefacts, espoused beliefs and values, and underlying assumptions. Artefacts relate to *objects* such as dress and symbols, while the verbal relates to stories and expressions and activities relate to *interaction*s such as ceremonies and other traditional events (Hatch & Cunliffe, 2006).

According to Schein, when a problem is encountered, individuals will express beliefs about how it should be handled and/or the values which should guide the group in approaching the problem. If one particular belief is accepted by the group it becomes a shared belief. Over time repeated success in dealing with a particular type of problem may prove to the group that the beliefs and values are warranted and slowly they are taken-for-granted. Such underlying assumptions are not open to debate. People who disagree are regarded as foreign or crazy and their views are dismissed.

It is this pattern of shared basic assumptions that underpins much of the theory on culture (Schein, 1992) as it leads to interpretive schemes that are used for problem solving (Kohlbacher & Krähe, 2007), although others say it is better "understood to

be a system of common symbols and meanings" that provides the shared rules governing behaviour (Alvesson, 2002).

When assumptions are challenged, it causes anxiety and this drives much of the behaviour of individuals and groups as they try to reduce anxiety, "even if it means distorting, denying, projecting, or in other ways falsifying to ourselves what may be going on around us. It is in this psychological process that culture has its ultimate power (Schein, 1992, p. 32)".

Once an individual has a stable and integrated set of underlying assumptions it becomes a "thought world" or "mental map" which guides sense making and action. In cross-boundary *interaction*s, in which others that have greatly different underlying assumptions, the potential arises for misinterpretation of communicative *interaction*s or the individuals may not understand what is going on at all.

An example from the interview data illustrates Schein's theory, showing how problems can quickly lead to deep-seated assumptions that inhibit or enable *interaction* − in this case, "that it won't work so I shouldn't bother trying":

> *"If they can't get [the video teleconferencing system] working or can't book it, then after a few times they won't even try."*

Culture can thus constrain *interaction* because of a rigid set of underlying assumptions. For an organization to learn something new requires "us to re-examine and possibly change some of the more stable portions of our cognitive structure − a process ... called 'double-loop learning' or 'frame-breaking' (Schein, 1992, p. 31)"

Schein's model of organizational culture makes a certain assumption that culture is an identifiable property of groups. For example, he said (1992, p. 200) organizations may have an integrated culture, with a single set of shared assumptions, or a differentiated culture, with a small number of clearly defined and powerful subcultures that disagree on certain key issues − e.g. management versus labour.

In the study site, a number of clear sub-cultures were apparent. The biggest internal cultural boundary related to the differences between the uniformed military staff and civilians who make up a significant percentage of the workforce.

> *"Civilians do not understand what they are doing."*

> *"They have one civilian in an Army role. There is a little bit of cultural difficulty. We don't quite know how to relate."*

These examples indicate a possible cultural barrier arising from not understanding the underlying assumptions of a culture which can make it difficult to "understand what is going on". However, at least one interviewee thought that having a different set of underlying assumptions would actually enable *interaction*s of a different and beneficial sort, as the following examples shows.

> *"[X] is arguably just a PSO (principle staff officer) but [X] is more than that. [Being a specialist officer] brings a degree of independence and opinion that comes from outside the military system."*

A cultural barrier to *interaction* also arose between HQ LTDG and its external service provider as follows.

> *"We turned over the duties of the Logistics battalion to a commercial provider. They don't have a strong culture. Instead of bringing innovative commercial culture, they end up conforming to Army culture which is not the best or most effective way of doing things. It's to be expected when you have an organization with a very strong culture and a commercial company is very customer focused. They have taken on the culture of the Army."*

Another example of a cultural barrier was that existing between the different services – Army, Navy and Air Force – which can lead to difficulties in *interaction*. For example:

> *"The three services do things differently. The other services are technology focused and have more rigid roles... Take Navy for example. For their PTI (Phys Training Instructor) training they will front end load all the knowledge into the start of the course. However, Army put people on the job to consolidate initial training. This is a result of our focus to get them on operations as quickly as possible – ours is fighting fit focus and PTI is compulsory. Whereas for the Air Force and Navy it is home based ... and focused on sports. It is more focused on morale and it is voluntary. This can be difficult because we are trying to get common training systems... Part of my role is to identify where we can have commonality so only one training establishment provides that training. Where it becomes a barrier is where we give one course a priority but theirs will be different as they are more focused on engineering.*

It should be noted that some researchers (see below) reject such clear cut notions of culture as those of Schein's described above and instead present alternative models of culture such as fragmentation, deconstruction and polyphony. For example Hatch and Cunliffe (2006, p. 203) said:

> *"Researchers who assume a fragmentation view of culture claim there can be no unity of understanding and that any consensus or affinity, even within a subculture, is temporary because interpretation shifts incessantly.*

> *"When two cultural members agree (or disagree) on a particular interpretation of, say, a ritual, this is likely to be a **temporary and issues-specific congruence** (emphasis added) (or incongruence). It may well not reflect agreement or disagreement on other issues, at other times. Subcultures, then, are re-conceptualized as fleeting, **issue-specific** (emphasis added) coalitions that may or may not a have a similar configuration in the future. This is not simply a failure to achieve sub cultural consensus in a particular context; from the fragmentation perspective this is the most consensus possible in any context" (citing Martin, 1992).*

The emphasis on the words "issues specific" is made to raise the point that this would support the idea the culture may express itself in organizational boundaries as just one aspect of specific emergent properties.

A possible example of this fragmentation view was apparent in the interview data during the implementation of a project. In the following example, a "temporary and issue-specific incongruence" arose in the use of a particular technology enabled practice which was recommended due to a false assumption about the ability of Army staff to use it.

> *"There was never a [proper] scoping of how much work was involved. They weren't ready for the technicalities of it all. They thought that everyone would have access to [technology X] but here we don't want to have to train everyone in requisitioning and receipting. We have many more people than Navy and Air [and they are not technology oriented]. They would be struggling with it."*

Note that in the fragmentation view of culture there is an emphasis on the conscious interpretation and negotiation of meaning which relates to communication and hence indicates a strong overlap between these two attributes of the *properties* category. It's also in contrast to Schein's focus on the taken-for-granted, where deep underlying assumptions simply aren't discussed. An example this is apparent in the interview data as follows:

> *"There is a lot of what we do that we may not know why we do it that way. For example, if someone was to design a brand new army from scratch, would we still do drill on parade ground? There are lots of good reasons for this, like teaching soldiers to function as a team, to take orders and obey instantly and to break that link to civilian habits but the benefits are not immediately obvious. In other areas we have developed ways to move stealthily through jungle but this may not be obvious in the training."*

According to Schein (1992) common underlying assumptions in organizations relate to external adaption via mission, strategy and goals including the means by which they should be achieved, ways of measuring success and how best to implement

corrections. There are also a number of internal integration assumptions around power and status including the aspects of language discussed in section 3.2.3.3.2, as well as norms such as those governing friendship, membership of class and expectations of reward and punishment.

Assumptions around mission and strategy and associated attitudes are apparent in the interview data.

> *"The first issue is that Army officers struggle to say no. They have a 'can do' attitude which gets us into trouble."*

> *"Planning processes are subordinate to real-time operational processes. i.e. we drop everything if required to support new deployments. Sometimes courses may be cancelled if soldiers suddenly have to deploy."*

> *"Army Operational Deployments are being given the number one priority and we need to support them. We have to give them as much training as we can. If we are sending young troops away we need to give them as much training as they need before they go. I have my opinions about the priority. I think it is the wrong way round – training should come first. Then we can determine what operations we can support."*

The second comment arose because of the high operational "tempo", which means that other longer-term aspects of running the Army are inevitably being given a lower priority. However, because of the widespread 'can do' attitude, it would take "frame-breaking" behaviour (Schein, 1992, p. 31) in order to change the underlying assumptions.

Beyond Schein's influential model of culture there are many alternative models which build on the concept of one or other dimensions of culture. For example, Denison and Mishra (1995) outlined two major axes for cultural dimensions. One axis relates to the contrast between internal integration and external adaptation. The other axis relates to the contrast between change and stability on the other. This model suggests there may be cultural "types" relating to each quadrant of the theoretical matrix.

A whole range of possible dimensions have been suggested including internal-external focus, flexibility, formality, task orientation, risk orientation, sociability and solidarity (outlined in Cameron & Quinn, 2006). In addition to cultural dimensions internal to an organization, there are a number of dimensions relating to differences across national borders including power distance, individualism vs collectivism,

masculinity versus femininity, uncertainty avoidance and long vs short term orientation (Hofstede, 1998a, 1998b).

There is much debate about which set of dimensions is most useful or relevant in any particular organization. The important point is they indicate the kinds of cultural issues that may arise in organizations and lead to difficulties in cross-boundary *interaction*. Some examples are given below:

- **High-context versus low-context** (Hall, 1976, cited in Griffin, 1997, p. 421) – High-context cultures have concerns for mutual face and inclusion that lead them to manage conflict with another person by avoiding, obliging, or compromising. Words cannot be understood outside of the cultural context and its important to understand the undercurrents. It is more important who is speaking than what they are saying. By contrast, people from low-context cultures have a concern for self-face and autonomy and "manage conflict by dominating or through problem solving" The focus is on what is being said and people are taken at face value.

- **Muted group theory** (Griffin, 1997, p. 459) claims that subgroups of a culture can be effectively silenced by the language (speech codes) that is controlled by a dominant group. In particular it is claimed that the "feminine voice" is muted by a masculine dominated language.

Summary: In this section we have seen how culture conforms to the criteria for emergent properties set out at the end of section 3.2.3.1. Firstly, assumptions can develop that enable or constrain *interaction* by providing people with a mental map of how to behave in various contexts. Secondly, shared or higher-order assumptions may arise through the *interaction* of lower-order beliefs and ideas about how "things should be done". This section also outlined the opposing arguments that organizations may have definable sub-cultures or that culture is a fragmented and temporary phenomenon. The fragmented approach is more compatible with this research because it aligns with the idea that boundaries have many emergent properties, each of which may have a cultural dimension. Lastly, we also saw examples of a whole range of possible assumptions and "dimensions" common to organizations. These examples simply serve to illustrate the possible cultural dimensions of emergent properties. When we look at the examples in section 3.2.3.2

we can see that several have obvious cultural dimensions such as capability, comfort zone and urgency, not to mention norms, which are almost synonymous with culture.

Culture is just one of the five possible attributes of *properties* identified at the start of this attributes section (3.2.3.3). The next section examines the evidence relating to the attribute of space.

3.2.3.3.4.　Space

In this section, findings relating to the following points will be discussed:

Properties Attributes
Communication
Power
Culture
Space
Time

- Geography
- Workplace setting
- Communication medium
- Physical objects
- Technology
- Summary of space as a dimension of emergent properties

The attribute of space was initially noted in the interview data for the practical constraints faced by a number of interviewees primarily related to the physical location or **geography** of their workplace. As noted in the introduction, space was also highlighted by Giddens (Giddens, 1984) as a key dimension of structuration theory. However, in contrast to the attributes of communication, power and culture, there is much less academic literature devoted to space and related topics. This section reviews both the interview data and the literature to better understand the spatial aspects of the *properties* category.

One of the most obvious special aspects relates to geography and in particular physical distance, as this example shows.

> *"The rest of the Army is spread out and at a distance. This makes dealing with others more difficult."*

> *"Even walking across the 50m between our building and the others [makes it] difficult."*

> *"Having isolated pockets of people, you can easily forget them for a time and its harder for me to convey an idea. i.e. I have to jump on the phone or send them an email with a picture , then call. For example I have people in [city X] for training design, in [city Y] for validation and I have a range safety cell in [city Z]. If I have a thought, then I have to write it down. If they are here I*

would just go around and talk to them. If you have a meeting you usually only have only two thirds of the people. You then have to capture the ideas from the meeting and pass them on."

A key point to be made about geographic separation is that the concept of "distance" is not necessarily static. Espinosa et al (2003, p. 163) noted that the concept of distance is complicated by factors such as group members changing location during projects or having multiple work locations.

O'Leary and Cummings (2007, cited in Espinosa et al., 2003) make the suggestion that it may be more appropriate to use weighted average of travel time between sites to measure geographical spread rather than measures based on distance. Other factors include the number of sites represented within the team, degree of isolation (measured by dividing one by the average number of team members per site), the relative importance of particular members and their location (e.g. the leader) as well as those of customers and suppliers.

Some of these factors were evident in the following example from the interview data:

"The command element always wants a response faster than others... Because of their proximity to us they expect a faster response. Whereas external agencies will give you a deadline by the end of the week."

The impact of geographical location can have a profound effect on *interaction*. Nerkar (2003) noted the tendency of firms and individuals within firms to collaborate and search for solutions to problems locally, i.e. within geographical regions, giving rise to the phenomenon of "knowledge spill over" and the rise of clusters of related industries, as exemplified by "Silicon Valley" in the United States.

Wang et al (2004) found that knowledge spillover is not only related to the geographical characteristics of a region (which may dictate the nature of knowledge exchanges) but that spillover intensity exponentially decreases with distance. In other words, the further away the participants the harder it is to collaborate across boundaries.

Physical distance can also be viewed at the opposite end of the spectrum – when people are too close. For example, Burgoon (1978) outlined the concept of personal space in which cultural norms dictate the appropriate distance for productive *interaction*.

Another common sense spacial aspect relates to the physical nature of a **workplace setting** and the design of buildings and working spaces. The role of the particular features of a building, such as the water cooler or tea rooms, has been cited in literature as being critical to facilitate serendipitous exchanges of knowledge (e.g. Dalitz, 2002, p. 78). To that end some attention has been placed on designing workspaces to facilitate such conversations (Nonaka & Konno, 1998).

Physical space is a key element of the Japanese concept of "Ba", introduced to organizational theory by Nonaka andKonno (1998). Ba (equivalent to "place" in English) is a shared space for emerging relationships. It can be a physical, virtual, or mental space. They argue that knowledge cannot be separated from the context it is embedded in.

Other factors relating to workspace design include, building layouts, sound and temperature, office design and the physical arrangement of meetings. The spatial impact of the workplace setting was evident in the interview data as the following examples show:

> *"With our expansion we basically outgrew the offices we are in. We have reorganized offices to get all staff who work together as close to each other as possible. 7 branch is now all in one building across the stream. Prior [to the reorganization] there was a dysfunctional relationship between branches that were meant to be working closely together being the 1, 3, 4, 5 and 9 branches. We tried to get these as close together in one building as we could which means their day to day activity is now more closely linked and they speak more freely and they are all in support of the 7 branch."*

In the next examples note the positive impact of the physical office layout on *interaction*.

> *"Having the S9 sitting next door has been brilliant. We have a window between our rooms which we can just flick open and talk. Often she will see me through the window and it will remind her of something which she passes on to me."*

Contrast the above example with the possible negative impacts of design in office layouts.

> *"If I'm in an open plan with a whole lot of people I will relate with each individual in a day [and I tend to] give them a lot of direct instruction. I'm very aware if I'm at their desk and then follow up few hours later they can get swamped."*

> *"I found it hard when I didn't have my own office. I am now appreciating having my own office. When I was in the thoroughfare my work output dropped."*

This illustrates how special attributes of the same type can both enable and constrain "productive" *interaction* across boundaries.

Another spatial aspect relates to the physical nature of the **communication medium**. The academic discipline of semiotics has shown that the physical characteristics of communication, including smell, taste, touch, tone of voice and gestures can have a profound impact on communication outcomes. (Griffin, 1997, p. 111). Even the physical appearance of a person can have a big effect, as this example from the interview data shows:

> *"A lot of people are treated by their first impression. For example, if they are fat they may not be seen as professional (as it is a duty of all active army personnel to maintain a required level of fitness)."*

A common ramification of semiotics theory in organizations relates to the widespread adoption of email as a communication medium of choice. Semiotics tells us that all sorts of misunderstandings can arise in mediums that lack "richness". One example from the interview data reflects this:

> *"You know how sometime you type an email and press send and you wish you hadn't done that? Well that is one of the big problems we are facing. So what we are trying to do is encouraging people, if they are responding to something they don't like, we say, type the email and send it to yourself and then sit on it for a while before you send it."*

A more general example of the physical impact of communication mediums relates to the Army's approach to formal communication:

> *"Important communication is done on a multi-tier basis. For example, if we change a document in Doctrine, we can just change it online. For some that is OK but for others we have to send out as a signal as well. There are no specific guidelines but if it affects safety then it will have a signal. There is a time difference between when we make the changes to electronic version and when we change the hard copies in the Vols. The publication cell in Wellington does this- it records the change and sends out amendment sheets."*

So the physical medium and people's access to various communication systems affects the speed with which communication can be achieved. The implication for this research is that the relative physicality of a communication medium can enable or constrain *interaction*.

In addition to communication mediums, **physical objects** may become the focus of and facilitator of *interaction*. A good example of this is found in the research of

Barrett et al (2007) who studied the introduction of a dispensing robot into a hospital. The introduction resulted in a shift of workplace jurisdiction which emerged through the "operation of the robot, the assignment of responsibilities for interacting with it and the resultant visibility of the assistant's work." In this example a physical object, by virtue of the way it is used, has a mediating impact in *interaction*s, despite the fact that it was never designated or recognized by the participants as a "boundary object" (Barrett et al., 2007, p. 27).

So the wider implication for this research is that **technology** in general, not just that of communication can have an impact on *interaction*. This is reminiscent of the technical determinism of Marshall McLuhan and his famous statement – "the medium is the message" (cited in Griffin, 1997, p. 341). The argument of McLuhan's theory is that technology, like the invention of the alphabet, the printing press, the telegraph and probably now the internet, change us more than the combined content of the messages in each medium. What we do in our every-day lives and how we do them is changed by the medium of communication more so than by the content of the messages conveyed by that medium.

One only has to consider how the "social media" of the internet is enabling and activating relationships (i.e. connections/boundaries) where none existed before, to understand that technology is truly an enabling and constraining property of organizational boundaries.

Summary: In this section we have seen how space conforms to the criteria for emergent properties set out at the end of section 3.2.3.1. Firstly, it is clear and evident from the several aspects of space presented that it enables or constrains *interaction*. Secondly we have seen how several of these factors are clearly not static but emerge from the *interaction* of lower order components. For example, we say how the impact of distance can depend on who is in each location, that what is "too close" depends on culture and that technology evolves to meet needs event as we adapt to the technology. When we look at the examples in section 3.2.3.2 we can see that some clearly have a physical component such as capability, which in the military inevitably involves weapons hardware, and also technology which usually involves physical tools.

Space is just one of the five possible attributes of *properties* identified at the start of this attributes section (3.2.3.3). The next section examines the evidence relating to the attribute of time.

3.2.3.3.5.   Time

In this section, findings relating to the following points will be discussed:

Properties Attributes
Communication
Power
Culture
Space
Time

- Linearity
- Intermittency
- Asynchronous boundaries
- Organizational memory
- Rapid response
- Urgency
- Summary of time as a dimension of emergent properties

In section 3.2.1.3.1 we saw an aspect of time that may be treated as an object (that of a deadline) and in the examples above (section 3.2.3.2) we saw how a "sense of urgency", which is strongly related to time, could be thought of as an emergent property in its own right. So early on the researcher had become attuned to the idea that aspects of time may enable or constrain *interaction*.

As noted in the introduction, time is a key dimension of Giddens' (1984) theory of structuration. He said (p. 35):

> *"The fundamental question of social theory ... is to explicate how the limitations of individual 'presence' are transcended by the 'stretching' of social relations across time and space. This raises "once more the problem of 'history', since the absent others include past generations whose 'time' may be very different from that of those who are in some way influenced by residues of their activities."*

In other words, Giddens was concerned with how structure formed from actions taken in the present.

Butler (1995) says: "We experience time in the present, but only by relating ourselves to a past and a future". Butler argues that the best way to understand the role of time is to understand the "different conceptions we have in the present about our past, and how we use these conceptions to envisage the future".

One temporal aspect of emergent properties is the **linearity** of many business processes. Carlile (2004, p. 565) describes this issue as follows:

> *"In complex processes in our society (i.e., product development, public policy development, etc.) specialized knowledge is distributed across different domains and cannot always be equally represented at the same time. This temporal dimension of dependency means that the consequences of downstream knowledge generally have a harder time being represented earlier in the process, putting upstream knowledge (i.e., designing a product or policy) in a politically stronger position relative to downstream knowledge (i.e., building the product or implementing the policy)."*

For example, Howard-Grenville and Carlile's (2006) case study of a manufacturing organization found tension arising between the manufacturing and environmental functions of the organization as a result of differing time scales. They said (p. 481):

> *"These two knowledge regimes [manufacturing and environmental] operated on very different time horizons or temporal cycles for the development of knowledge. The causal specificity within semiconductor manufacturing enabled new manufacturing process generations every 2 years and [they have] even been able to develop a mechanism (roadmaps) for planning new technological milestones with a rolling 15-year time horizon. Environmental issues come up on their own time, driven by scientific discovery and a slow and unpredictable accumulation of facts. Given the lack of causal specificity as well as ambiguity in terms of where critical information will come from (e.g., data on chemical concentrations in the water under various conditions) it can take long cycles to develop and test knowledge in this regime."*

Similarly, design breakthroughs can often not be delivered due to constraints in manufacturing knowledge. Nerkar (2003, p. 215) said:

> *"Different rates of co-evolution can cause potentially useful technologies to lie fallow for many years. Inventors who look back across broad time periods are likely to find such potentially useful technologies. This suggests that recombining knowledge from broad time periods is relevant as it can uncover valuable knowledge that is forgotten or whose time has not come."*

The implication for this research is that the effect of temporal linearity may impose a constraint on *interaction* i.e. different groups can find it hard to meaningfully interact with each other because they have to wait until some point in the future before the relevant *objects* become available to facilitate the *interaction*.

Another temporal aspect is that of **intermittency**. In discussing the metaphor of connectivity (i.e. boundaries) Kolb (2008) said " connectivity comes and goes, producing and produced by temporary breaks — inevitable cycles, planned changes and unanticipated disasters." Examples in the interview data include:

"We interact with a variety of government agencies – that information is more pull not push. Generally, it's us who will say if we need to know something."

"I have intermittent interactions with staff officers [in the higher headquarters]."

Similarly, Espinosa et al (2003) found **asynchronous boundaries** to same-time *interaction* arise when members of a team are separated by time because of differences in, for example, working hours, time zones, or working rhythms. Evidence of this was also found in the interview data:

"Working with other armies, we must visit them or rely on scheduling meetings at the right time or use electronics."

Of course people do develop a wide range of techniques to manage the time related issues outlined above including synchronization and sequencing of activities, including the rate at which they are conducted (Hassard, 1991). However schedules are used for more than just coordinating the completion of a list of preconceived tasks. Reaching a milestone often triggers a period of transition in which the actors "evaluate their progress on their tasks and to redirect their efforts to ensure completion by a set deadline" (Okhuysen & Waller, 2002, p. 1057). In other words, there seems to be a temporal limit into how far forward people can plan activities before they have to stop and re-evaluate. Evidence of this was noted in the interview data as follows.

"There is now a core group ... who have had a huge positive influence on the way things are being conducted. It's along the lines of moving the planning further out... We need to decide how far we can take this, i.e. 12, 18 or 24 months, before we get too far out and it becomes unrealistic due to external influences."

Another way of looking at the role of time in boundaries is to examine the spectrum from long to short time periods. For example, one particular issue that arises at the long end of spectrum is that of **organizational memory** – the need to learn from the past – a temporal boundary between the past and the present or between current and past actors. The following two examples show the different impacts of short and long term memory fade:

"Time becomes important if it's a complex idea being presented. If the decision cycle is too long we have to go back to the education phase again."

"An observation might relate to something we have seen before with lessons identified and implemented, but obviously it hasn't stuck. Knowledge is perishable, as people leave, we have to

> *relearn lessons. We try to embed it in doctrine and training as a way of capturing and avoiding knowledge fade over time.”*

Lost knowledge can have either anticipated or unanticipated effects, tangible or intangible impacts and create immediate or delayed costs (Alagna, 2004). Over long time periods this is actually a case of inter-generational knowledge transfer.

The flip side of organization memory is the periodic need for unlearning – i.e. where the organization has to unlearn practices that have been successful in the past but are now constraining the organization. (Leonard, 1995). A related point is that individuals are strongly affected by events in their formative years which can make unlearning difficult. Jennings (1996) said the identity established by individuals as they enter maturity is already stable and influences their actions throughout most of their mid-life.

An example of this can be found in the interview data as follows:

> *“Army people change so slowly -- most have their 10 or 15 year career. Part of the problem is that we front load them and this initial training carries them through their career -- junior officers have 115 competencies, progressing to 40 for mid-level commanders and about 10 for senior commanders. Those early years tends to be our formative ones and what we learn then carries through our career.”*

Similarly, humans tend to be more strongly influenced by knowledge of recent events, more than knowledge of experiences a long time in the past (Nerkar, 2003, p. 214).

One issue that arises from long periods of time is that providing motivation for individuals to act on behalf of future generations. A key factor is the absence of reciprocity – future generations cannot repay the favour so there is no benefit for the current generation. One theory as to why current generations would act on behalf of future generations is that they are in fact reciprocating the benefits (or burdens) passed onto them from past generations (Wade-Benzoni, 2002).

As we move down the temporal distance scale, we encounter the need for organizations to make decisions in a timely manner – so called **rapid response** environments. There is considerable debate as to whether fast decision making improves performance or not (Perlow, Okhuysen, & Repenning, 2002). However, there are a range of organizations with real requirements for fast actions, such as medical trauma centres or disaster relief organizations.

Faraj and Xiao's (2006) study of coordination in fast response organizations suggests that in addition to expertise coordination practices found in other organizational environments (reliance on protocols, communities of practice structuring, plug-and-play teaming, and knowledge sharing) there is also a need for "dialogic coordination practices (epistemic contestation, joint sense making, cross-boundary intervention, and protocol breaking)" which are "time-critical responses to novel events and ensure error-free operation" (p. 1155).

An example of the requirement for fast response can be found in the interview data:

> *"Generally, people in the Army are well trained to deal well with crisis management – in military terms we never know what the opposition is going to do and we are trained to deal with the unexpected. We are not good at the opposite of crisis management."*

The last sentence of the above comment relates to the issues of organizational memory above, learning from past events and improving the management of organizational processes. Military processes are not the only thing that requires fast response though, as the following example from the interview data shows:

> *"People issues are emotive and they have to be dealt with quickly."*

One observation of the research is that urgency may not always arise from external events. It can also arise from decisions made about what activities to pursue and resource availability.

> *Memo: Because of the finite amount of time people have, the more time spent on any given activity automatically reduces the amount of time that can be spent on another. As a person spends time on multiple activities then it may lead to resource and identity conflicts.*

An example from the interview data illustrates how this can occur in organizations:

> *"The reality is that most people do a superficial job and the resource requirements are not given sufficient attention. Sometimes the tasks are unachievable as the resources are inadequate. So we end up with resource and or time conflicts. The first issue is that Army officers struggle to say no. They have a "can do" attitude which gets us into trouble. A second issue is the lack of skill in prioritization."*

As staff in organizations feel they are becoming overworked, bounded rationality may begin to prevail with increasing tendency towards satisficing behaviours (Haas, 2006). Haas said (2006, p. 1171) said: "As information becomes increasingly abundant, the pressures toward satisficing behaviour grows more acute because the

processing demands required to identify the most relevant and useful information increases as the wealth of available information increases."

An example of this can be found in the interview data as follows:

> *"If they come to me with a problem I will answer it but they will only get the amount of due diligence that I believe I can afford at the time or should be giving them in the scheme of things."*

The urgency created by deadlines, whether self-imposed or arising from an external influence, affects decision making in multiple ways. In particular, the way decisions are justified is related to "the lead time given for adjustment and co-adaption" of the various inputs to the decision and this leads to satisficing behaviour (Soderlund, 2002). As the time-pressure to make a decision rises, actors tend to focus only on actions or "cues" that are relevant to the decision and people with greater knowledge of the decision topic will respond more positively (Spilker, 1995).

In the extreme, a so called real-time response may be required where the foibles of human decision making are considered too risky e.g. as in automatic missile defence systems. In this case it may be desirable to make decisions based on the knowledge of experts, whose knowledge can be codified to some extent and represented in a set of rules (Grabowski & Sanborn, 1992). These representations of knowledge need to be accessed quickly, in the absence of the experts, and used in automated or assisted decision making systems.

The implication of temporal distance, from long to short time periods, is that the passage of time has strong constraining effects on boundaries relating at one extreme to the difficulties in sharing knowledge across generations through to the difficulties encountered in making rapid decisions, at the other.

Summary: In this section we have seen how time conforms to the criteria for emergent properties set out at the end of section 3.2.3.1. Firstly, it is clear and evident from the several aspects of time presented that it enables or constrains *interaction* through phenomena such as deadlines and linearity. Secondly we have seen how several of these factors are clearly not static but emerge from the *interaction* of lower order components. For example, the phenomenon of organizational memory is clearly something which arises from many individuals' memories and asynchronous effects arise from as many people as there are interacting together. When we examine

the examples in section 3.2.3.2 we can see that some have clear time related factors involved, such as urgency and resource availability.

3.2.3.4. Connection

As will be argued in section 4.2.3, the properties that characterise organizational boundaries are *emergent*, arising from complex processes of *identification*. However, we find in section 4.2.4 that properties are not the only emergent feature of organizational boundaries – it is argued that *identity* is likewise emergent, resulting from the same process of *identification*. The next section focuses on the role of *identity* in organizational boundaries.

3.2.4. Identity

3.2.4.1. Introduction

The idea that identity may be a key element of boundaries arose early on from the observation that for many people,

organizational boundaries are directly related to function. People seem to strongly *identify* with their role, profession or practice. Departmental units in an organization are often aligned directly with function and so organizational boundaries are often synonymous with departmental boundaries.

Identity, like many words, has multiple definitions. Reading through some of these (*The Macquarie Dictionary*, 1991) we can observe that identity is commonly understood to relate to the "condition, character, or distinguishing features of person or things", particularly as it relates to "the condition of being oneself or itself and not another". Identity also relates to "remaining the same ... under varying aspects or conditions". It's important to note that the definition of identity above includes "of person or things" as this research assumes that groups can have an identity as well as individuals. A conventional definition is that identity is the " sets of meanings people hold for themselves that define 'what it means' to be who they are as persons, role occupants or group members" (Burke, 2004, p. 5).

There are two major schools of thought relating to identity – identity theory and social identity theory. Much of identity theory has been focused on the individual and
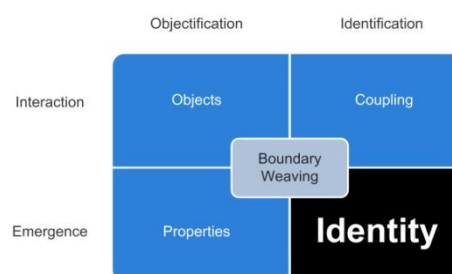
the self and particularly the roles they play in society (Stryker, 1980). By contrast social identity theory focuses on the identity of groups and the way individuals identify with a variety of social categories, thus creating a common culture among participants (Tajfel, 1982, cited in Stryker & Burke, 2000). According to Burke (2004) there are three bases of identity relating to the social, the role and the person.

A key challenge in identity theories has been accounting for the difference between individual and group identity. However, according to Stacey, there is no need to differentiate between the two because, as Gidden's (1984) theory of structuration argues, they are mutually constituted at the same time, in recursive social practices. He summarised Giddens as follows (2001, p. 61):

> *Social practices, that is, patterns in the ongoing dealings of individuals with each other, are sustained through time and across space in the medium of the very practices themselves... Human subjects and social institutions are jointly constituted through recurrent practices. The properties of the individual mind and of social practices do not exist outside action but are constituted in it. Individual and social are thus not separate levels of being but the same level, with each arising in the reproduction of patterns of interaction between people.*

This is similar to Foucault's argument that individuals are simply *objects* – being the product of historical processes of power-knowledge relations (see section 3.3.3.2.1 for further detail).

The next section examines ways in which identity manifests itself in organizational boundaries.

3.2.4.2. Examples

Prior to the identification of the above literature, the researcher had already started gathering data from the interviews as to nature of identity in relation to boundaries. This is in line with the direction of grounded theory methodology, which dictates that the researcher gather data free of any unwarranted influence of pre-existing literature. Following are examples of some of the codes that were developed.

Aspect of identity	Interview Data	Memos
Attitudes	*"The first issue is that Army officers struggle to say no. They have a 'can do' attitude which gets us into trouble. A second issue is the lack of skill in prioritization."* *"It would be great to just turn [the phone] off and ignore it but you can't. Personally I can't.* *"Some people do and don't give a dam and they don't always give a dam when they are at work."* *"I try to respond as quickly as possible."*	From these examples, we can see that some attitudes seem to arise from preferred "ways of doing things" which may be deep seated aspects of identity. In the first example, the attitude arises from their sense of being an "Army officer" while in the second it seems to arise from a sense of being a "conscientious person". These attitudes affect cross-boundary *interaction* significantly, as people decide whether and how to interact with others, based on their identity.
Habits and Routines	*"Because of their training ... and their role as an analyst, they tend to do analyst stuff ... and train people rather than facilitating the [process]."*	In this example we can see how the way people interact arises from their role, in this case, their sense of self as an "analyst".

Table continued on next page

Aspect of identity	Interview Data	Memos
Interests	*"People by human nature have hobby horses and preconceptions. Of the hundreds of courses we have there are only a few that everyone has an opinion on - e.g the JSO (Junior Staff Officer) course. Of the rest only a few or none have any interest. If it's not of great interest then it's a hard process getting them to a meeting, getting face time."* *"An issue is what I call my pets. eg. Doctrine is one of the things I have a bent for and so I will be more hands on with [head of doctrine] than with [heads of other 7 branch cells]. So [head of doctrine] gets a lot of emails from me because of my interest in doctrine which arose from TAC (Tactical) school and from my time at the ... Command School."* *"I used to deal with the vendor that is developing the [synchronization] system. However, I have handed over the lead to [the Information Systems department] on this as they are going to be funding it for wider application across Defence and we are just the pilot."*	These examples show how people's interest affect *interaction*. In the first example, the Junior Staff Officers course is something that all staff officers identify with because they have all done it as part of their formative training. Hence it is likely to form a core part of their identity. The second example shows a more personal example of how a particular experience in an advanced Tactical school has led to development of a particular aspect of identity, which is now influencing *interaction* in a different setting. The last example shows how people will act to protect their "interests" In this example the Information Systems department took over a project that they deemed to be their "turf". In other words, IS systems development is a core part of their identity and they want to maintain control of this activity in the organization.
Skills	*"I have been given a [difficult management task]. Partly, it was given to me because of my perceived people skills."* *"My experiences in the business world have helped me immensely. I ran a ... business for ... years and the skills I got from that [e.g. management, decision making] help in this role."*	Here personal effectiveness, which is strongly associated with a variety of skills which are seen to arise partly from experience. These skills become a core part of a person's identity and affect their way they interact with others.

Aspect of identity	Interview Data	Memos
Personality	*"[X] is a difficult person to deal with – they can be rude and treat people differently according to [his/her] perception of their importance. This can led to poor communication and can get in the way of work."* *"If the wrong person is sitting in a key role it creates problems through the whole system. If you don't have a suitable person on both sides its worse. An [unsuitable] person is not able to articulate himself or build good relationships or is not as social as he could be. It's easier to deal with some people than others."* *We have a good relationship with [the units reporting to headquarters]. This is largely due to the personalities of the officers and the way I approach them. There are no major personality clashes. It has a potential for difficult relations because they are all talented officers and WOs -- who are strong willed and strong minded. We need to work to their personality and how you approach them and work with them. Each is slightly different. There are some things you can say to some and not to others. It's about relationship building."* *"I don't like these laptops [and other forms of electronic communication] – I think people hide behind them. I try to go down and knock on their door wherever possible."* *"I'm not one to pick up the phone. Generally I won't walk and talk, they will come to me. I will send them notes… This is my personality and also it gives them their independence. I want them to be independent, free and frank."*	Here the personality of individuals is seen to have an impact on the way people interact with each other. Manifestations of personality, such as the "rudeness", "sociability", "strong will" and "dislike of electronic communication" in these examples, may arise from a person's basic identity. Many of these examples were coded in the interview data as "*interaction style*" due to the way personality affects the style of *interaction*.

Table 3: Examples of different aspects of identity in organizational boundaries

The examples given above are useful in that they provide a tangible feel for the role of identity in organizational boundaries. However, like *properties*, a comprehensive list would be very much longer. Again the researcher turned his attention to determine common attributes of these examples, using the constant comparative process. Two key attributes were identified being cognitive-affective influence and fragmentation and these are examined in the next two sections.

3.2.4.3. Attributes

Identity Attributes
Cognitive-affective
Fragmentation

3.2.4.3.1.   Cognitive-affective influence

In this section, findings relating to the following points will be discussed:

- Examples of the affective influence of identity;
- How this influence may arise from events;
- Examples of the cognitive influence of identity; and a
- Summary of cognitive-affective influence.

In reviewing the range of examples above, it was noted that some of the examples related to likes and dislikes or to the emotional bonds that people had with various *objects*. In other examples, the bonds had arisen more from cognitive processes. As a result, emotion and cognition were identified as possible attributes of the identity category.

That identity or personality relates to a person's cognitive-affective system is supported by the literature on psychology (e.g. Mischel & Shoda, 1995). For example, in his discussion of how "meanings" arise from the way people relate to *objects*, Burke (2004, p. 7) said:

> *What an object or process means lies in our response to that object or process... ICT (Identity Control Theory) understands these responses to be bipolar, each response lying along a relevant dimension such as good and bad... Yet because our responses are not only cognitive, meaning is not only cognitive; it is affective. Future research must strive to more fully capture what it means to be who one is by expanding the areas of measure meaning to include both the cognitive and the more affective or emotional dimensions of our responses.*

In general, the term affective pertains to "feeling or emotion" and cognitive pertains to "perception or knowing" (*The Macquarie Dictionary*, 1991).

Following are some examples of the affective influence of identity.

> *"I cherish this part of the role. I like being given responsibility for making decisions"*

> *"We have had colleagues leave to go out and work in a civy environment and get very frustrated with lack of direction and then they come back because they like being in the military. They like the camaraderie and also the freedoms we give. I mean there aren't many jobs where you can go down the gym at any time of the day."*

> *"People don't join the Army because they want to sit behind a desk."*

These examples show how if people enjoy something they may be strongly and positively attached to something. Conversely if someone has a bad experience with something they may be strongly and negatively attached to it (as per the attributes of *coupling* in section3.2.2).

Another more convoluted possibility is that people won't couple with some things unless a strong event happens as shown in the following example.

> *"They have the attitude that 'nothing bad has happened therefore I don't need to do anything'."* and *"to make things happen you need to make it a fear of failure."*

Schein (1992, p. 11) emphasizes the importance of emotional reactions to "key marker events" as a key aspect of group formation. As anxiety is generated over some event "everyone who has shared the response is now, by definition, in the group at some level, and anyone who has not shared the experience is initially not in the group" (p. 68) The chain of key-marker events, often linked, become part of the ongoing history of the groups.

Following are some examples of the cognitive attributes of identity

> *"Army people change so slowly -- most have their 10 or 15 year career. Part of the problem is that we front load them and this initial training carries these through their career -- junior officers have 115 competencies, progressing to 40 for mid-level commanders and about 10 for senior commanders. Those early years tends to be our formative ones and what we learn then carries through our career."*

This first example shows how the cognitive processes of training and learning lead to deep seated aspects of identity. i.e. people identify themselves as soldiers or officers which has arisen partly from the training which is a cognitive process (and partly from the camaraderie which is an emotional one). In other words, soldiers and

officers know what they know about being soldiers and officers because of their training and experience.

The next example shows how cognitive processes helps frame a person's or organization's world view – a key aspect of identity.

> *"Army operational deployments are being given the #1 priority and we need to support them. We have to give them as much training as we can ie sending young troops away we need to give them as much training as they need before they go. I have my opinions about the priority. I think it is the wrong way round – training should come first. Then we can determine what operations we can support."*

In this case the individual's identity is conflicting with the organizational identity. The background to this comment was a widespread concern that the increased "tempo" in recent years was putting an unsustainable strain on the training/operational balance – that something would eventually break.

The following example shows how cognitive aspects of identity drive engagement – in this case inhibiting it:

> *"There is a mental factor arising from the fact that our interfaces are still being established. People don't want to engage with us till they understand what it is we do."*

That activity is driven by identity is supported by Stets and Burke (2000, p. 225) who said:

> *"Much of the meaningful activity within a role that is governed by an identity revolves around the control of resources; this feature as much as anything defines social structure."*

<u>Summary</u>: In this section we saw how identity may influence *interaction* and *identification* with *objects* in two main ways. The first way relates to the emotional or affective influence of identity, which is manifest in likes and dislikes and may arise from the magnitude of an *impression* made by an object, such as a traumatic event. The second way relates to the mental or cognitive influence of identity, which is manifest in the logical arguments people use in the way they engage (e.g. the need to "understand") and may arise from similarly cognitive activities such as training or sharing of information.

Cognitive-affective influence is just one attribute of identity. The other attribute, fragmentation, is examined in the next section.

3.2.4.3.2.   Fragmentation

In this section findings relating to the following points will be discussed:

Identity Attributes
Cognitive-affective
Fragmentation

- How the multiple aspects of identity arise;

- The different levels of identity; and a

- Summary of fragmentation.

Working through the literature presented in the introduction (section 3.2.4.1) we can see that identity is essentially related to the way that people identify with certain "categories" or "self-categorise" themselves. One key implication is that there may be multiple categories contributing to identity – meaning that it has multiple parts.

For individuals, these multiple aspects arise from factors such as "personal histories or position within the hierarchy" " (Kreiner, Hollensbe, & Sheep, 2006, p. 1317). This fragmentation of identity can be seen clearly in several roles within the study site. For example:

> *"My formal role is leading the [lessons cell] but I am also the HQ Adjutant, the formation security advisor and I'm on the Officer's Mess Committee. In addition, I do OO duties and I could be put into a peace keeping role at any time. Internationally, I represent the Army in an international lessons sharing network. Within the lessons cell there are several functions I manage including collection, collation, analysis, dissemination and training."*

While some of these are roles related to the individual's "post" , i.e. their official role, others are not. All these different roles mean that the individual's identity may have different parts relating to each of the roles, leading to "identity boundaries" as Kreiner et al calls them. The same can be said of identity at an organizational level of analysis. HQ LTDG has seven clearly defined functions, some of which had several sub-functions.

Carlile (2002, p. 442) says the structuring of organizations into functional groups are: "a perpetual necessity because much of what organizations produce has a foundation in the specialization of different kinds of knowledge." As people specialise in particular domains of knowledge with the associated investment of time and energy, it increasingly becomes a core part of their identity.

So identity seems to be "fragmented" into several different parts. It's also important to note that there are different levels to identity. For example, the overall function of HQLTDG is the "manage the training system" and so every sub-unit would share this identity to some degree and their sub-units would again inherit it. So we can see the same aspects of identity at multiple levels of analysis. This is an analogy of the concept of fractals, which is a mathematical term relating to "a geometrical structure having an irregular or fragmented appearance which is of similar character at all magnifications" (*The Macquarie Dictionary*, 1991).

Summary: In this section we have seen how identity may be fragmented and that this arises from the multiple categories (or *objects*) that people identify with. This fragmentation arises at all levels of analysis including the individual, group and organization.

3.2.4.4.   Connection

As will be argued in chapter 4, *identity* has a powerful role in the way it influences *interaction*. It is suggested that actions may be purposeful and that the way people *objectify* the world is guided by the *cognitive and affective influence* of *identity*. It is also argued that identity itself arises directly from the process of *identification* and indirectly as a result of *emergence* in the same way *properties* do. So section 3.3 now examines the social process of *objectification, identification, interaction* and *emergence*.

3.3. Social Process Findings

Section 3.2 detailed the findings relating to elements of social structure – the categories corresponding to the inside four quadrants of the theoretical matrix, but not including the core category depicted in the centre of the diagram. This section details the findings relating to elements of social process, found on the outside of the matrix. The first of these social processes to be discussed is *objectification*.

3.3.1. Objectification

3.3.1.1. Introduction

The researcher initially began with the idea that boundary *objects* were largely real and concrete things. This was driven largely by the examples given in the pioneering literature on the subject. However a key insight was identified that drove the theoretical sampling in a different direction from the conventional view of boundary *objects*.

The insight relates to the realisation that boundary *objects* are essentially constructs of the human imagination. Consider the following memo the researcher wrote while documenting this insight:

> *Memo: If a person decides that a particular rock on top of a mountain of similar rocks is in fact a sacred rock, then it becomes a boundary object in the interaction between worshipers of the rock and also with various other people who have an interest in the mountain.*

This view is supported by Diamond et al (2004) who argue that organizational boundaries result from the dynamics of changing psychological projections that are rooted in "unconscious fantasies and emotions" (p. 32). They said:

> *Organizational boundaries may ... exist in the mind in a manner that is created and shared by others. Shared psychic artifacts and taboos can create just as clear and inviolate boundaries as might an electrified fence topped with razor wire. One simply may not go there (p. 37).*

Thus, this section is concerned with understanding the psychological processes by which individual/groups mentally create boundaries and, in particular, the objects described in section 3.2.1. The term *objectification* was adopted, during theoretical coding, to describe this process.
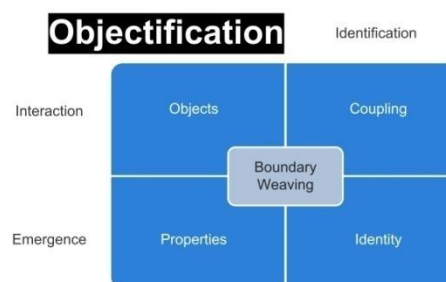
In a subsequent literature search, it was found that the term "objectification" is not exclusive to boundary related theory. It is also used in practice theory or "relational thinking" (Bourdieu, 1977, cited in Osterlund & Carlile, 2005), which develops an understanding of social dynamics from the relationships between agents and social groups rather than from their individual properties.

According to Levina and Vaast (2005, p. 93), "objectification involves naming (symbolically representing) specific relations among agents so that these relations can be reproduced beyond a given interaction. The production of relations, therefore, no longer relies on direct interpersonal connections and embodied memories."

The term is also used in practice theory to describe the "degree of objectification". To avoid confusion between the process of objectification and the end result, an alternative term (that of *embodiment*) is used to describe the degree of objectification in a boundary and this is discussed in section 3.4.2.3.

Having established that objectification may be a key element of organizational boundary theory, the researcher returned to the data to determine if the evidence supported such a notion. As we will find below, objectification is a subtle phenomenon that does not lend itself to easy discovery. Therefore, evidence is garnered from both the literature and interview data and this is interwoven in the following discussion of possible attributes of objectification. Two such attributes were noted, being *reification* and *abstraction*, and these are discussed in the next sections.

3.3.1.2. Attributes

Prior to the commencement of the research, the researcher was aware of Etienne Wenger's (1998) pioneering work in developing the theory of communities of practice. A key concept underpinning this theory is the "duality of participation and reification". Wenger's (1998, p. 62) asserts that reification cannot exist in isolation from the wider process of "participation" or *interaction* as we would call it in the research. According to Wenger, participation and reification form a fundamental duality in the generation of meaning. He argues that boundary *objects* will naturally emerge in every participative engagement, regardless of whether they are created intentionally or not. This is what he means by a duality – one does not exist without the other – participation does not exist without reification.

This led the researcher to initially focus on *reification* as a possible process by which *objects* are created as discussed in the next section.

3.3.1.2.1.   Reification

In this section, findings relating to the following points will be discussed:

Objectification Attributes
Reification
Abstraction

- Definitions of reification;

- Examples of the process of reification;

- The designed versus unconscious nature of reification;

- The reflexivity of reification; and a

- Summary of reification.

Wenger (1998, p. 58) defines reification as "the process of giving form to our experience by producing objects that congeal this experience into 'thingness'. In doing so we create points of focus around which the negotiation of meaning becomes organized".

Wenger provides some examples of reification including "making, designing, representing, naming, encoding, and describing as well as perceiving, interpreting, using, reusing, decoding and recasting" (p. 58) and these illustrate the diversity of activities in which reification occurs.

The process of reification is usually defined as "converting into a concrete thing" (The Macquarie Dictionary, 1991).

The following example clearly illustrates the process of reification, where an abstraction (the idea) is made concrete by writing it down in a diagram/email. The resulting object is then used for communication.

> *"Having isolated pockets of people, you can easily forget them for a time and its harder for me to convey an idea. I have to jump on the phone or send them an email with a picture."*

The ability to articulate your ideas clearly is seen as essential to effective communication, as in the following example:

> *"Your ability to write English is important. This has to do with interpretation of policy – there can be different interpretations of what people are entitled to."*

The next example shows other ways by which phenomena such as "knowledge" is reified e.g. into "doctrine" and in "training".

> *"Knowledge is perishable, as people leave, we have to relearn lessons. We try to embed it in doctrine and training as a way of capturing and avoiding knowledge fade over time."*

One observation that arose is that reification can be somewhat designed. In the following example we can see that the "process" is an object that has been consciously created to meet a need.

> *"If a piece of equipment is missing then we have a process set out in the DFOs for dealing with this."*

In other cases the object created may simply have evolved without any conscious thought.

> *"My complaint is I need another staff officer – a captain who can do the things I can do and share my workload."*

The above example, the object (the complaint) is there before the person has even thought about whether they need a complaint or not. It just arises naturally as the person articulates what they think and feel.

It's also important to note that objectification is a reflexive process. In his discussion of the historical difficulties in sociology of reconciling micro and macro level phenomena, Gilbert (1994, p. 1) said people "do routinely reason about the emergent properties of their own societies".

The notion of reflexivity is a key aspect of Gidden' s (1984) structuration Theory. Note also, the reference to emergent *properties*. The suggestion is that *properties* too can be reified and turned into *objects*.

An example of this reflexive objectification is seen as people classify themselves, as in the following example.

> *"My relationship with him is that I am the implementer of much of what he is recommending."*

Here, the interviewee is objectifying himself as "an implementer" and the other person as a designer.

Summary: In this section we have seen how reification is the process of giving form to abstractions in order to facilitate interactive processes such as communication. Reification may be a conscious, designed activity but may also occur unconsciously or naturally. Reification may be applied reflexively to any observed phenomena, be it an aspect of one's own *identity* or an emergent *property*.

During the course of the research it was realized that objectification related to more than just reification. A closely related, but distinctly different, process of *abstraction* was also occurring at the same time and this is discussed below.

3.3.1.2.2.   Abstraction

In this section findings relating to the following points will be discussed:

Objectification Attributes
Reification
Abstraction

- Definitions of abstraction;

- Examples of abstraction; and a

- Summary of abstraction.

In thinking about objectification as reification, a question naturally arose – "how do people know what to reify?" It was realised that there may be some kind of process occurring prior to or in parallel with reification. A clue arose from the emerging attributes of *objects*, in particular those of *markedness* and *abstractness* (discussed in section 3.2.1.3). The process of *reification* seemed to relate directly to that of *markedness* but where did the attribute of *abstractness* arise from? This line of questioning led to the idea that a process of abstraction may lead to the attribute of *abstractedness*.

The process of abstraction relates to drawing or taking away from something else, particularly as a generality removed from a specific context (*The Macquarie Dictionary*, 1991). Star and Griesemer (1989, p. 404) describe abstraction as the deletion or ignoring of extraneous properties of objects in order to suit the needs of "each participating world".

Consider the example of the lessons process in an Army, whereby:

> *"[We provide] lessons into the individual training cell, the results of our analysis [of the observations] and confirmation that there are things to implement [in training] as lessons learned."*

There is some point in the cognitive process where an idea or view of "what the lesson is" begins to be conceived and is "separated out" from all other possible ideas and the background context.

Similarly:

> *"We will advise them of what we are working on. We are developing how we will divide what they work on and what we work on."*

In this example "what we are working on" is a separation of activities into those that one group thinks the other needs to know – not literally everything they are working on.

This process of separating out appeared in the interview data under a number of codes such as noticing, filtering and focusing. Following are some related examples:

> *"When it came though to us I realized that what the senior people were asking for was incorrect and there had been a miscommunication at their end."*

Here, the person notices something is wrong, thus separating out this object from the background context of the *interaction*.

> *"The main issue is validating that people have read the material – they tend to read selected parts."*

Here, a similar process of filtering is occurring, whereby individuals are essentially creating a custom boundary structure by creating *objects* of items that are of interest.

> *"I have my PSO's give me a briefing every Monday morning covering the next seven days, and for the next month."*

This last example is interesting because the filtering relates not to a concept but to a temporal period, suggesting that abstraction can occur in any dimension.

<u>Summary</u>: In this section we have seen how abstraction is a process of separating *objects* out from their background context and this occurs in a wide variety of activities such as noticing, focusing and filtering. This process of separating out may occur in any dimension, be it physical, temporal, psychological or cultural.

3.3.1.3. Connection

Objectification is a key social process by which *objects* are formed. However, as will be argued in chapter 4, *objectification* is meaningless if people do not also *identify* with *objects*. In fact it is suggested that people cannot help but *identify*, on some level, with the *objects* they create or use. It will be argued that *objectification* and *identification* are in essence a duality, being deeply intertwined – you can't have one without the other. Thus, the next section is devoted to an exploration of the social process of *identification*.

3.3.2.Identification

3.3.2.1.   Introduction

Section 3.2.2 outlined the way in which people are *coupled* to *objects*. A question that arose in the research was "how do these couplings come about?" Similarly, Anderson (1999b) argues that theoretical models need to better explain how couplings come to be "energized" and describe "the continuous injection of energy necessary to sustain a pattern of interactions in a network" (p. 223). He said most simulations "abstract away the problem of how to energize the making, breaking, and maintenance of ties" (p. 223).

In addition, Section 3.2.4 outlined the nature of *identity*, which again begs the question, "how do these different aspects of *identity* come about?"

The term *identification* was adopted during the theoretical conceptualisation of the model as a working category to answer these questions. A search of the literature revealed the term is already in use in identity theory (see section 3.2.4) where the process of identification relates to "the categorization of the self as an occupant of a role and the incorporation into the self, of the meanings and expectations associated with that role and its performance" (Stets & Burke, 2000, p. 225).

Burke (2004, p. 5) argue that identity theory should be thought of as "sociological rather than psychological" because identities are tied to categories that make up social structure. He said these categories "are learned through shared experience, observation, and instruction... from others around us and from the culture in which we are embedded" and that "meanings are very often local... shared only within local settings of the social structure, and allow coordinated interaction, communication, and control of resources with the setting" (2004, p. 7).

According to Burke (2004) there are three types of categories relating to the social, the role and the person. It is argued that the process of *identity* development needs to balance the differing processes related to these identity bases (Stets & Burke, 2000). Categories relating to the person arise through the process of self-categorisation. Stets and Burke (2000, p. 224) explain the process of identification, from an identity theory point of view, as follows:
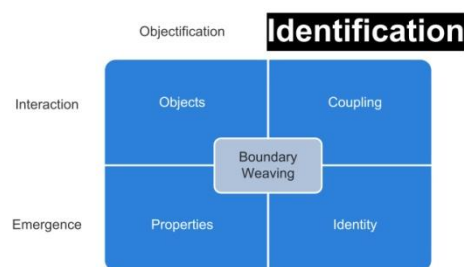
> *"The self is reflexive in that it can take itself as an object and can categorize, classify, or name itself in particular ways in relation to other social categories or classifications… Through the process of self-categorization or identification, an identity is formed."*

Recently, different conceptions of how identity is formed have arisen from developments in knowledge and practice theory, where it is argued that identity reflects knowledge and *emerges* in individuals as a result of the activities they have engaged in. For example, Orlikowski (2002, p. 270) argues that "knowing 'what the organization is' is enacted in practice" and that "we might usefully begin to think about identity as an ongoing accomplishment, enacted and reinforced through situated practices".

Kreiner et al (2006, p. 1332) argue that the identity emerges at the interface of the individual and collective, which "are recursively interrelated" so that 'not only does the organization construct the employee, but the employee constructs the organization' (Gabriel, 1999, cited in Kreiner et al., 2006, p. 1332)."

In the context of this research, social categories, roles and aspects of self may all be considered as *objects*. However, as demonstrated in section 3.2.1, they are not the only kinds of *objects*. In the course of the theoretical coding phase and the conceptualization of the theoretical model, the researcher increasingly developed the view that *identification* was related to the way people identified with any and all *objects* – not just social categories. The interview data contained a large number of examples which illustrate how people couple with *objects* and implicitly identify with them. The following section includes a number of these examples, divided into two key attributes that were identified – that of *committing* and *impression*.

3.3.2.2.   Attributes

3.3.2.2.1.   Committing

In this section findings relating to the following points will be discussed:

Identification Attributes
Committing
Impression

- Examples of committing;
- Investment; and a
- Summary of committing.

During the open coding process a number of codes were identified that relate to how people *commit* to particular *objects*. For example, the code of arguing shows how committing relates to conceptual *objects* such as a particular point of view or idea. For example:

> *"You know how sometimes you type an email and press send and you wish you hadn't done that, well that is one of the big problems we are facing."*

Here we can see how a person is committing themselves to a point of view by sending the email. In this example, the *coupling* may be regretted but the *coupling* exists none the less. Even if the point of view contained in the email is retracted a *coupling* will remain in the memory of the participants – that the person was committed at a certain point of time to that object and they are now forever associated with, or identified with, that particular object.

Another obvious code associated with committing was that of decision making. Here people commit to a particular object as a result of making a decision, e.g. a course of action. For example:

> *"Some people are strong willed and will focus a group of people on a course of action. If they can't get the decision they want they will find other ways to get it, e.g. go to a particular commander's ear or just stall and try to wait out the process."*

We can imagine from this example that when individuals commit to a course of direction it becomes a key part of their identity, even if only for a short time. By contrast, if people are not involved in a decision they may not identify with them or couple with them as much. For example:

> *"Sometimes decisions are made that have an effect on [my] branch but I wasn't consulted or only find out at the last moment... The positions opening up in phase two should be the positions that I want [but they are not]"*

Similarly, the next example shows the impact of not committing to a decision.

> *"I guess the frustrating thing for me is people not being prepared to make decisions that are firm and final. For example, COMD makes a decision, it's over-ridden at a higher level and we go around in circles for a few weeks, then make the same decision but it is three weeks later and everyone has less notice to plan alternative activities [to the course that was cancelled]."*

A related code was that of responsibility.

> *"Some projects are coming to me because they have an implication for planning."*

> *"Our role is to manage the training system."*

> *"As Commander ... he is responsible for driving issues higher up in Army."*

These examples show how the responsibility of role may lead people to commit to various *objects* associated with a particular function.

Another code was that of influencing:

> *"I would like the CA to drive the lessons process."*

Here, the interviewee knows that if CA can be persuaded to lead the lessons process then they will have to commit to it. The idea of commitment being related to influencing tactics was captured by the following memo:

> *Memo: Commitment is inherent in many forms of interaction e.g. by associating yourself publically with an object (e.g. agreeing to talk to someone about an issue) you are committing to it in a kind of way, by acknowledging its existence. This is a classic influencing tactic – getting someone to acknowledge there is an issue, even if they don't agree with your view.*

From the examples above, we can see that as people argue, decide, exercise judgement and take responsibility, people are in essence committing to a particular object

Commitment to *objects* is a key attribute of organizational boundaries according to Carlile (2002), although he uses the term "investment". He said (2002, p. 446):

> *Knowledge is invested in practice—invested in the methods, ways of doing things, and successes that demonstrate the value of the knowledge developed. When knowledge proves successful, individuals are inclined to use that knowledge to solve problems in the future. In this way, individuals are less able and willing to change their knowledge to accommodate the knowledge developed by another group that they are dependent on. Changing their knowledge means an individual will have to face the costs of altering what they do to develop new ways of dealing with the problems they face.*

In the context of this research, "methods" and particular "ways of doing things" are *objects* that people may identify with. Carlile's research highlights the way people "invest" themselves in various *objects*.

Summary: In this section we have seen how people commit to *objects* and this is inherent in a variety of activities such as argue, deciding, influencing and taking responsibility. We saw how the process of committing binds people to an object (i.e. increases the *strength* of the *coupling*) and how, overtime, people become invested in an object. By contrast, people who do not participate in these kinds of activities have low levels of commitment.

Committing is just one attribute of identification. The other attribute, *impression*, is examined in the next section.

3.3.2.2.2.   Impression

In this section findings relating to the following points will be discussed:

Identification Attributes
Committing
Impression

- Examples of how *objects* impress people;

- Factors relating to impression; and a

- Summary of impression.

There were a number of codes in the interview data that illustrate the attribute of *impression* in the process of identification. One such code was that of presentation, where the term impression relates to the conventional use of the term.

> *"I have done presentations of previous experience overseas to two courses."*

In this example, the presentation was by a retired [elite] soldier relating experiences that would have been "impressive" to younger soldiers. Similarly, one interviewee said:

> *"When we are in [dress uniform], people will look at the medals you have. If you have done lots of trips then you are treated differently."*

In both the above examples, people may identify with the *objects* used in the *interaction* more so than normal because of the impression they make. This can translate to influencing the actions that people take. For example:

> *"Others will ask 'who has done that analysis' i.e. they will judge how good that analysis is based on who did it rather than the process that has been followed."*

Similarly,

> *"Most are taking their decision based on the three PowerPoint slides."*

Here, people are making their decisions about courses that are supported by (often large) reports that must be summarised in three slides for the decision makers. The suggestion here is that people may use the Power Point format to "impress" on people the importance of the key points.

Another related code in the data was that of repetition, whereby repeated exposure to a particular object may lead to a deeper impression than that arising from a fleeting exposure. The following memo captures this idea:

> *Memo: Coupling arises from common usage. In the HQ there are a number of key forms and reports (such as a "Data Sheet" outlining the course requirements and a "General Course Report" that was used for course evaluation) that are used by most branches of the HQ. So as these objects become accepted through common usage, coupling strength grows. Similarly as new staff members join, a key induction process is to become familiar with the use of these common boundary objects.*

There were also a number of examples of impression that related to both committing and impression. For example in the code on training:

> *"Army people change so slowly -- most have their 10 or 15 year career. Part of the problem is that we front load them and this initial training carries these through their career -- junior officers have 115 competencies, progressing to 40 for mid-level commanders and about 10 for senior commanders. Those early years tends to be our formative ones and what we learn then carries through our career."*

> *"I look at the civilians differently. I'm not really a civilian because I've done the training. Once a soldier always a soldier."*

In these examples we can see how training in "the formative years" may make a deeper impression on people than later in life and results in a long-term *commitment* to particular ways of doing things.

Similarly the following example illustrates how *objects* can combine the two attributes:

> *"I've been asked if I want to go back into uniform."*

Here, a former soldier now employed as a civilian is being asked to return to the military ranks. A decision to do so would be a particular strong sign of commitment to the organization. By wearing the uniform, which symbolises the commitment, the person would also be making a bigger impression on military colleagues.

A final point to raise is the way impression influences the development of different aspects of *identity*. It has been noted in the literature that identity has multiple aspects and one view, taken up by this research, is that this *fragmentation* may arise from what individual / group members perceive as important or central (Albert & Whetton, 1985, cited in Kreiner et al., 2006).

The literature on identity and social identity theory uses the term "salience" to refer to the way different aspects of identity are activated. Oakes (1987, cited in Stets & Burke, 2000) proposed that salience was tied to "accessibility", the readiness of a

category to be activated in a given person and "fit". Salience is thus tied "to the social requirements of the situation and results from an *interaction* between the individual and the situational characteristics" (p. 230). In other words, if a particular object (such as an emotionally traumatic event or a startling revelation) makes a big impression on someone it may help form a core part, or fragment, of their identity. The notion of *fragmentation* of *identity* was discussed in section 3.2.4.3.2.

Summary: In this section we have seen how people may be impressed by *objects* and factors relating to the process by which this happens such as the way *objects* are presented, who presents the object, the meaning of the object, the level of repetition and the time/context in which the object is noticed. It was also noted that impression may relate to the fragmentation of *identity*.

3.3.2.3. Connection

As will be argued in chapter 4, *identification* primarily occurs in the context of *interaction*. The *impression* that people have of *objects* and the *commitment* that they develop is related to the frequency, duration and proximity of *interaction*. The next section is thus devoted to an exploration of the social process of *interaction*.

3.3.3. Interaction

3.3.3.1. Introduction

Right from the start of the research, the term interaction was a focus for the research because of a basic question that sprang to mind – "how do people interact across organizational boundaries?" Interaction is intuitively central to the role of boundaries in organizations. This was encouraged by a prior knowledge of the boundary spanning literature, which had as its focus, the way in which so-called "boundary spanners" facilitate interaction across boundaries. In addition, Wenger's (1998) seminal communities of practice model had interaction (or participation as he calls it) as a central feature of his theory. Interaction was thus seen early on as a potential core category for the research.

The term "interact" means "to act on each other" (*The Macquarie Dictionary*, 1991). In the context of organizational boundaries the term act would refer to the way
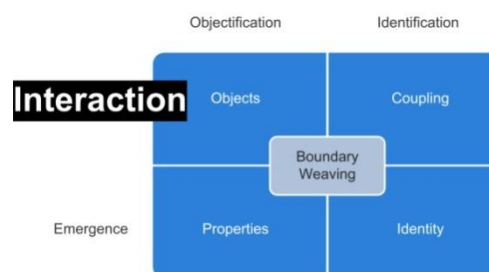
people impact each other in some tangible way. During the open coding a large number of examples of how people "act on each other" were noted as follows.

* Advise
* Analyse
* Approve
* Argue
* Authorise
* Block
* Communicate
* Complain
* Conduct
* Consult
* Dealt with

* Direct
* Dispute
* Distribute
* Enact
* Facilitate
* Filter
* Hand over
* Inform
* Ignore
* Impacts
* Induct

* Manage
* Present
* Participate
* Relate
* Remark
* Respond
* Share
* Talk
* Tasked

An early attempt to categorize these actions was quickly abandoned as it became apparent that almost every verb in a dictionary could be added to this list, making categorisation into any theoretically meaningful typology quite unfeasible.

Therefore interaction fell out of focus as a potential core category and for a while it dropped out of view as other categories were explored. However, as the research moved into selective coding process, the category of *interaction* quickly returned as a key focus. Nearly 50 codes identified during open coding were found to have some sort of relationship to the interaction category.

After identifying interaction as a key category in the emerging theory, the researcher then returned to the data, in particular the academic literature, in order to saturate the interaction category.

The closest theoretical discipline which has interaction as a focus is activity theory (see Blackler, 1995; Engestrom, 1987; Kuutti, 1995). The base idea of activity theory is that as people engage with each other, then tools or instruments (in the broadest sense of the term) naturally emerge to aid further interaction. In activity theory, a differentiation is made between activities and actions, with activities being made up of many actions. A key point is that many actions taken in isolation make little sense, as they do not appear to achieve any particular objective, yet when taken in the

context of the whole activity system (the unit of analysis) then they can be seen as stepping stones to a larger outcome. Communities generally divide its labour among the actions required to undertake activities and achieve these broader ends.

Kuutti (1995, p. 27) said "an activity is a form of doing directed to an object[3] and activities are distinguished from each other according to their objects. Transforming the object into an outcome motivates the existence of an activity."

The relationship between activity theory and the organizational boundary theory developed by this research is discussed more fully in section 5.3.1.

A broader area of academic inquiry relating to interaction is that of communication. Stacey (2001, p. 132) said people interact with each other through "communicative turn-taking sequences". Turn taking is competitive with people making turns through techniques such as asking questions, expressing opinions. This turn-taking, turn-making imparts "structure to that communication by actions of sequencing, segmenting and categorizing."

Note here the emphasis on communication as a core aspect of interaction. In fact, Stacey argues that "human relating **is** (emphasis added) human communicating" through which "humans are able to cooperate in sophisticated ways" (Stacey, 2001, p. 139).

There is a huge amount of literature relating to communication theory (outlined further in section 3.2.3.3.1) and this research cannot pretend to incorporate all of it. It is sufficient to say that a variety of rhetorical and other techniques are available to participants in cross-boundary interaction in organizations.

However, others argue that interaction has more than one dimension and that power relations in particular are just as important (Pfeffer, 1992) and the three key dimensions of Giddens (1984) structuration theory are communication, power and sanction (culture). The researcher thus reviewed the literature for these dimensions in some depth (outlined in more detail in section 3.2.3.3).

A key observation of this review is that there seem to be two major streams in the literature for all of these dimensions of interaction – one relating to social structure and one relating to the actual actions people take. For example, there is a significant

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[3] Note that in activity theory the term "object" is used to describe goals of particular actions and, although there are similarities, should not to be confused with the *objects* category of this research.

body of literature relating to a wide variety of interpersonal influencing tactics (French & Raven, 1959; Kipnis, Schmidt, & Wilkinson, 1980; Raven, 1992; Raven, Schwarzwald, & Koslowsky, 1998; Schriesheim & Hinkin, 1990; Yukl & Falbe, 1990, 1991; Yukl & Tracey, 1992) that does not seem to cross reference at all with the writings of other authors on power (e.g. Luke, Haugaard, Clegg as reviewed by Deetz, 1992) at all and vice versa.

This split in the literature inspired the researcher to think about how these may be integrated via a theory of organizational boundaries. The idea that emerged is that structural elements of communication, power, culture, time and space may be accounted for as enabling and constraining *properties* (outlined in section 3.2.3) and that the "action-related" aspects of these dimensions are better accounted for under the category of interaction.

Furthermore, it is noted that in structuration theory, the acts that constitute interaction will involve communication, power and sanction, simultaneously (Timbrell, Delaney, Chan, Yue, & Gable, 2005). The notion that all these dimensions are present in each and every act of interaction led the researcher to return to the interview data to identify possible attributes of interaction that combined all of these dimensions.

Two key attributes were identified, being *contending* and *intermediation*. These attributes are discussed in the following sections.

3.3.3.2. Attributes

As the researcher began theoretical coding, two seemingly clear attributes of interaction stood out being frequency and duration. Frequency of interaction obviously varies from very frequent to infrequent as the following examples show:

> *"If I'm in an open plan with a whole lot of people I will relate with each individual in a day. E.g. I'm giving them a lot of direct instruction. I'm very aware if I'm at their desk and then follow up few hours later they can get swamped."*

> *"[There are] people I am dealing with on a day to day basis, regularly and for my key activities."*

> *"We don't routinely sit down together. We only sit together during the ... group meetings."*

> *"[Our interaction with government agencies] is more pull not push. Generally, it's us who will say, if we need to know something then we will ask them."*

The duration of interaction can be brief and "sharp" or it may extend over a long period of time, perhaps intermittently, as illustrated by this example of the lessons process:

> *"There are differences in the speed of the loop, from fast to slow. For example, for something like an unauthorized weapons discharge due to faulty handling, we can do a quick capture and analysis , get validation from the SME (subject matter expert) and then change the publication. This could happen in a week. A medium term lesson could be anything from ways they carry out patrols or dealing with IEDs (improvised explosive devices) and this may not happen in time for next deployment. For this kind of lesson we need to have approval from a wide range of stakeholders and the TTPs(Tactics, Techniques and Procedures) have to get changed for PDT (Pre-Deployment Training). Longer time frames might include a change to the organization of light infantry or cavalry and this could take a decade or two.""*

Despite obviously being factors in interaction, the researcher found it difficult to integrate these factors into the overall theory at the level of theoretical categories. Therefore some higher level attributes, *contending* and *intermediation* were conceptualised as outlined in the following section. Frequency and duration were found to play an important role in both of these attributes as discussed and may be considered as common sub-attributes.

3.3.3.2.1. Contending

In this section findings relating to the following points will be discussed:

Interaction Attributes
Contending
Intermediation

- The promotion of *objects*;
- How contention and resistance arises;
- How other actions like reflecting have elements of contending;
- The role of frequency and duration in contending;
- The role of language and knowledge;
- The role of resources;
- How *objects* become the focus of contention;
- The variety of influencing tactics; and a
- Summary of contending.

A key category that emerged during the opening coding process was the promotion of boundary *objects*. For example:

> *"I am doing presentations to camp staff and my first round of presentations in Feb, Jul and Oct are explaining what we are doing and the reason for doing it."*

> *"We do our submissions with our recommendations."*

Here the *objects* being promoted are "reasons" and "recommendations" but could of course be any kind of boundary object such as ideas or practices.

While promotion is a useful concept, it did not capture all the nuances of interaction observed in the data. Another concept that emerged during open coding was that of contention.

> *"In conferences a Major might be running a conference and there will be other Majors there with differing viewpoints."*

> *"[X] often presents things as 'this is the way ahead' but does not do so in consultation. E.g. The positions opening up in phase two should be the positions that I want [but they are not]."*

In these kinds of situations, interpersonal influencing tactics (such as persuasive logic, coalitions or appeals to higher authority) may come to the fore because of the equal ranks of some of the participants. In other situations, people may simply use hard tactics like imposition of authority.

Closely related to contention was the category resistance.

> *"It won't get traction unless it is supported from the top. People will pay lip service to the lessons process unless they are forced. [X] is headed by a colonel and he can ignore things happily if he wants to, resulting in inertia."*

> *"There are a lot of people who just don't engage. Sometimes I think this is because they just don't understand what you do so they don't want to engage. Or it might be that they have the attitude that "nothing bad has happened therefore I don't need to do anything."*

> *"Of the hundreds of courses we have there are only a few that everyone has an opinion on - e.g the JSO (Junior Staff Officer) course. Of the rest only a few or none have any interest. If it's not of great interest then it's a hard process getting them to a meeting, getting face time."*

In these examples it can be seen that the reasons for resistance vary but they all share the same characteristic of refusing to engage cooperatively around the *objects* being promoted.

The researcher began to consider terms that might describe a theoretical category that encompassed these different aspects relating to promotion, contention and resistance. An appropriate term seems to be that of *contending*, a derivative of contention that spans promoting and resistance.

The above notion of contending, with associated promotion and resistance of *objects*, is supported by the literature specifically on boundaries which notes how *objects* are used as a "points of focus for the negotiation of meaning" (Wenger, 1998, p. 58). For example, Bechky (2003, p. 724) said that claims on occupational jurisdiction take place during the creation, interpretation and handoff of organizational artefacts. This is because *objects* are used as a means of "representing and instigating difference and conflict". Social interaction occurs around boundary *objects* as people "cooperate to solve problems, fight to maintain status, and struggle to maintain control of the work process".

As the researcher began to develop the code of contending, it was seen that some of the other codes in the data could partially be subsumed by it. For example, another code was that of reflection, as follows:

> *"If they come to me with a problem I will answer it but they will only get the amount of due diligence that I believe I can afford at the time or should be giving them in the scheme of things."*

Reflection could be seen as an aspect of resistance or support, depending if people decide to reflect a lot or little on what is being contended. For example, if people give little consideration to an object, it could be a form of passive resistance.

Similarly, frequency and duration can be considered as influencing tactics used in contending. If one promotes an object over a long period of time and with high frequency, one may be successful through sheer perseverance.

While the attribute of contending is able to account for many of the key aspects of interaction noted in the interview data, there were some that it did not account for and these are discussed in the next section on *intermediation*.

Before leaving this section it is important to note the findings of a large body of related literature – being that of interpersonal influencing tactics and the exercise of power.

In section 3.2.3.3.2, some key structural concepts of power, such as language, were introduced. However, that introduction glossed over the actions that people take in the exercise of power: Clegg (2005) argues that "discourse is central" and that "power is not a thing but a relation of flows" (p. 300). In this view people are "seeking to enroll, translating, and otherwise socially constructing the people, places, things and situations which matter to us – but they are doing it too" (Clegg, 2005, p.

300). In other words, people are *contending* what is important. In this view "power becomes conceived as a set of techniques disciplining practices, as well as the more or less stable or shifting networks of alliances that such disciplinary practices make possible." (Clegg, 1994, p. 157)

This relational nature of power derives from the notion that it only becomes apparent when it is exercised. Therefore power is not associated with individuals or organization, but arises from the techniques and practices by which it is employed.

According to Haugaard (1997, p. 68), power relations involves struggle that "results in a disqualification of some representations of knowledge as idiocy and a fight for others as 'truth'. When one representation becomes seen as truth a new reality emerges, with associated knowledge.

A key point Foucault makes (1980, p. 52) is that "the exercise of power itself creates and causes to emerge new *objects* of knowledge and accumulates new bodies of information". He goes on to say that the exercise of power inevitably creates knowledge and it is impossible for knowledge not to engender power. The use of the term "*objects*" here is obviously well aligned with the *objects* category of this research introduced in section 3.2.1.

The above discussion of the literature thus suggests that a key aspect of contending is the creation of *objects* that may then be used in the exercise of power. This has a close relationship with the findings of one of the key authors on the practical exercise of power in organizations, Jeffrey Pfeffer. He said (1992, p. 87).:

> *I have come to marvel at the skill of those who can create resources virtually out of thin air. The key to this skill seems to be the ability to recognize the fundamental things that people in a given situation want and need, and then to create a resource that will give one access and control over them... Resources can be almost anything that is perceived as valuable – from building contracts to press exposure to control over systems and analysis.*

This conception of resources as "almost anything" as long as it is "perceived as valuable" is closely aligned with the concept of *objects* developed in section 3.2.1 where *objects* can be almost anything as long as people conceive or use them as *objects*. The *property* of resource availability may also emerge from the process of *contending*. The suggestion is that *objects* may be viewed as resources in the exercise of power.

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Lastly there is a significant body of literature devoted to the nature of interpersonal influencing techniques (French & Raven, 1959; Kipnis et al., 1980; Raven, 1992; Raven et al., 1998; Schriesheim & Hinkin, 1990; Yukl & Falbe, 1990, 1991; Yukl & Tracey, 1992), which is often seen as the practical side of power and thus contending. The list of techniques is long and generally divided into two main categories – hard and soft. Hard influencing generally relate to coercion and reward tactics while soft approaches relate to such tactics as logical persuasion, development of coalitions, inspirational appeals, personal appeals and ingratiation. However the list of techniques seems to be endless and if Pfeffer above is correct in that "almost" anything can be used as a resource in power relations then there would be correspondingly long list of possible tactics. Thus this approach to power is not seen as contributing to the development of an attribute of interaction.

Summary: In this section we have seen how contending can be conceptualised simply as the promotion of *objects* and the subsequent resistance and contention that may arise. Contention is also seen to be inherent in many activities and can arise from a wide variety of factors such as the frequency and duration of interaction. In essence, people are struggling to have their version of the "truth" (i.e. their *objects*) become accepted "knowledge" and these *objects* become valuable resources in the exercise of power. There are a whole range of interpersonal influencing tactics that have been documented but the choice of tactic does not seem to be relevant to this theory of organizational boundaries.

Contending is just one attribute of interaction. The other attribute, intermediation, is examined in the next section.

3.3.3.2.2. Intermediation

In this section, findings relating to the following points will be discussed:

Interaction Attributes
Contending
Intermediation

- The role of "boundary spanners";
- How intermediation can involve blocking as well as facilitation of interaction;
- The collaborative development of *objects*;
- The directness and formality of interaction;
- The role of frequency and duration of interaction;
- The difference between mediation and intermediation; and a

- Summary of intermediation.

Prior to the research, the researcher was already aware of a large body of literature relating to the concept of boundary spanning, also known as knowledge broking (Bartel, 2001; Briggs, Nunamaker Jr, & Sprague Jr, 2006; Brown & Duguid, 1998, 2001; Chai, 2003; Cranefield & Yoong, 2007; Cross, 2004; Currie et al., 2007; Dombrowski et al., 2007; Johnson & Chang, 2000; Levina & Vaast, 2005; Mason, 2003; Mitchell & Nicholas, 2006; Teigland & Wasko, 2003; Tushman, 1977). The emerging category of interaction thus provoked the researcher to investigate its possible relation with boundary spanning.

Leonard (1995, p. 158) highlights the importance of nurturing boundary spanners to increase the ability of an organization to absorb knowledge and thus innovate. Boundary spanners are "people who make communication contacts with external information sources and supply their colleagues with information concerning the outside environment" (Johnson & Chang, 2000, p. 242). Levina and Vaast (2005) point out that the people who emerge as the real drivers of cross-boundary relationships are in roles, often junior, where they go beyond the formal confines of their role to facilitate the relationship. They are able to do this because of their inclination, their peripheral position on the boundary of both groups, their credibility and other personal factors.

At least one person in the study site seemed to fit the classic profile of a boundary spanner outlined above.

> *"I have become the key front person for [the headquarters] to most of the external agencies in the Army. They come to me and from there I either respond or direct them to the right place."*

This individual was a retired elite soldier, inspiring respect and credibility among the people they liaised with and their current civilian status allowed them to mingle freely in multiple groups including among soldiers, officers and civilians. This individual's boundary spanning role was widely recognised by others in the headquarters and was seen to have resulted in a number of benefits for the organization.

With these issues in mind, and in the wider context of general interaction, the researcher took a fresh look at so called boundary spanning in organizations, in line

with the grounded theory methodology and in the broader context of facilitating interaction as shown in this example.

> *"[With] my personal relationships I have been able to facilitate interaction for other PSOs (Principle Staff Officers) with my former unit. i.e. I have gone to bat for someone."*

The constant comparative process quickly yielded a number of key points. For example, in the code on facilitating, it was noted is that people can block interaction as much as they facilitate it.

> *"I will block information sharing if the requestor is being lazy. [For example] we have information sitting in [our intranet] web pages which people should be able to get in and source information without us having to find information for them."*

This point is supported by Tushman (1977, p. 594) who noted that "special boundary roles not only function as links to external sources of information, but that they also buffer the subunit from external uncertainty". In the study site, this buffering behaviour was observed primarily by people who perceived themselves as too busy to provide the relevant information.

> *"There is this 'we are so busy we don't have spare capacity' attitude."*

Buffering was also observed in a formal way in boundaries between unclassified information and associated work and that of higher security classifications. People wanting to have access to higher security information networks have to be security cleared.

Other evidence suggests that boundary spanners need to have a balance of skills in connecting and blocking.

> *"If the wrong person is sitting in a key role it creates problems through the whole system. If a person is not able to articulate himself or build good relationships or is not as social as he could be. There is a credibility issue, that you can trust each other. It's easier to deal with some people than others.*

Another point that came up in the data was that the concept of *contending*, discussed in the previous section, assumes that a boundary object is already formed, ready to be promoted. However, in some interactions this is not necessarily the case. For example:

> *"Mainly the COs are running something past me that is a bit different, i.e. not made clear in the VOLs (manuals of policy and procedure). So it is mainly direction or guidance."*

Here the CO seems to have a fuzzy idea of a potential object e.g. an issue, knowing the issues and circumstances surrounding it, but feels the need for interaction to develop and clarify the fuzzy object into a sharper object, say a decision or course of action. In this case the participants cooperatively develop the object. A number of similar examples were noted in a code that was named seeking.

> *"We are looking at what needs to change."*

> *"This year we talked about [lessons learning] processes to see if there are things we should be sharing and adopting."*

The common aspect of these examples is that the *objects*, e.g. "what needs to change" and "see if there are things", have a distinct fuzziness to them and this is coupled with a seeking style of interaction aimed at resolving this fuzziness.

Another aspect of intermediation is that of directness.

> *"I can't think of anyone who I can't ring up. For example, I have just rung the CO's of both the battalions."*

This comment was from the "star" boundary spanner mentioned earlier and this may be contrasted with another person who said:

> *"They would never consult with me because I am too low."*

It was also noted that interaction can be indirect in the sense that an intermediary person may be used to facilitate interaction, as exemplified in the relationship between the Commander and the Chief of Staff.

> *"I put all my directions through him unless he is away, then I CC him on emails. When COS is here, he is the filter, gatekeeper and controller of tasks."*

Use of intermediaries is commonplace in the military due to the culture of command and control. It is expected that permission should first be obtained for any interaction with people who are not your direct reports – i.e. one should go through their commander.

Where direct interaction is required different techniques are used. For example:

> *"We will use newsletters to inform people of changes."*

> *"I have vision and intent I need to annunciate... I do a 'Commander's Hour' in the hall where I talk directly to everyone and take out several tiers of communication levels."*

Another aspect of intermediation was the formality of interaction, as illustrated by these examples:

"Some lessons will be put to them (SMEs) formally. We will establish working groups and committees."

"They give people 21 days to complain."

"The Army ... Management Board is the last check where someone can object to a recommendation."

This is in contrast to informal channels of interaction as follows:

"There are informal channels of communication. A number of SNCO and WOs have worked for me in the past. They will raise issues with me and I will raise issues directly with them."

"Most of that work is spent discussing issues they don't feel comfortable raising through the direct chain of command. They just want a different spin, opinion or guidance which may or may not be directly related to their current output. Sometimes they just want to bounce an idea off someone. I consider this part of my normal role. I just need to take that time out to work with them, provided it doesn't come into conflict with their direct chain of command, in which case I will point them back in the direction they need to go because obviously I wouldn't want to undermine or compromise that position."

An interesting point is that under certain conditions, formality is imposed for various reasons. For example:

"Part of the reason the severe incidents are raised to HQ level is that with so many different units, you would have different commanders making different agreements and interpretation. To get equity you get them bumped up a level so they come to the same person."

Minor incidents are dealt with informally by the commanders but for severe incidents a more formal process is adopted to ensure consistency.

A key point about formality is that increasing it is to also increase the intermediary aspects of interaction.

As noted at the start of section 3.3.3.2, frequency and duration play a role in intermediation as well as contending, as the following examples show:

"The boundary here is not such an issue as their cells have been going for a while. Once you are known as being in an official lessons role, you are considered part of the network and they are happy to communicate with you."

In this example, becoming "known" may be a function of how frequently people interact and the duration, leading to trust, a key enabler of intermediation. By

contrast, with infrequent and short duration or interaction, the opposite is true. These contrasts are supported by the following example.

> *"I am meant to go through [the land commanding officer] to the other formations but I don't because I know them. If I were new to this I would have to get liaison approval from [the land commanding officer]."*

Keeping in mind that the aim of intermediation can be also be to create barriers, we can see how duration may contribute to this in the following example:

> *"I think there are too many people who have been there too long – it's my perception that there is a different attitude from those who have been there a long time compared to those who have been there a shorter time. Time has dragged on and they haven't met their own deadlines."*

In this example, the target of this criticism is a service group that is acting in a way to isolate itself from interaction in order to protect itself from overload.

These different aspects of *intermediation*, being facilitating, seeking , directness, formality and interaction style, differ from the attribute of *contending* in that they generally have a more positive and cooperative sense to them. Even when buffering occurs, it is often for good reasons. After considering the above observation about the way individuals and groups may "facilitate interaction" it was decided that a better term to use was that of *intermediation*.

Finally, a noted kind of interaction was that of *feedback*. However, this is discussed in the next section in the context of emergence.

Summary: In this section we have seen that intermediation reflects the more cooperative side of interaction as people act purposefully to facilitate interaction and collaboratively develop shared *objects*. While occasionally people may also act to block interaction, this is usually perceived by the blocker as necessary in the overall management of an organizational boundary. This potential for blocking also differentiates intermediation from mediation. Intermediation can involve direct interaction or it may involve a third party acting between the main participants. In some contexts the presence of a third party may help constrain the volatility of the interaction as will an increase in the formality of the interaction. In general, intermediation involves the development of trust and "getting to know" the other participants and this can arise from the frequency and duration of interaction.

3.3.3.3.　　Connection

Interaction is undoubtedly a key social process that, logically speaking, indicates the presence of a boundary but it is not the only process. Interaction is essentially a process that relates to cause and effect – action and reaction. On its own it cannot account for the presence of the range of *properties* discussed earlier in section 3.2.3. So, as will be argued in section 4.3.4, there is another social process at work – that of *emergence*. In the same way that *objectification* and *identification* form a duality, interaction is similarly deeply intertwined with the social process of *emergence*. As will be argued in section 4.3.3.3, *emergence* can only occur because of the presence of *feedback* and *disturbance* arising in *interaction*. The next section is devoted to an exploration of the social process of *emergence*.

3.3.4. Emergence

3.3.4.1.　　Introduction

From the outset of the research it was apparent that boundaries were not static things but were constantly changing. HQ LTDG itself had just undergone a "restructure" of reporting lines and a number of new functions had been assigned to the unit. As a result, a wide range of new relationships were being developed in order to facilitate these functions and hence new organizational boundaries were being created in front of the researcher's eyes. In addition to the major changes to relationships there were many minor changes, such as those relating to rotation of staff or personality clashes.

Initially, the researcher began conceptualising a theoretical category named "dynamics" to account for the above observations but found it difficult to integrate with other categories in the theoretical framework under development. As the category on *properties* was developed it was realised that complexity theory (see section 3.2.3.1) could explain the balance of the dynamics observed in the study site not already accounted for by direct *interaction*. For example, new relationships appearing where none had been present before, seemingly related to small changes in personalities during the rotation of personnel, as the following memo illustrates:
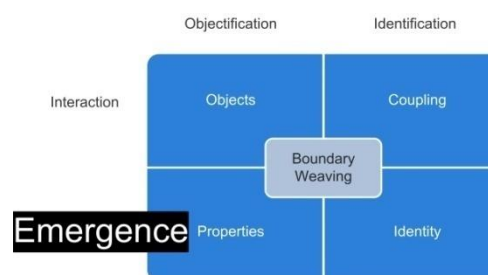
> *Memo: During the fifteen months of observation the person occupying one role changed three times as people were deployed and others shuffled around to fill the gaps. It was remarkable to watch the differences in relationships for that function that resulted from the changes in personality. Some relationships that had been antagonistic became positive, others remained the same and some new relationships formed due to previous connections. In particular, the whole direction and activities of the unit shifted with each new person as they emphasized different aspects of the function, which seemed to relate to personal preferences. One activity and the associated interface with others in the Army (i.e. boundary) which had been deemed critical by one occupant was stopped altogether by the next.*

From the literature complexity (see section 3.2.3.1) we saw that that the process of *emergence* may give rise to the enabling and constraining higher-order *properties* that relates system components in ways that they were not related before (Juarrero, 1999, p. 129). This immediately sparked an idea with the research that emergence may account for much of the dynamics seen in the interview data.

So the researcher considered the possibility of introducing a higher level category of *emergence* into the theoretical framework. Unfortunately, while emergence is well documented in natural systems, just how it occurs in human organizations is less clear.

According to Stacey the actual human action that activates the process of emergence is that of communicative *interaction*. He said (2001, p. 93): "I understand the circular process of gesturing and responding between people who are different to be self-organizing, relating in the medium of symbols with an intrinsic patterning capacity."

In other words, he argues that "coherent patterns of relating", namely themes, emerge from the process of relating itself rather than "rules of any sort" i.e. "human relating is inherently pattern forming". According to Stacey, the observable features of communication that give rise to the pattern forming are "mutual expectations of associative response; turn taking sequences; sequencing, segmenting and categorizing actions; rhetorical devices."

However, not everyone agrees with Stacey's conceptualisation of emergence in organizations, where themes are the agents rather than individuals. Bodhanya (2008) said most researchers generally attribute agency to human individuals. For example, Capra (2002, p. 102) suggests a simpler explanation as follows:

> *In a human organization, the event triggering the process of emergence may be an offhand comment, which may not even seem important to the person who made it but is meaningful to some*

> *people… Because it is meaningful to them, they choose to be disturbed and circulate the*
> *information rapidly through the organization's networks. As it circulates through various feedback*
> *loops, the information may get amplified and expanded, even to such an extent that the*
> *organization can no longer absorb it in its present state. When that happens, a point of instability*
> *has been reached. The system cannot integrate the new information into existing order; it is forced*
> *to abandon some of its structures, behaviors, or beliefs.*

A key point about emergence is that it is not a process involving cause-and-effect mechanisms. Rather it is one of self-causality and this is discussed further in section 3.4.2.2.3.

After establishing that emergence may be a useful concept to explain certain aspects of dynamics in the study site, the researcher returned to the data (both literature and interviews) to determine possible attributes. Two such attributes were noted being disturbance and feedback. The evidence for these attributes is outlined in the following two sections.

3.3.4.2. Attributes

3.3.4.2.1. Disturbance

In this section findings relating to the following points will be discussed:

Emergence Attributes
Disturbance
Feedback

- The role of disturbance in complexity theory;
- The natural versus intentional nature of disturbance;
- Examples of disturbance to technology and capability;
- How disturbance is inherent in different types of *interaction*;
- How disturbance may or may not lead to change in a boundary; and a
- Summary of disturbance.

The idea that *disturbance* might play a role in emergence first arose in reviewing the literature on complexity theory where the non-linear impact of disturbance features strongly. These are the "naturally occurring fluctuations around which a phase change nucleates" mentioned by Juarrero (1999, p. 129) in the introduction above.

The phenomenon of a "phase change", also known as a "bifurcation point", is critical to the emergence of *properties* and nucleates changes around "fluctuations", which we understand (from the outline of complexity theory in section 3.2.3.1) can be very small *disturbances* to which the system can be sensitive.

Juarrero, above, describes disturbances as "naturally occurring", which may well be true in natural systems, but in social systems the role of disturbances is less clear because humans are differentiated from the natural environment by reflexivity and purposeful action. This raises the possibility that disturbance, which is intentional, may well have similar effects as those that are "naturally occurring".

For example, one interviewee said:

> *"There are a number of generic statements made by [higher headquarters] and they come out in the form of Army plans, directives and dispatches. In a lot of those there is not much detail – they are quite conceptual. We have to apply a certain amount of interpretation. I'm concerned with the 3rd and 4th order effects that are not considered. I'm trying to interpret them to ensure CA intent is met while minimizing the 3rd order effects."*

Here, the higher headquarters is clearly intending to disturb the system to effect change and the local commander is aware of the potential for these disturbances to result in the emergence of new "effects", or *properties*, that were not present before.

We can now examine the property examples in section 3.2.3.2 to examine the general role of disturbance in emergence. An archetypal example of disturbance to normal *interaction* is the introduction of a new technology.

> *"Email generates an expectation that people will respond directly."*
>
> *Memo: The expectation of fast response to emails probably emerged from the very early days of the technology when people were excited to use it and responded quickly just because they could. This then became the norm. People respond quickly to email because that is what they always did in the early days.*
>
> *Memo: Staff in the unit all have a love/hate view of email. Most argue that they could not do their job without it but complain about being 'swamped by emails'. In particular, some are concerned that the accepted practice of communicating by email with just about anyone was circumventing the chain of command and bypassing the sanctioned approval processes. Many have actual examples of this happening.*

We can see from these examples that there can be many unintended consequences arising from introduction of new technology, including a range of emergent *properties* such as new norms for communication and approval.

Disturbance doesn't just arise from the introduction of physical artefacts. It may also arise from activities. For example, in the emergence of the *property* of capability in the Army, just as much emphasis is placed on training activities as the equipment used.

"If we are in the streets of dealing with a riot, equipment becomes secondary and the way our soldiers act is paramount."

Memo: The competence or capability of an individual/group, which is similar to subject based authority, isn't just handed to someone on a plate. It emerges over a long period of time and may arise from a wide variety of factors such as training, experience or motivation. Competence is deliberately fostered via the Army's leadership framework and training doctrine.

As soldiers and officers undergo their years of training, they are continually subject to a range of designed disturbances, including "unexpected" complications in exercises and TEWTs (tactical exercises without troops) and placed under extreme physical hardship at times. The unexpected and the extreme are aspects of disturbance.

Similarly, in the case of authority (see table 2 in section 3.2.3.2), we can see that it and also other power-related *properties* may emerge as a result of the associated influencing tactics employed by individuals in the course of *interaction*.

Memo: The authority of command seems to arise from agreements made between others in command, kind of like coalition-based influencing tactics. E.g. A commander can made decisions that are binding for others, but only because all the other commanders at that level and above have agreed that this particular commander has the "authority" to do so.

The key point is that some characteristics of capability, authority and other *properties*, for example leadership skills, cannot be manufactured or downloaded into an individual's brain or a group's dynamics. They emerge from the *interaction* of a variety of lower-order activities and *objects*.

The *property* of awareness (see table 2 section 3.2.3.2) exhibits a slightly different take on disturbance, being more internally focused.

Memo: This phenomena of "awareness" or "knowing a situation" seems to arise over a long period of time. The "old hands" obviously know what is going on around them because they have had time to develop and appreciation of the "big picture" as well as the detail – essentially they are 'connecting the dots'.

Awareness can obviously develop from intentional activities like induction, consulting, analysis and designed disturbances such as scenario planning and creative friction. However, it can also arise simply from people "noticing" things that stand out and "disturb" the observer. This is the basis of sensemaking theory and is discussed further in section 3.4.2.1.1.

As we examined all of the examples of emergent *properties* listed in section 3.2.3.2, it was possible to identify some factors relating to disturbance, and certainly enough to suggest it is a common attribute in the process of emergence.

A final point that needs to be made is that not all disturbances lead to change and the emergence of new *properties*. Capra (2002, p. 31) said that living (structurally coupled) systems respond "to disturbances from the environmental with structural changes" but also maintain "the freedom to decide what to notice and what will disturb it" (p. 32).

The implication here is that complex systems are quite robust and do not necessarily undergo catastrophic phase changes in response to every disturbance.

Stacey (2001, p. 142) said "stability is preserved by the properties of redundancy, loose coupling and the power law". Here redundancy imparts stability because "more than one kind of interaction can produce the same result" (p. 142) while loose coupling means that "one interaction does not depend in a very exact way on the successful completion of a number of other interactions" (p. 142). Similarly with power laws, "there are many small misunderstandings and few large ones" (p. 142). Stacey's (2001) view is summarised as follows:

> *People never fully understand each other and no one knows what has been well understood and what has been misunderstood. For this reason, conversational themes trigger along unexpected and unpredictable routes. Small misunderstandings may escalate and major ones suddenly occur with important consequences for joint action. (p. 142)*

Summary: We have seen in this section that disturbance to organizational boundaries may arise naturally in the course of *interaction* or may result from intentional actions by people aiming to initiate change. Disturbance may arise from a wide variety of factors such as the promotion of a new policy, introduction of new technology, extreme experiences in training, coalitions formed in the exercise of power or the noticing of something odd. We saw how these disturbances may lead to the emergence of enabling and constraining higher order *properties*. The key point is that any such disturbance may form a nucleus around which change amplifies due to the *feedback* processes discussed in the next section. It should be noted however that not all disturbance leads to change. Change in organizational boundaries only occurs if people choose to notice the disturbance and react to it in some way. Even, then the change that occurs is unpredictable in its consequences and scale.

Disturbance is just one attribute of emergence. The other attribute, *feedback*, is examined in the next section.

3.3.4.2.2.   Feedback

In this section, findings relating to the following points will be discussed:

Emergence Attributes
Disturbance
Feedback

- Examples of feedback processes;
- How feedback can involve multiple participants and pathways; and a
- Summary of feedback.

In reviewing the property examples in section 3.2.3.2, one possible common factor was that of *feedback*, which itself has a number of aspects as follows. The most obvious aspect is where information is fed back to requesters. A good example of this can be found in decision making.

> *"We will present our recommendations to the SME and get feedback. Then the recommendations will be put in front of a board and then someone will be tasked to enact it."*

In this example, by choosing from a number of recommendations, the board is not only making a decision, it is also providing feedback to the people participating in the *interaction*.

Another aspect of feedback is where people "get to know each other" which is often found in the process of building a relationship.

> *"If you don't know someone, you have to almost establish the parameters of the conversation first to find out what the underlying current of the request is."*

> *Memo: The emergence of relationship related properties seem to come from arise from observing how others interact over a long period of time. People can reach a point where they are confident about how others will act in certain situations – i.e. they become predictable. This allows others to leverage the relationship e.g. They can act knowing the other will give their support (or that they will contend).*

In the process of "getting to know each other" people may probe each other and gauge the responses (feedback) as part of establishing a cognitive model in their mind of the other person. Of course this breaks down if there is no feedback:

> *"What I don't like is when there is no response."*

In the previous section we discussed how new cultural norms may emerge from disturbances like the introduction of new technology such as email. A key component

of this emergence may be feedback, where the expectation of fast responses may have arisen because of feedback in the early days of email when this was an exciting new thing and people did respond quickly because they were excited to use it. A different example, also relating to norms, is as follows:

> *Memo: The emergence of norms seems to be based on expectation of interactions that may occur if the norms are or are not followed. For example, the interviewee said officers do not drink with soldiers because of the potential for difficult disciplinary interactions later on. Presumably this has happened in the past and it is feedback from these prior events that has led to the cultural norm."*

Another important aspect relates to the multiple *feedback* interactions between multiple individuals as in the emergence of the property of reputation:

> *Memo: Clearly, reputation or credibility arises from the actions and behaviors of individuals/groups. However, reputation and credibility is also something that must be conferred by others, it is not an inherent attribute of an individual. Moreover, it is only a reputation if a number of people think the same thing. So reputation and credibility may arise as people develop views about the action/behavior of others, shares this with third parties and gains feedback as to their agreement, or otherwise, with this view.*

Yet another aspect of feedback is that it does not necessarily have to be communicative. For example, the emergence of technology related *properties* is related to the use of artefacts. In the Army, new technologies are periodically introduced to help develop a capability yet only go into service if people find them useful and practical in field trials. In general, technologies only become widespread if people adopt them. This idea of adoption could also apply to the emergence of other phenomena, such as practice.

Summary: In this section we have noted that feedback can arise from a variety of actions, such as decision making and "getting to know each other". This can result in the development of *properties* such as norms and the adoption of new technologies and practices. Of course the same actions can also provide no feedback, which indicates there may be varying levels of feedback. We also noted that some *properties*, such as reputation, results from multiple *interaction*s between multiple individuals.

3.3.4.3.　　Connection

Section 3.2 outlined four structural elements of organizational boundaries – *objects, coupling, properties* and *identity*. All of these relate directly to the central concern of

the research, namely, what is the nature of organizational boundaries? However, none of them on their own could adequately explain the phenomena commonly associated with boundaries.

Similarly, section 3.3 examined four social processes relating to the creation and development of boundary structure. Again, none of these processes on their own adequately describe the basic social process associated with the creation and development of organizational boundaries. A question remains about how people engage, in a more general way, with the elements of boundary structure identified in section 3.2.

Therefore the researcher began considering what the "core category" of the research might be, as required by the grounded theory methodology. As noted in section 2.4.3, the core category can also be a "basic social process", so with that in mind section 3.4 explores how we might conceptualise the way in which the elements presented so far might be integrated.

3.4. The core category – Boundary Weaving

3.4.1. Introduction

The idea of a possible basic social process first emerged in an observation captured by the following memo:

> *Memo: In promoting an object, one first has to create it. What is being promoted is actually the **weaving** together of many objects (aspects) of boundary structure to form a "unique" object at that point in time. It's not like people actually take some ready-made object off the shelf and use it. Any particular context will always give rise to unique requirements for an object / structure.*
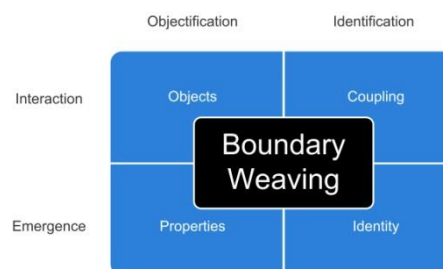
This observation relates to the findings throughout sections 3.2 and 3.3, that the aspects of structure involved in any particular boundary involve multiple *objects*, *couplings* and an array of emergent *properties* that are *objectified*. These interconnections do not come about on their own. As noted in section 3.3.2 on *identification*, it is only through human agency that *objects* have any apparent relationship to each other. The researcher thus began to consider overarching terms that might describe the basic social process by which people create and change boundary structure.

The term *weaving* as used in the memo above became a candidate term for the basic social process. Bowker and Star (1999, p. 314) use a related term – "filiation" – to describe the way boundary infrastructure is created. This term derives from the Latin "filum" meaning "thread" and they talk about the threads that join categories to a person. Cole (1996, p135 cited in Bowker & Star, 1999, p. 314) said: "The frequency with which metaphors of weaving, threads, ropes and the like appear in conjunction with contextual approaches to human thinking is quite striking."

So "weaving" would seem to be an appropriate metaphor to use. However it was realised that this focuses mainly on processes associated with boundaries, as outlined in section 3.3. We need to also pay attention to the thing that is actually woven – the boundary itself. As a result, an extended metaphor was chosen to reflect this – that of *boundary weaving*.

Weaving is a metaphor with at least two basic meanings (*The Macquarie Dictionary*, 1991). The first meaning relates to the actions taken in moving "from side to side" through obstacles or to following a winding course, as in "weaving through traffic". This meaning is a good analogy for the way people *navigate* their way through boundary structures as they go about their day-to-day activities. The second meaning relates to the "interlacing of threads" in the *creation* of a fabric.

By coincidence, Orlikowski (2002) says that people deal with boundaries through knowing how to navigate (articulate, attend to, engage with) and negotiate (redefine, reconstruct) them. So *navigation* and *creation* were identified early on as possible attributes of the basic social process. However, as the researcher returned to the data, it was found these attributes on their own did not adequately explain the relationship with the eight theoretical categories already identified in sections 3.2 and 3.3 above. Through a process of critical reflection another four attributes were identified that help integrate all of the theoretical categories – being *embodiment, multiplicity, domain/clustering* and *attraction*. All of these attributes are discussed in the following section.

3.4.2. Attributes

3.4.2.1.   Navigation

In this section, findings relating to the following points will be discussed:

- How people make sense of the world;
- How people develop a "hermeneutic knowledgeability";
- How people deal with the effects of history;
- How organizational boundaries are fundamentally recursive;

3.4.2.1.1.   Sensemaking

In this section, findings relating to how people make sense of the world are discussed, including how:

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- People choose what to notice and how to react; and
- What is noticed reflects people's identity.
- Identity may be altered to accommodate the world and the actions of others;
- People act equivocally to cope with ambiguity; and
- People cope with equivocation by acting with equifinality.

The idea of boundary *navigation* implies some kind of cognitive processes are at play as people attempt to make sense of the boundary structure and there were a number of related codes in the interview data, as follows. The first of these is noticing, as the following example illustrates:

"Sometimes when [communications] come through [they] have been misinterpreted... This was the case with one signal that came through to us. I just happened to have sat down and discussed it with a person who was involved because I had some free time in Wellington. When it came though to us I realized that what the senior people were asking for was incorrect and there had been a miscommunication at their end."

A similar code is that of filtering whereby people choose to notice some things and not others. For example:

> *"The main issue is validating that people have read the material – they tend to read selected parts of the material ie what affects me and focus on those areas."*

> *"[Unit X] is headed by a Col and he can ignore things happily if he wants to."*

These examples are reminiscent of an aspect of complex adaptive systems as explained by Capra (2002, p. 31). He said "structurally coupled systems" respond to environmental influences by "rearranging their pattern of connectivity" and they "also specify which disturbances from the environment trigger them. In other words, a living system maintains the freedom to decide what to notice and what will disturb it."

Once something has been noticed, how much it affects the social system depends on how much consideration it is given and how much effort is made to understand something, both of which were codes in the interview data:

> *"If they come to me with a problem I will answer it but they will only get the amount of due diligence that I believe I can afford at the time or should be giving them in the scheme of things."*

> *"This is coming from people who used to be in those branches and arises from their failure to read the directive and failure to understand its intent."*

> *"The intended role of [our unit] is not clearly understood by [unit X]. [Y] is the key player and because he does not understand our role, it is a big part of the problem."*

The ability to understand a situation is directly related to a well established academic discipline known as sensemaking. For the purposes of this research we examine the findings of a lead theorist in the field, being Karl Weick (1995a).

In sensemaking, there is a focus on extracted cues in the environment that generates surprises, discrepancies and problems requiring resolving. This is similar to the noticing and filtering codes identified above. "Extracted cues are simple, familiar structures that are seeds from which people develop a larger sense of what may be occurring" (Weick, 1995a, p. 50). What gets noticed and becomes a cue depends on the context and the individuals – what is noteworthy for one may not be for others.

Weick says sensemaking is grounded in *identity* construction – a key category identified by this research. The idea here is that the sense people make of the world around them "tends to be the one that reflects favourably on the organization and one

that also promotes self-enhancement, efficacy, and consistency. If negative images threaten any of these three representations of self, then people may alter the sense they make of those images, even if this means redefining the organizational *identity*" (1995a, p. 21). See section 3.4.2.2.4 below on *identity* conflict for further information on this process.

This process of *identity* construction is reminiscent of complexity theory in which agents co-evolve with one another and reach equilibrium at the "edge of chaos". A key concept is that of a fitness function whereby "each agent adapts to its environment by striving to increase a payoff or fitness function over time" (Anderson, 1999b, p. 220). Anderson (1999b, p. 220) said: "Because each individual's payoff function depends on choices that other agents make, so each agent's adaptive landscape (mapping its behavior to its realized outcomes) is constantly shifting."

Another key code noted in the interview data is that of equivocation. Equivocation is the misleading use of a term with more than one meaning or sense by glossing over which meaning is intended at a particular time. This was apparent in everyday interactions of the study site as the following example illustrates.

> *"I'm after someone who will call a spade a spade and not be intimidated by my rank. Many officers are mindful of my rank and their responses may be modified."*

This is related to the *ambiguity* attribute of *objects* identified in section 3.2.1.3.3. Equivocation and ambiguity means that people "never fully understand each other" (Stacey, 2001, p. 143) and this can have an impact on the ability of people to make sense of situations.

However, as Donellon et al (1986) points out, communication does not necessarily need to generate full semantic understanding to enable coordination. They said (p. 43):

> *In the absence of shared meaning, organized action is made possible by the shared repertoire of communication behaviors group members use while in the process of developing equifinal meanings for their joint experience. That is, organized action does not require that the meanings held individually by organization members be coincident; equifinal meanings are sufficient.*

Donellon et al (1986) define equifinal meanings as interpretations that are dissimilar but have similar behavioral implications.

Similarly, Kellogg et al (2006, p. 39) said:

Enacting a trading zone does not require equivalence of similarity of interpretations of interest, nor does it assume stability or permanence of relations. Instead, members of different communities coordinate their actions temporarily and locally, navigating their differences in norms, meanings, and interests only as needed. Engaging in a trading zone suggests that diverse groups can interact across boundaries by agreeing on general procedures of exchange even while they may have different local interpretations of the objects being exchanged, and may even disagree on the intent and meaning of the exchange itself.

The above views of Donellon et al (1986) and Kellogg et al (2006) both lend support to the notion that people may navigate boundaries by acting equivocally and equifinality.

3.4.2.1.2.   Hermeneutic Knowledgeability

In this section, findings relating to how people develop a hermeneutic knowledgeability are discussed, including how:

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Navigation
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- It is a basic awareness of organizational boundaries and how to navigate them;
- It arises through iterative revisiting of elements of boundary structure;
- It is a deeply tacit and pragmatic know-how (as per Heidegger); and
- It allows people to deal with complexity.

Sensemaking is a key part of explaining how people "go on" in the world as Giddens (1984, p. 23) puts it. People seem to develop an intuitive awareness of all the nuances of organizational boundaries and this is supported by Giddens' concept of "knowledgeability". He said (1984, pp. 22, 26):

All human beings are highly 'learned' in respect of knowledge which they possess, and apply, in the production and reproduction of day-to-day social encounters; the vast bulk of such knowledge is practical rather than theoretical in character... The knowledge of social conventions, of oneself and of other human beings, presumed in being able to 'go on' in the diversity of context of social life is detailed and dazzling. All competent members of society are vastly skilled in the practical accomplishments of social activities.

Examples of such knowledgeability can be seen in the interview data as noted by a code called awareness which was outlined earlier in section 3.2.3.2.

How people attain such knowledgeability is a key question and one of the codes in the interview data, iteration, sheds some light on this. It was noticed that a key characteristic of cross-boundary *interaction*s was the constant revisiting of particular boundary *objects*. For example:

> *"If the decision cycle is too long we have to go back to the education phase again, over and over. For example, if we are redesigning a course then people need to be briefed again on the reasons and background."*

Similarly, as people develop an object they may keep revising it until they are satisfied that it will "work" in the context for which it is intended.

> *"They should be able to work through it and I will correct the product they produce if I'm not comfortable with it."*

A different aspect of iteration in the study site is how knowledge of a particular topic (i.e. object) is built up over time and captured in doctrine and training methodology and support materials.

> *"We are building our knowledge as we go, capturing knowledge over time."*

Similarly, in the context of decision making or project management, knowledge may be formally built up in an iterative process the stakeholders feel they have enough knowledge to make a decision and can be assured that activities are being conducted in "the right way".

> *"We would then introduce it to the [board] agenda. We would then actually run a number of workshops which become working groups. They would embark on a reporting regime to the [board]."*

An iterative process may also be used in the promotion of *objects* until the promoter feels the other people understand what is being promoted.

> *"[For requests] I will tend to use email initially. If it's a no I will get on the phone. 3rd option is a staff paper that outlines the full case."*

This idea of constantly returning to an object to gain a better understanding is strongly reminiscent of the field of "hermeneutics" in sociology. Originally, hermeneutics was synonymous with the use of the "hermeneutic circle" for understanding texts and history, in which "our understanding of the parts hinges on

our understanding of a larger whole, which, again, can only be understood on the basis of the parts" (Ramberg & Gjesdal, 2009). Understanding, then, comes from moving back and forth between the whole and the parts.

However, according to Ramberg and Gjesdal (2009), the work of Martin Heidegger in 1927 completely transformed the discipline of hermeneutics. Ramberg and Gjesdal (2009) said:

> *In Heidegger's view, hermeneutics is not a matter of understanding linguistic communication ... nor the outcome of a willed and carefully conducted procedure of critical reflection. [Rather] hermeneutics is ontology; it is about the most fundamental conditions of man's being in the world ... It is not something we consciously do or fail to do, but something we are... Understanding is a mode of being, and as such it is characteristic of human being, of [existence]... Our understanding of the world presupposes a kind of pragmatic know-how that is revealed through the way in which we, without theoretical considerations, orient ourselves in the world. We open the door without objectifying or conceptually determining the nature of the door-handle or the doorframe. The world is familiar to us in a basic, intuitive way... We do not understand the world by gathering a collection of neutral facts by which we may reach a set of universal propositions, laws, or judgments that, to a greater or lesser extent, corresponds to the world as it is. The world is tacitly intelligible to us.*

Heidegger thus introduces the idea that a kind of "hermeneutic awareness" is a fundamental human characteristic that allows people to navigate the world. This view seems to preclude a conscious awareness of boundaries and would take a perceptual breakdown to bring them to conscious awareness. Heidegger uses the example of hammering as an unconscious process and one only becomes fully aware of the nature of the hammer if it breaks. Ramberg and Gjesdal (2009, p. s4) said:

> *The fundamental familiarity with the world is brought to reflective consciousness through the work of interpretation. Interpretation, however, does not have to be of a propositional nature. At stake is the explicit foregrounding of a given object [such as the hammer]. Interpretation makes things, objects, the fabric of the world, appear as 'something', as Heidegger puts it.*

In this way, elements of boundary structure, such as *objects*, are created as people *notice* them and interpret their significance in a hermeneutic interplay between "self-understanding and our understanding of the world".

The role of hermeneutics becomes critical in the context of complex adaptive systems. Juarreo (1999, p. 222) said:

> *When non linear interactions result in interlevel relationships …the meaning of individual events can only be fully understood only in context: in terms of the higher-level constraints (the dynamics) that govern them. I propose that explaining complex systems, including human beings and their actions, must therefore proceed hermeneutically, not deductively... The interlevel tacking of the hermeneutic 'circle' reproduces the self-organization of complex dynamical processes. By showing the dynamics of complex adaptive systems, hermeneutical narratives are uniquely suited as the logic of explanation of these strange-loop phenomena.*

3.4.2.1.3.   History and narrative

In this section, findings relating to how people deal with the effects of history are discussed, including how:

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- History influences the way we interact; as
- We intuitively navigate the ongoing storylines of organizational interaction; but
- We never fully understand the context in which information was authored; and
- History is constantly changing as we reinterpret it; and
- Understanding of self (identity) develops as we iterate between the present and the past

Stacey (2001, p. 135) emphasizes the importance of history in the way it patterns human behavior. In particular, current actions cannot be considered in isolation of historical events. He said:

> *Although a beginning and an end might be ascribed to a particular sequence of communicative interactions, that description is purely arbitrary, for even before a particular episode begins, even between total strangers, each has a history of experience. That history has patterned the private role playing of each individual in particular ways that enact, that is selectively enable and constrain, what the individual responds to both privately and publicly. That history establishes what aspects of the gesturing of the other will be striking, will call forth, or evoke, a response and what kind of response it will evoke.*

As people take their turns they engage in rhetoric, making assertive statements that drive the conversation forward by impacting others and motivating them to respond (Stacey, 2001, p. 133). The kind of rhetoric that is used depends on the kind of mutual expectations of a response to communicative acts arising from their history of previous *interaction* (Stacey, 2001, p. 131). So knowing the *history* of *interaction* leads to a competence in engaging in communicative action across boundaries in organizations.

According to Stacey a key part of history is an understanding of the narrative-like themes of the organization. He said (2001, p. 140):

> *Human experience is patterned by communication.... These patterns are narrative-like in their*
> *structure ... My proposition is that all human relationships ... are story lines and propositions*
> *created by those relationships at the same time as those story lines and propositions construct the*
> *relationships.*

Stacey's theory casts a new light on the possible role of hermeneutics in the weaving of organizational boundaries because hermeneutics is basically the interpretation of texts and Stacey is saying that human *interaction* consists of story lines.

Heidegger's work seemed to move away from the central focus of texts in the application of the hermeneutic circle. However, according to Ramberg and Gjesdal, the work of Heidegger's most famous student, Gadamer, reintroduced it with his focus on the role of hermeneutics in the interpretation of history. Ramberg and Gjesdal (2009, p. s5) said:

> *Gadamer argues that we never know a historical work as it originally appeared to its*
> *contemporaries. We have no access to its original context of production or to the intentions of its*
> *author... The past is handed over to us through the complex and ever-changing fabric of*
> *interpretations, which gets richer and more complex as decades and centuries pass. History, as*
> *Gadamer puts it, is always effective history.*

In other words, history is always changing as we learn more about the world and ourselves and use this to constantly re-evaluate the structures of the past. The hermeneutic circle, then, also applies to jumping between the present and the past, between an understanding of ourselves and the meaning of historical texts of the past. Ramberg and Gjesdal (2009, p. s5) said:

> *This co-determination of text and reader is Gadamer's version of the hermeneutic circle. As important as the interplay between the parts and the whole of a text, is the way in which our reading contributes to its effective history, adding to the complexity and depth of its meaning.*

The implication in Gadamer's view of hermeneutics is that *identity* itself develops as people reinterpret history. In essence the act of navigating the historical elements of organizational boundaries alters *identity* which may alter the boundary itself – a recursive relationship that is discussed further in the next section.

Sensemaking, hermeneutic knowledgeability and history are deeply interrelated and this summary from Weick (1995a, p. 133) is a good illustration of how they all come together in the way that people navigate organizational boundaries.

> *Sensemaking is about the enlargement of small cues. It is a search for context within which small details fit together and make sense. It is people interacting to flesh out hunches. It is a continuous alternation between particulars and explanations, with each cycle giving added form and substance to the other. It is about building confidence as the particulars begin to cohere and as the explanation allows increasingly accurate deductions. The image here is one of people making do with whatever they have, comparing notes, often imitating one another directly or indirectly , and then operating as if they have some sense of what was up, at least for the time being. They keep checking with one another, if that is possible, knowing that whatever sense they have created is transient and can collapse at any moment.*

3.4.2.1.4.   Recursion

In this section, findings relating to how organizational boundaries are fundamentally recursive are discussed.

Stacey (2001) emphasises the recursive nature of *interaction* (see quote above on narrative themes) – that navigation is not only about hermeneutic awareness of boundary structure and sensemaking but is deeply inter-related with the creation of boundary structure itself.

We can also see this view in Weick's (1995a) comments above on *identity* construction where "as

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people construct their identity, they are also enacting the environment around them" and we can see it in Gadamer's view (Ramberg & Gjesdal, 2009) that history is

always effective – that is, we create and recreate history through the process of interpretation and this becomes part of the structure of the boundaries we navigate.

Recursion is a key principle underpinning structuration theory in which "the structural properties of social systems are both the medium and outcome of practices they recursively organize" (Giddens, 1984, p. 25).

This section on navigation has explored how people deal with boundaries. The next section on *(re)creation* explores how boundaries are actually enacted.

Summary: In this section (3.4.2.1) we have seen that navigation in organizations involves making sense of the world as people notice elements of boundary, interpret it according to their own *identity* and occasionally alter their own *identity* if the elements cannot be accommodated. Alternatively they act equivocally to cope with ambiguity or act with equifinality to avoid unnecessary clashes where people agree on actions even though their reasons may be different. People develop a hermeneutic knowledgeability of organizations, by iterating between different elements, levels of boundary in both the present and the past as they read the storylines of *interaction*. As people navigate boundaries, they are constantly altering their own *identity* and reinterpreting history, recursively changing the landscape they navigate.

3.4.2.2.   (Re) Creation

In this section, findings relating to how boundaries are created and recreated are discussed, particularly those relating to:

- How action and beliefs create boundaries
- How classification underpins the actions that create boundaries
- How people attempt to design organizational boundaries
- How *identity* conflict drives purpose
- How boundaries are sustained and transformed.

3.4.2.2.1. Action and belief

In this section, findings relating to the way action
and beliefs create boundaries are discussed, in
particular how:

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Navigation
(Re) Creation
Action and belief
Classifying the world
Design
Purpose and identity conflict
Continuity and transformation
Embodiment
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- Social structures arise and are reproduced
  through recurrent actions; and
- People may become committed to their
  actions and mobilise beliefs to justify them;
  or
- People may take manipulative actions to
  create an environment that suits them; or
- People may only see what they believe in.

A key concept that recurs through the literature is
that boundaries are created, recreated and destroyed
by the actions of individuals/groups. In Giddens' comment on recursion in the
previous section, the medium of recursion is "practice" and Hernes (2004, p. 11)
quotes Giddens as saying that boundaries "emerge and are reproduced through
interaction".

Abbott (1995, p. 860) explicates this view in arguing that "social entities come into
existence when social actors tie social boundaries together in certain ways.
Boundaries come first, then entities". He quotes an example in the 1870s, when some
wealthy individuals often visited the homes of the poor to help them but institutions
such as charities and professions relating to social work did not exist. However, by
the 1920s, all this had changed and such institutions were common place. It was
through the recurrent action of these early workers that different types of social
welfare tasks developed and these distinctions arose long before anyone was naming
them as such.

In an analysis of Barley's (1986) comparative study of the implementation of
computed tomography (CT) in two hospitals, Black et al (2004, p. 572) developed a
dynamic model that "formalizes the recursive relationship between the activity of CT
scanning and the types and accumulation of knowledge used by doctors and
technologists". They found that implementation of technology disrupts the way

people from different professional and functional groups interact with each other, often delaying the expected benefits of the technology. New patterns of interaction have to be established before the benefits can be gained. In other words, the desired boundary structures do not appear until new patterns of *interaction* are established.

Weick (1995a, p. 156) also emphasises the importance of what he calls "action-driven processes of sensemaking" relating to behavioural commitment and manipulation. Commitment relates to actions that are "explicit (there is clear evidence that the act occurred), public (important people saw the act occur) and irrevocable (the act cannot be undone)". In such circumstances "beliefs are selectively mobilized to justify the act" and people "try hardest to build meaning around those actions to which their commitment is strongest".

By contrast manipulation focuses on "multiple simultaneous actions" that "places a greater emphasis on actual change in the environment". Weick said (1995a, p. 165): "Sensemaking by means of manipulation involves acting in ways that create an environment that people can then comprehend and manage" i.e. one that is "easier to explain" and in some cases "suits the explanation that some would like to give". In other words, the enacted environment (including organizational boundaries) adapts itself to the actions of "bold" individuals.

So action-driven sensemaking may create elements of boundaries as people create the environment around them by taking bold actions and justifying actions to which they have become committed.

Weick also specified a number of belief-driven processes of sensemaking in which people only see what they want to see. As Weick (1995a, p. 133) puts it, "to believe is to notice selectively". To a certain extent, people create a self-fulfilling prophecy. He says people engage in argument "in an effort to reduce the variety in beliefs that are thought to be relevant, variety in what is noticed and variety in what is prophesied." Initial proposals are refined through argument, being elaborated and strengthened until they become a strongly held belief.

In other circumstances, beliefs are held more strongly from the start and here expectation dominates sensemaking. Rather than trying to develop or contradict beliefs, sensemaking as expecting is about confirming beliefs, regardless of the situation – one only notices what one expects to see. This may be common in

fervently held beliefs such as religion. If necessary, action is taken to correct the environment so that it conforms with expectations, so it can be seen that action and belief go hand-in-hand.

So the creation of boundaries may also relate to the way people develop strongly held beliefs and expectations.

We can see hints of the role of action and belief driven sensemaking in the study site:

> *"As I point out to them, today [unit A] is the most important, tomorrow it could be [unit B], next week it could be [unit C], so it depends where the priority of effort needs to be placed and as I point out to them, [our formation] is not always the most important formation so as you cascade down what may be a big issue for [a unit] at the time may be a small concern in how a formation views something."*

In this example, we can see how the power dimensions of boundaries are constantly shifting as various individuals/groups promote what they **believe** are more important issues and take prioritised **actions**.

3.4.2.2.2. Classifying the world

In this section, findings relating to how classification underpins the actions that create boundaries are discussed, in particular how:

Boundary weaving attributes
Navigation
(Re) Creation
Action and belief
Classifying the world
Design
Purpose and identity conflict
Continuity and transformation
Embodiment
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- People select the "things" or objects of a situation.
- Authoritative acts create defining categories; and
- Language embeds the distinctions that make up the structure of boundaries; and
- Classification systems become institutionalised in "boundary infrastructure".

Having established that social structure may recursively create itself in the medium of human action, we need to better understand how this occurs in organizations. An explanation is given by Weick (1995a, p. 30) with his concept of enactment, as follows:

In organizational life, people often produce the environment they face... There are close parallels between what legislators do and what managers do. Both groups construct reality through authoritative acts. When people enact laws, they take undefined space, time and action and draw lines, establish categories and coin labels that create new features of the environment that did not exist before.

The key to enactment, then, may be the establishment of distinctions, categories and labels. A general word for this is classification. Weick (1995a, p. 8) says sensemaking involves the "construction and bracketing of the text-like cues that are interpreted, as well as the revision of those interpretations based on action and its consequences":

When we set a problem, we select what we will treat as the 'things' of a situation, we set the boundaries of our attention to it, and we impose upon it a coherence which allows us to say what is wrong and in what directions the situation needs to be changed.

"Bracketing" and selecting the "things of a situation" are basic processes of classification.

Weick makes a clear connection between sensemaking and the context of this research when he says (1995a, p. 36) that sensemaking is "a process that creates *objects* for sensing or the structures of structuration." People construct an external factual "out there" that "subsequently constrains actions and orientation becoming a feedstock of institutionalisation in society".

We can see from the above discussion on enactment and cognitive complexity that the choices people make in bracketing the narrative flow of organization is related to the exercise of power. This leads us to Foucault's (1980) concept of "power-knowledge" which is the foundation of his concept of disciplinary power discussed in section 3.2.3.3.2.

The power-knowledge concept holds that the two are inseparable and that "power is exercised by virtue of things being known" (Foucault, 1980, p. 154). For something to be rendered amenable to intervention or regulation it must first be conceptualised in particular ways – it requires vocabularies, ways of representing and ordering for the purposes of management, decision making and the exercise of power.

In this conceptual approach to power, language is seen to play a critical role and this is expressed by Flemming and Spicer (2005, p. 101) in their discussion of Clegg (1989):

> *We are told that an analysis of power is 'neither ethical nor micro-political; above all it is textual, semiotic, and inherent in the very possibility of textuality, meaning and signification in the social world' (Clegg, 1994) and that 'there is only representation; there is no fixed, real, hidden or excluded term or dimension. Power is apparent in the order of taken-for-granted categories of existence as they are fixed and represented in the myriad of discursive forms and practices' (Clegg, 1989, p. 183).*

Deetz (1992, p. 28) highlights the role of classification in language as can be seen in the following quotation:

> *As a system, language holds forth the historically developed dimensions of interests – the attributes of concern or the lines along which things of the world will be distinguished. Language holds the possible ways we will engage in the world and produce objects with particular characteristics... Each word can reference only on the basis of its relation and contrasts with other words, a contrast which is reproduced in objects... Because it is a system of distinction (Saussure, 1974), every linguistic system put into place certain kinds of social relations and values – that is, certain things that are worthy of being distinguished from other things – and put into play the attributes that will be utilized to make the distinction.*

For example:

> *The word 'man' or 'woman' does not simply represent something really out there. It puts into play a way of paying attention to the "out there". The employment is not neutral. The distinction performs a production of identity for the subject as a woman or man and for the persons as objects with certain rights and characteristics. As the chain of signifiers fans out the female can be upheld as a mother in a kinship system, a wife in a marital relation, and so forth. In each case, each individual so constituted is both advantaged and disadvantaged in the way that institutional arrangements specify opportunities and constraints (Deetz, 1992, p. 29).*

When taken in the context of Weick's theory of sensemaking and the role of enactment, the implication of Foucault's theory of power-knowledge is that we are all creating and recreating the foundations of boundaries every time we label something, create distinctions and otherwise make use of everyday classifications.

This is certainly the conclusion of Bowker and Star (1999) in their theory of how boundary infrastructure (introduced in section 3.4.1) is developed in society. The infrastructure of boundaries is created through "categorical work" (1999, p. 310), where people exercise judgment in labelling phenomena to meet a variety of purposes. For example a clerk may enter "abortion" into a medical database as a crime to facilitate ethical discussion of the practice. However, it should be noted that this action may render the data invisible to those who think of abortion as a routine

medical matter. Thus categorical infrastructure is built up historically to meet multiple and changing needs.

Where categories become accepted, a process of "convergence" may occur (Bowker & Star, 1999, p. 311), where people behave in ways that help them fit into the accepted categories. Also, as people develop comfort zones they begin to "naturalise" categories – a process of forgetting the essential nature of what was once strange and new, whereby people do not think about the nature of the things they use as such. People often "have so naturalized the structures within which they are operating that they have become invisible

Scaling up, this categorical work goes on at an institutional level. "Bureaucracies are very good at making objects, people and institutions hold together" (Bowker & Star, 1999, p. 312). Large-scale classification systems and standards, such as those characterising international trade and the International Classification of Diseases, are developed over time and made to work with numerous adaptations to local needs. This development is the result of "practical politics" where people "decide and argue over the minutiae of classifying and standardizing... Whose voice will determine the outcome is sometimes an exercise of pure power" (Bowker & Star, 1999, p. 44).

3.4.2.2.3.   Design

In this section, findings relating to how people attempt to design organizational boundaries are discussed, particularly:

Boundary weaving attributes
Navigation
Creation
Action and belief
Classifying the world
Design
Purpose and identity conflict
Continuity and transformation
Embodiment
Multiplicity
Domain
Attraction

- The activation of new or latent boundaries; and
- The embedding of objects into structure.
- Structure may evolve naturally; but
- Purpose arises from identity construction.
- Self-cause may be a viable alternative to cause-and-effect as a method of explaining how some elements of boundary arise.
- Disturbance as an element of design.

Weick's emphasis on action and in particular, that of manipulation, raises the question of how people may purposefully design organizational boundaries. There were a number of examples of this in the study site, as the following examples show:

> *"They want to centralize and allow the civilian organizations to deliver all the routine functions."*

> *"I used to do just formation policy, compliance and governance. Now they want me to deal with current operations as well so I will have half my branch involved in current operations and half in planning."*

Indeed the whole study site, having recently been "restructured" was actively building new connections with other parts of the Army.

> *"We will make contacts and then develop the ones that are useful."*

Another aspect of designing boundaries is the deliberate creation of boundary *objects* with the sole purpose of facilitating *interaction* across boundaries. An example of this during the observation of the study site was the development of a "synchronisation matrix" that allowed the training units to coordinate courses with the operational activities of the Army so that soldiers and officers would be available.

Another code related to the creation of boundaries in the interview data was that of activation. There were a number of actions that seemed to deliberately activate boundaries, such as meetings and the establishment of committees:

"First we would convene a [capability board] for the capability [we are trying to develop]. We would then introduce it to the [Training Board] agenda. We would run a number of workshops inviting [representatives of relevant units] in which we would be looking specifically at the training issues. These working groups would then embark on a reporting regime as they developed proposals to amend the Army Universal Task List, Individual Competency Models, the Individual Training Model and Doctrine etc."

Note in this example that boundary activation is leading to the development of capability, one of the examples of *properties* noted in table 2 of section 3.2.3.2.

It was also noted that so called "boundary spanners" do far more than just pass on information – in many cases they are actually connecting people and essentially creating new boundaries. For example:

"They come to me and from there I either respond or direct them to the right place."

In essence, the boundary spanner is creating a new boundary or at least activating a dormant one.

Other examples involved connections that were activated only after some *disturbance* (see section 3.3.4.2.1) such as the activation of an external connection, with the Police, after some important Army property was stolen. Also, certain events such as disciplinary incidents will often trigger internal processes that activate boundaries with other units in the army.

Yet another related code was that of embedding which relates to the deliberate locking of *objects* into the boundary structure as the following example shows:

"By the end of this year, I will have written down what I can and cannot do and what the Commander has to do. This will be written into the Terms of Reference for the governance boards which will outline my authority level. I'll decide what goes to the board for decision or what goes to him for decision."

So the examples above show how individuals and groups do seem to act in a purposeful manner. However, there are numerous examples of boundaries and aspects of structure that do not appear to be designed.

"There is a lot of what we do that we may not know why we do it that way. For example, if someone was to design a brand new army from scratch, would we still do drill on parade ground? There are lots of good reasons for this, like teaching soldiers to function as a team, to take orders and obey instantly and to break that link to civilian habits but the benefits are not immediately obvious."

In this example, drill is a key part of the boundary between recruits and experienced soldiers yet it is not something that is necessarily a designed part of the contemporary boundary as the quote makes clear, although it may have been in the past.

So the question remains as to whether boundaries are primarily designed, evolved, emergent or have aspects of all of these. How do we account for the *emergence* of enabling and constraining *properties* that do not seem designed?

These questions raise a range of philosophical issues relating to intentional behaviour, explanation, free will and causality. Juarrerro argues (1999, p. 4) that "modern philosophy's understanding of cause and explanation has failed as a general theory", grounded as it is in Newtonian science. She says (1999, p. 3) that modern philosophy "uncritically assumes that intentions, volitions, or agents cause action in the collision-like way that a cue stick cause cue balls to move" and that "nothing moves or changes itself".

Juarrero argues that the theory of complex adaptive systems offers an alternative to cause and effect approaches to philosophy– that of self-causality, which was introduced earlier in section 2.3.2. She said (1999, p. 5):

> *Complex adaptive systems are typically characterised by positive feedback processes in which the product of the process is necessary for the process itself... This circular type of causality is a form of self-cause... When parts interact to produce wholes and the resulting distributed wholes in turn affect the behavior of their parts, interlevel causality is at work.*

Similarly, Stacey (2001) in his discussion of "transformative teleology" said (p. 163):

> *The cause of the movement toward a known-unknown future is the detailed, self-organizing process of bodily communicative interaction as it forms and is formed by itself at the same time. This is circular, reflexive, self-referential causality in which human interaction forms and is formed by interaction... Themes pattern interaction having the characteristics of habit and spontaneity. Interaction itself amplifies small differences in communication into discontinuous, novel change.*

So in Stacey's view, themes may be recreated as "habit" resulting in continuity while change arises from small disturbances in communication and manifests itself as new themes patterning *interaction* which, in the context of this research, would relate to *properties* of the boundary structure.

Stacey's (2001) view and that of complexity theory in general, is that you cannot predict the emergence of particular *properties*. Nonetheless, there is a view among

some complexity practitioners (e.g. Snowden & Boone, 2007) that it may be possible to encourage the emergence of desired system properties through "stimuli and probes", "setting barriers", encouraging "interactive communication" and by managing "starting conditions" (p. 75), even if the outcome is uncertain. It may be that effective leaders unconsciously engage in such activities.

3.4.2.2.4.   Purpose and Identity Conflict

In this section, findings relating to how *identity* conflict drives purpose are discussed, particularly how:

Boundary weaving attributes
Navigation
Creation
Action and belief
Classifying the world
Design
Purpose and identity conflict
Continuity and transformation
Embodiment
Multiplicity
Domain
Attraction

- Motivation underpins identity
- When boundaries are too permeable, one aspect of identity can intrude on another
- When boundaries are too segmented, aspects of identity can be too distant
- People take balancing actions.

As noted earlier, sensemaking is grounded in *identity* construction (Weick, 1995a, p. 21) and the purpose of human action is to express continuity and transformation of individual *identity* (Stacey, 2001, p. 162). Similarly we can see from the social process of *identification*, outlined in section 3.3.2, that boundary creation is also grounded in *identity*.

In social identity theory the motivational underpinning of *identity* may arise from a number of factors including self-esteem, self-efficacy, self-consistency, and self-regulation (Stets & Burke, 2000). When these motivational factors are threatened it may result in tension or conflict.

For example, Carlile (2002, p. 445) notes that organizational boundaries have a "pragmatic" dimension whereby "individuals are committed to and invested in their knowledge as hard-won outcome" and as such is "at stake" in any negotiation across boundaries. In essence, a person's core knowledge is part of their *identity* and they will struggle to defend it.

In a broader sense, people understand that *identity* is the cause of much conflict in organizations as one interviewee in the study site said:

> *"There are about 1000 [people doing courses] here at any one time. When we have so many identities involved one of them will always have an issue."*

Kreiner et al (2006) argue that boundary[4] dynamics results from conflicts between different aspects of individual and organizational *identity*. They said (p. 1326) that boundary dynamics occur "between aspects of individual identity", "between aspects of organizational identity" and "between aspects of the individual and organizational identities". In modelling the interaction between these different aspects of *identity*, Kreiner et al (2006) highlight two major processes being:

- Intrusion – which relates to boundaries that are perceived as being too permeable.
- Distance – which relates to boundaries perceived as too segmented.

Kreiner et al (2006) use the boundary between home life and work life as a simple example. Where boundaries are seen as too permeable, the work life may be seen as intruding on home life or simply occupying too large a percentage of the overall *identity*. Conversely, some people may feel that their work life is not providing enough meaning in the life and seek a stronger connection and that there is too much of a hard segmentation between their work and home life.

The key point in terms of boundary change is that individuals may take balancing actions to achieve a better balance of intrusion and segmentation. Alternatively identity change may occur. Thus, an individual's actions help define and redefine their identity and hence redefine the nature of the boundary (Kreiner et al., 2006).

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[4] Note that Kreiner is referring to boundaries between different aspects of identity, not necessarily organizational boundaries as defined by this research. However, some of the examples they use are relevant, such as that between work and home life. This is because they equate different aspects of identity with different roles.

3.4.2.2.5. Continuity and transformation

In this section, findings relating to how boundaries are sustained and transformed are discussed, in particular how:

Boundary weaving attributes
Navigation
Creation
Action and belief
Classifying the world
Design
Purpose and identity conflict
Continuity and transformation
Embodiment
Multiplicity
Domain
Attraction

- Action can sustain and transform at the same time
- Stability is required for transformation
- Elements of structure can simply fade away

Much of the discussion in this section (3.4.2.2) has been implicitly focused on how boundaries are created. However, it is equally important to understand how boundaries are sustained and also how they change, potentially transforming or ultimately cease to exist. The key is to recognise that actions can have both stabilising effects and transforming effects. Stacey (2001, p. 155) said: "Communicative interaction between human bodies patterns human interaction in two opposing ways: as stability, continuity and identity, on the one hand, and as potential transformation on the other hand."

Likewise, Wenger (1998, p. 104) argues that the processes of participation and reification act both "as sources of social discontinuity and as connections that can create continuities across boundaries". He said: "Participants move on to new positions, change direction, find new opportunities, becoming uninterested, start new lives... Similarly, new artefacts, ideas, terms concepts, images and tools are produced and adopted as old ones are used up, made obsolete or discarded."

Obviously the converse of these examples may also be true. People may remain in positions, maintain an ongoing interest, operate under enduring concepts and good tools may stand the test of time.

Wenger's argument was readily apparent in the study site where the biggest source of disruption to the smooth flow of business, staff rotation, was also seen as a strategically important source of continuity. The Army has a policy of rotating all military staff every two years, on average. The idea is that if any one area of the

organization suddenly loses all its personnel (as can happen in war) then there are other people in the Army who have recently done the job, thus acting as an insurance of continuity. It also helps facilitate *interaction* across organizational boundaries as there will be a greater general understanding of the function of other units in the Army. However, every time someone is rotated out of a role, there is an inevitable disruption to the boundary as new people learn the particulars of a role and potentially transform it as they apply their own views of how things should be run.

It has been noted that discontinuities associated with boundaries are also often associated with continuities that exist or emerge to help bridge the discontinuities (Watson-Manheim, Chudoba, & Crowston, 2002). Watson-Manheim et al argue that stability (as provided by continuities such as motivation, understanding of the task and mutual expectations) are necessary, indeed a prerequisite, for dealing with discontinuities with flexible and adaptive behaviour. `

In the study site, the restructure that was underway inherently meant the change or destruction of old organizational boundaries in favour of the new design. However, in the context of the elements of boundary structure outlined in this thesis, change can simply relate to the way *objects*, *coupling, identity* and *properties* change in a boundary structure. For example:

> *"An observation might relate to something we have seen before with lessons identified and implemented, but obviously it hasn't stuck."*

This shows how particular *objects* may slowly become uncoupled from the wider structure, hence altering the fabric of the structure. For example, it was mentioned by one member of the study site that many lessons of previous wars were never properly captured and hence have been lost. In other words, if *objects* are not used in day-to-day practice they may fade from memory and use.

Summary: In this section (3.4.2.2) we have seen how organizational boundaries are created through actions and beliefs as people classify the world around them, drawing distinctions in the language they use as they exercise power. People attempt to design boundaries by selectively noticing what they want to see, manipulating others, disturbing the organizational environment, all while attempting to balance conflicts of *identity*. The end result is that boundaries are created, sustained and transformed and ultimately fade away.

As noted in the introduction to the core category (3.4.1), navigation and (re)creation are the two key attributes of *boundary weaving*. However, other attributes are required to explain the relationship to the lower level theoretical categories making up this theory. The first of these, embodiment, is discussed in the next section.

3.4.2.3. Embodiment

In this section, findings relating to the following points will be discussed:

Boundary weaving attributes
Navigation
(Re) Creation
Embodiment
Multiplicity
Domain
Attraction

- Community and market like boundary spanning practices;
- The embodied – objectified continuum; and
- A summary of embodiment.

The attribute of *embodiment* is related to the category of *objects*. Awareness of this attribute first arose during the literature search around the nature of boundary spanning. Levina and Vaast (2006) differentiate between two styles of cross-boundary *interaction*, corresponding to either end of an embodied-objectified spectrum in relationships as follows, as follows:

- Community-like (embodied) boundary spanning practice: When spanners "rely primarily on interpersonal relationships and engage in a joint production and negotiation of objects and their meaning" (p. 17).
- Market-like (objectified) boundary spanning practice: When spanning practice involves "an exchange and combination of work outcomes that are, for the most part, produced separately" (p. 18).

Levina and Vaast (2006, p. 18) argue that "any given practice is situated somewhere along the embodied/objectified continuum". Examples of such a spectrum, and how it relates to the notion of boundaries, could easily be seen in the study site. The key example of an "objectified" boundary related directly to the management of courses being run by the training units. This boundary was characterised by a large number of forms, checks and procedures that needed to be completed for each student before, during and after the course was run. There were also numerous processes that lent themselves to the embodied end of the spectrum, such as the ongoing development of doctrine using lessons from the field, where high levels of collaboration with experienced personnel is essential.

The spectrum is also apparent at the micro-level of interpersonal *interaction* as the following example shows:

> *"When you are asking people for something a lot of people will ask to send it (an email) through the network. However, written words can be [mis]interpreted while meetings give you the context. Also they can result in information overload and the more information they get the less time they have for face to face. I think it's better to have a 10 min face to face meeting to get agreement first."*

So in this example, we see some people attempting to objectify a boundary (by asking for the request to be emailed) and others want to create a higher level of embodiment (by calling for a meeting). So in general we can see that a key attribute of *boundary weaving* is the relative levels of embodiment and objectification.

<u>Summary</u>: In this section we have seen how boundaries may lie somewhere on a spectrum between highly embodied and highly objectified. Highly embodied boundaries relate to higher levels of interpersonal *interaction* while highly objectified boundaries rely more on an exchange of *objects*.

Embodiment is just one attribute of *boundary weaving*. Another attribute is *multiplicity* and this is examined in the next section.

3.4.2.4. Multiplicity

In this section, findings relating to the following points will be discussed:

Boundary weaving attributes
Navigation
(Re) Creation
Embodiment
Multiplicity
Domain
Attraction

- Examples of multiplicity in the study site;
- How *objects* connect people;
- How *objects* come to have multiple classifications;
- How multiplicity is an essential element of complex systems; and a
- Summary of multiplicity

An attribute of boundaries that the researcher struggled with early on in the research is the observation that any given organizational group has multiple boundaries. HQ LTDG had a number of relationships with other units in the Army, both large and small, as well as corresponding units in the other services (Navy and Air Force), a

wide range of government departments and non-government agencies external to the Defence Force.

In addition, there are multiple boundaries that are internal to the study site, a point that was noted by Espinosa et al (2003) who said that teams have external boundaries that distinguish them from other teams but they also have internal boundaries (e.g., geography, time zones, functional expertise) that represent edges which team members need to bridge to do their work.

The researcher documented 39 specific groups with which HQ LTDG has formal relationships and for many of these there is more than one relationship, as different cells within the study site conducted business with them for different reasons. For example the head of the 7 cell (training design) has 29 relationships documented by the researcher and the 5 cell (planning) has informal relationships with every almost every unit of the Army as they attempt to synchronise the training schedule with operations and other activities of the Army.

The study site as a whole seems surrounded by a multiplicity of boundaries, which comprised the combination the boundaries of its sub-units and its individual employees. It is clear that there is no single "organizational boundary" as such.

This issue is recognised by other researchers. Hernes (2004) argues that boundaries are "composite" in nature and that organizations "operate within multiple sets of co-existing boundaries". Other researchers use the concept of a "field", originally developed by DiMaggio and Powell (1983, cited in Heugens & Lander, 2009) in organizational theory to denote the recognised area of an organization's institutional life. For example, Levina and Vaast (2005, p. 337) propose that:

> *The emergence of a boundary spanning competence in practice is associated with the emergence*
> *of a new joint field which unites agents in their pursuit of a common organizational interest while,*
> *at the same time, distinguishing them from others who are not engaged in a similar pursuit… At*
> *any given time, agents are engaged in multiple, nested fields.*

Levina and Vaast's concept is readily apparent in the case example. For example,

> *When the need for a [new or changed] course is identified they go to 7 (training) branch. 7 branch*
> *builds it and then it comes to 5 for planning, to work out how and when we are going to run it. This*
> *impacts on 4 (logistics) and 9 (finance). If we get 5 (planning) right then the other jobs are easier*
> *because there is not as much crisis management.*

Here the temporary joint field would be the "similar pursuit" of dealing with the need for a new course and the "common organizational interest" is avoiding crisis management. Of course the need for new or modified courses comes up regularly so this joint field may have some stability about it.

Bowker and Star (1999) elaborate on the concept of "multiplicity" and its flipside of "marginality". By these terms, they mean that "all things inhabit someone's residual category in some category system [resulting in a] myriad of classification and standards that surround and support the modern world (p. 301)". They said (p. 303): "If we think in terms of a complex cluster of multiple trajectories simultaneously of both memberships and naturalizations, it is possible to think of a many-to-many relational mapping."

In other words, all *objects* fit into multiple classification systems, people fit into multiple groups and they are often deeply interconnected into "clusters" that form structure. On the other hand, *objects* may not fit well into any one group and may be quite disconnected, such as mavericks or frame-breaking ideas. These points fit well with the *strength* of a *coupling* which determines if an object is truly integrated or marginalized.

Stacey (2001, p. 142) also implies that multiplicity, as it arises from "loose coupling", is essential to the stability of a complex system. He said (p. 142): "Parts of a process can be damaged or not succeed in producing a repetition of a particular behavior but others will survive and succeed in doing so."

In general, we can see that boundary weaving involves creating a multiplicity of connections.

Summary: In this section we have seen how there is no single boundary in any organization. Rather, there are a multiplicity of boundaries which revolve around the multitude of *objects* that connect people and the way people classify them in multiple ways. This multiplicity of connections may provide a level of redundancy in connections that foster stability in the face of disturbance.

Multiplicity is just one attribute of *boundary weaving*. Another attribute is *domain / clustering* and this is examined in the next section.

3.4.2.5. **Domain**

In this section, findings relating to the following points will be discussed:

Boundary weaving attributes
Navigation
(Re) Creation
Embodiment
Multiplicity
Domain
Attraction

- Definitions of domain;
- Examples of domain in the study site;
- How domains facilitate *interaction*;
- The messiness of domains; and a
- Summary of domain.

People commonly define boundaries in terms of a certain "domain", particularly when it relates to informal boundaries. Domains typically relate to a body of knowledge, practice or other such conceptual area. For example, the domain may be a topic of interest and consist of enthusiasts, such as people who follow a particular sport.

Wenger et al (2002, p. 27) define domain in the context of the communities of practice concept as follows:

> *The domain creates common ground and a sense of common identity. A well defined domain legitimizes the community by affirming its purpose and value to members and other stakeholders. The domain inspires members to contribute and participate, guides their learning, and gives meaning to their actions. Knowing the boundaries and leading edge of the domain enables members to decide exactly what is worth sharing, how to present their ideas, and which activities to pursue.*

Kreiner et al (2006) use the term domain as a defining feature of "identity boundaries". They said (p. 1319):

> *Domains consist of the cognitive space of what is included within the boundary. Boundaries separate domains from one another; both enable and constrain how domains are connected and interrelated; and define aspects within domains. We focus on the domains of individual and organizational identity and the 'mental fences' that individuals build in making sense of who 'I am' and 'we are'... The precise location and nature of the boundaries is contestable as individuals interact and 'shift among definitions of self' (Weick, 1995a).*

Note how both of these definitions of domain arise from *identity*, one of the key categories of this research. Kreiner et al noted research that indicates boundaries arise from the efforts of individuals to maintain their *identity*, which may arise from

external threats to their existence, and also from internal efforts to make sense of the world and to "differentiate internalized *objects* and representations".

From these quotes we can see that the creation of a domain is an active process of *boundary weaving* that fosters the *identity* of a community. In the study site there were a range of formal communities relating to the common domains of practice in the Army such as artillery, combat, signals, intelligence, catering and mechanics. There were also a number of informal communities relating to topics as diverse as the operation of particular kinds of software through to forecasting methodologies for human resources.

A concept related to domain is that of "boundary infrastructure". Bowker and Star (1999, p. 313) said:

> *Boundary infrastructures by and large do the work that is required to keep things moving along. Because they deal in regimes and networks of boundary objects (and not of unitary, well-defined objects), boundary infrastructures have sufficient play to allow for local variation together with sufficient consistent structure to allow for a full array of bureaucratic tools (forms, statistics, and so forth) to be applied. Even the most regimented infrastructure is ineluctably also local: if work-arounds are needed they will be put into place.*

For example, medical information systems and associated classification structures like the International Classification of Diseases mediate between industries and communities as diverse as medical practitioners and researchers, insurance companies and governmental regulators. In this sense, the domain of *objects, properties, couplings* and *identity* is essentially the boundary infrastructure. We can also see that, in terms of this research, keeping "things moving along" is actually the facilitation of *interaction*.

Other examples of boundary infrastructure includes the whole gamut of standards that regulate the technological environment of the world we live in including "the colour of paint on the walls and in the fabric of the furniture, the types of wires strung to appliances, the codes in the building permits allowing the kitchen sink to be properly plumbed and the walls to be adequately fireproofed" (Bowker & Star, 1999, p. 313).

So the concept of *boundary weaving* emerging from the literature is not one of cleverly designed systems of *objects*, neatly aligned between well defined groups of people. Rather the picture is one of a confusing array of different elements of

structure, historically built over time, and loosely woven together with no particular design and thoroughly adapted to meet local needs. So the clustering of *objects* together to create a boundary's *domain* is thus a key attribute of *boundary weaving*.

Summary: In this section we have seen that domains are collections of *objects* that people use to connect to each other at a higher level than afforded by single *objects*. Over time these domains may develop into a boundary infrastructure that facilitates *interaction* across a wide range of people, not just those in a single community of practice. This infrastructure is usually messy, having developed historically and been adapted to meet multiple needs.

Domain is just one attribute of *boundary weaving*. Another attribute is *attraction* and this is examined in the next section.

3.4.2.6. Attraction

In this section, findings relating to the following points will be discussed:

Boundary weaving attributes
Navigation
(Re) Creation
Embodiment
Multiplicity
Domain
Attraction

- The nature of attractors in complexity theory;
- How attractors may operate in human systems;
- Examples of attraction in the study site; and
- A summary of attraction.

This last attribute was conceived through consideration of how the metaphors of complexity theory (introduced in section 3.2.3) apply in organizations. A key concept in complexity theory is that of attractors.

Attractors are abstract mathematical concepts that describe the processes in a system's state space. Processes that initially appear to be random may in fact be chaotic, revolving around identifiable types of attractors in a deterministic way that seldom if ever return to the same state but are contained within a limited area from which the system never departs. (Anderson, 1999b).

Complex adaptive systems operate far from the equilibrium on the edge of chaos. In an ordinary equilibrium state, small changes in the state of a system are self-correcting – i.e. when disturbed, the system normally quickly adjusts settling back

into its attractor state(s). Occasionally, a bifurcation may occur, and the system tips into a new state space with different attractors.

As with most aspects of complexity science, there has been much debate as to whether these abstract mathematical concepts can apply in human social systems. At an individual neurological level, Juarrero (1999) has shown that intentional behaviour and the associated philosophies of explanation can be considered complex. She characterises the brain as a high-dimensional, semantically organized space characterised by a landscape of valley-like attractors that are context dependent. Using language as an example, and artificial neural networks as a metaphor, she said specific words have specific meanings in the context of their use. For example, "the word 'cat' activates such units as 'mammal,' 'has legs,', 'soft,' and 'fierce' (p. 173)" but generally means one of these in any particular context. So meaning is seen "not in terms of symbolic structure (a picture in the head) but as embodied in the topographical configurations of attractors in the brain... The more general and abstract a category or concept, the wider the neural valley it describes" (p. 173).

Juarrero says the major features of the mental landscape are created during childhood and are difficult to change, requiring major earthquake-like changes which follow a power law, becoming increasingly unlikely to happen as the magnitude increases. However, lesser phase changes can occur regularly in response to perceived disturbances in equilibrium, corresponding to a changed "frame of mind". She said that when "settling on a prior intention" a phase change occurs and "a person's existing mental attractor regime embodying meaning, desire and similar mental properties might reorganize and thereby recontour the landscape."

At an organizational level, Goldstein (1994) said the metaphor of attractors can be very useful for describing and understanding why employees behave the way they do. According to Goldstein, organizations are complex and everyone in an organization is always acting according to the attractors present.

Similarly Stacey (2001, p. 142) says that announcements and rumours can become powerful themes patterning conversation in organizations. Stacey warns, however, that the concept of attractor can only be used as an analogy and is not directly comparable. He said (2001, p. 142): "The word in ordinary conversation has the connotation of a force pulling something toward itself. This is not what I mean by

conversational themes that are not being pulled anywhere but are perpetually constructing the future."

The picture that the above researchers paint is important to the research because it implies that *interaction* is enabled and constrained in ways that form "patterns of attraction". These attractors may relate to particular *objects* such as individual words and/or *properties* such as authority (see table 2 in section 3.2.3.2), as the above quotes from Juarrero and Stacey show, but may also relate to a difficult-to-define "regime" of attractors.

There were several examples in the interview data of patterns of *interaction* that may correspond to attractors. For example, a very general attraction of the Army is that of camaraderie:

> *"We have had colleagues leave to go out and work in a civy environment and get very frustrated with lack of direction and then they come back because they like being in the military. They like the camaraderie and also the freedoms we give."*

It would be difficult to put camaraderie down to a single object or property. Rather the attraction forms from a whole range of *objects* and *properties*.

Another common expression used in armies is "Esprit de Corp" which relates to organizational climate and leadership as this example shows.

> *"The culture of a unit can be seen from a distance – one CO has transformed the culture of his unit through sheer force of his personality. You have to be very careful how you allow a personality to develop a culture because it can become a cult-like environment as opposed to culture."*

Here, the personality of an individual does seem to act as a powerful attractor but the background context of this statement reveals a powerful theme patterning the interactions around the unit – one of a need to reform certain cultural behaviours that had developed. This is more in line with Stacey's view above that there is no one thing that *interaction* is pulled towards.

The above examples illustrate what might be seen as patterns of attraction that relate to positive aspects of *interaction*. However, there are just as many examples of attraction toward destructive patterns.

> *"We run crisis management and it was worse before I came. I have just been dealing with a course that is two weeks away and we still don't have the support sorted out yet. Our big issue is that in many courses, where we have identified a due date for decisions, the decisions are not made , they*

> *are floated and they are let go until it becomes crisis management i.e. 5, 10, 15 days out from the start of the course."*

This example further illustrates the abstract nature of the attraction concept – there is no obvious single point of attraction. Rather there is a pattern of *interaction* which the organization seemed to be stuck in, as in the expression "stuck in a rut". Interestingly, the interviewee was making efforts to essentially disrupt this pattern of *interaction* through the creation of boundary *objects* (e.g. a synchronisation matrix) and this relates to the *(re)creation* of boundaries.

Summary: In this section we have seen how the concept of attractors in complexity theory may apply to humans and to organizations. The analogy may apply to patterns of *interaction* that form and persist over long periods of time. These patterns may form as people are attracted to a certain kind of *interaction* and it should be noted that the centre of attraction is not necessarily a particular object. The complex nature of organizational boundaries means it is hard to pin down exactly what is causing the pattern of *interaction* but we can see that people are attracted to it nonetheless.

Summary of the core category: Section 3.4 has set out the findings related to six key attributes of the core category – *navigation, (re)creation, embodiment, multiplicity, domain* and *attraction*. The nature of the core category and how these attributes inter-relate is discussed further in section 4.4.

3.5. Summary

This chapter has presented the findings of this research. It was found that organizational boundaries could be thought of in terms of both structure and social process. A range of examples of all of these elements were given and a number of attributes for each one are also set out. All of these elements are integrated via a proposed basic social process of *boundary weaving*. The structure of chapter 3 corresponds to elements of the theoretical model of organizational boundaries that is now outlined in detail in the next chapter.

4. Theory

4.1. Introduction

4.1.1. Structure of chapter

The previous chapter presented the findings related to organizational boundaries that were identified in the course of the research. This chapter aims to integrate these findings into a substantive theory explaining the nature of organizational boundaries.

The theoretical model is introduced in section 4.1.2. The different categories of social structure are then detailed in section 4.2 and those of social processes in section 4.3. Each theoretical category is set out in its own sub-section. Each sub-section includes an introduction that defines the category and its attributes followed by an explanation of how the category is related to all the other categories in the theoretical framework. Each section is rounded out with a general discussion of the category, including any insights developed during the research. Breakout boxes are employed for interesting asides that relate only indirectly to the explanation of the theory.

It is worth noting a key argument that will be developed throughout this chapter – that organizational boundaries are complex. Many of the discussion sections will make references to the drivers of complexity of organizational boundaries. It will be argued that this complexity arises primarily from the process of *identification* via the medium of constantly changing *couplings* and results in the *emergence* of higher order *properties*. The argument is outlined in more detail in section 5.3.3.

The reader is again reminded that any mention of categories (outside the section in which they are discussed) are italicized including their linguistic derivatives e.g. *identify* and *identification* both refer to the same category. This convention is to assist in developing comprehension of the theoretical model.

The readers should also note a few minor conventions, namely, that the theory developed in this chapter will from now on be labelled as "organizational boundary theory" for ease of referencing later in the thesis. In addition, the term "element" may at times be used interchangeably with that of "category" i.e. an "element of the theory" corresponds to a "theoretical category" in the grounded theory methodology.

4.1.2. A model of organizational boundaries

In this sub-section the core theory of organizational boundaries is summarized as concisely as possible in order to give the reader an immediate "big picture" understanding of the theory. This approach is taken in accordance with the hermeneutic approach to this thesis and is aimed at facilitating better understanding of the parts in this section. This thesis develops a theory of organizational boundaries which is illustrated by the matrix diagram in figure 4 below.
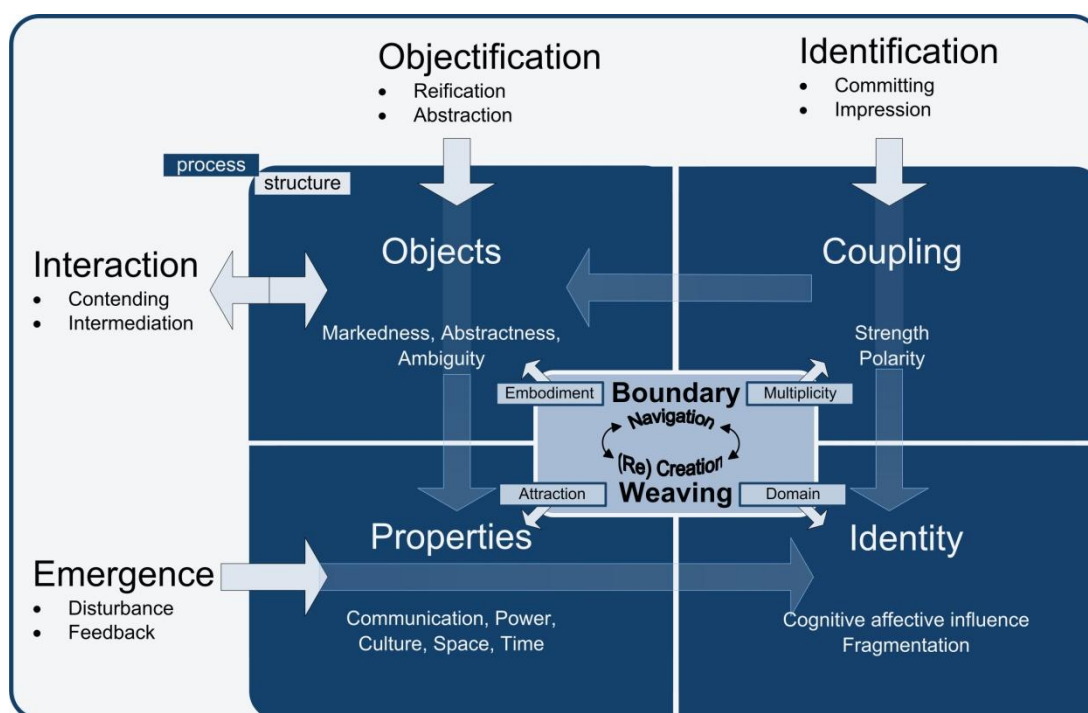
Figure 4: Key relationships between elements of organizational boundary theory

The core category is a basic social process called *boundary weaving,* by which people both *navigate* and *(re)create* organizational boundaries as they go about their day-to-day activities. *Navigation* and *(Re) Creation* are the key attributes of *boundary weaving* and they form a recursive relationship, as indicated by the curved arrows. Four other attributes, embodiment, multiplicity, attraction and domain serve to complete the description of the core category and also connect it to the other eight categories of the theory, primarily via those categories the small arrows are pointing to. This core category thus integrates eight other theoretical categories that explain the main elements (another word for category) of organizational boundaries and these are broadly divided into two groups. The term element will used from now on in preference to category.

Firstly, there are four elements of social **structure**, illustrated within the matrix, being reified and abstracted *objects*, *couplings* between people and *objects*, higher order *properties* of boundaries that enable and constrain *interaction* and the *identity* of individuals /groups. There are also four elements of social **process**, illustrated outside the matrix, being *objectification*, *identification*, *interaction* and *emergence*.

All of these theoretical elements are related to each other, as will be shown throughout this chapter, but there are certainly some main relationships as indicated by the larger arrows in the diagram. In general the process of *objectification* leads to the creation of *objects* and the labelling of higher-order *properties*. *Identification* leads to the creation of *couplings* and is a key part of the creation of *identity*. However, *identity* is also a result of the process of *emergence* along with the creation of higher order *properties*. The process of *interaction* is facilitated and mediated by the use of *objects* (including *properties*) as well as the *couplings* that people have formed with them.

The nature of each category and the relationship between them will be explicated throughout the remainder of this chapter. In each section, a new diagram focusing solely on the related category is employed. The diagrams in these upcoming sections have a few extra (smaller) arrows that help serve to explain the "why" of the theory – as discussed in section 2.5.3, on the nature of good theory. These smaller arrows are often labelled to highlight key explanatory concepts and these labels are **bolded** in the related text to make it easier to find the related discussion. In the next section we examine the first element of social structure – that relating to *objects*.

4.2. Social structure of boundaries

4.2.1. Objects

4.2.1.1.   Introduction

In section 3.2.1 the concept of boundary *objects*, as noted in the literature, was

introduced along with a range of possible attributes. In this section we aim to redefine the nature of these *objects* in the wider context of organizational boundaries and the theoretical model outlined in this chapter.
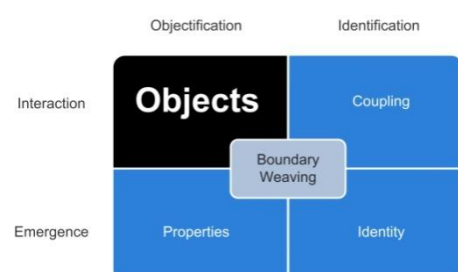
A key point to make is that the possible attributes identified arose from a number of related categories identified during the open coding process. For example, the attribute of *markedness* was developed to reflect a number of related codes in the data including impression, memorable, salient, absorbility and visibility.

This approach of absorbing multiple codes into a single overarching attribute was developed in order to provide some clarity and brevity around the list of possible attributes of *objects*. In the definitions of attributes below, these codes are highlighted by *italicized* text.

It is interesting to note in the related literature outlined in section 3.2.1 that neither Star (1989) nor Wenger (1998) provide a clear definition of boundary *objects*. They talk a lot about the attributes of boundary *objects* but they are defined only in the broadest terms as "artefacts".

Having examined the data we are now in a position to offer a new conceptualization of objects, in the context of organizational boundaries, as follows:

> **An object is any aspect of an organizational context that is recognized by individuals to facilitate interaction between people.**

Note the subtle distinction made here, between a "boundary object" and an object in general. The definition offered here deliberately avoids qualifying the type of object being defined. In the context of this research, all *objects* in organizations may be or become boundary *objects*, so there is no sense in differentiating them. It's also important to understand that by "any aspect" we mean that *objects* may have both physical and abstract dimensions as discussed in section 3.2.1.1.

Some key attributes of boundary *objects* can be defined as follows:

- *Markedness* is the degree to which an object is visible to a range of people in an organization.
- *Abstractness* is the degree to which an object has been removed from the context of its origin.
- *Ambiguity* is the degree to which an object is likely to be interpreted differently by different people.

In the next section, the relationship of this category and its attributes to all other theoretical categories is discussed.

4.2.1.2. Relationship with other theoretical categories

Figure 7 below illustrates the key relationships of the *properties* element with other theoretical categories and their attributes. These relationships are discussed in this and the following section.
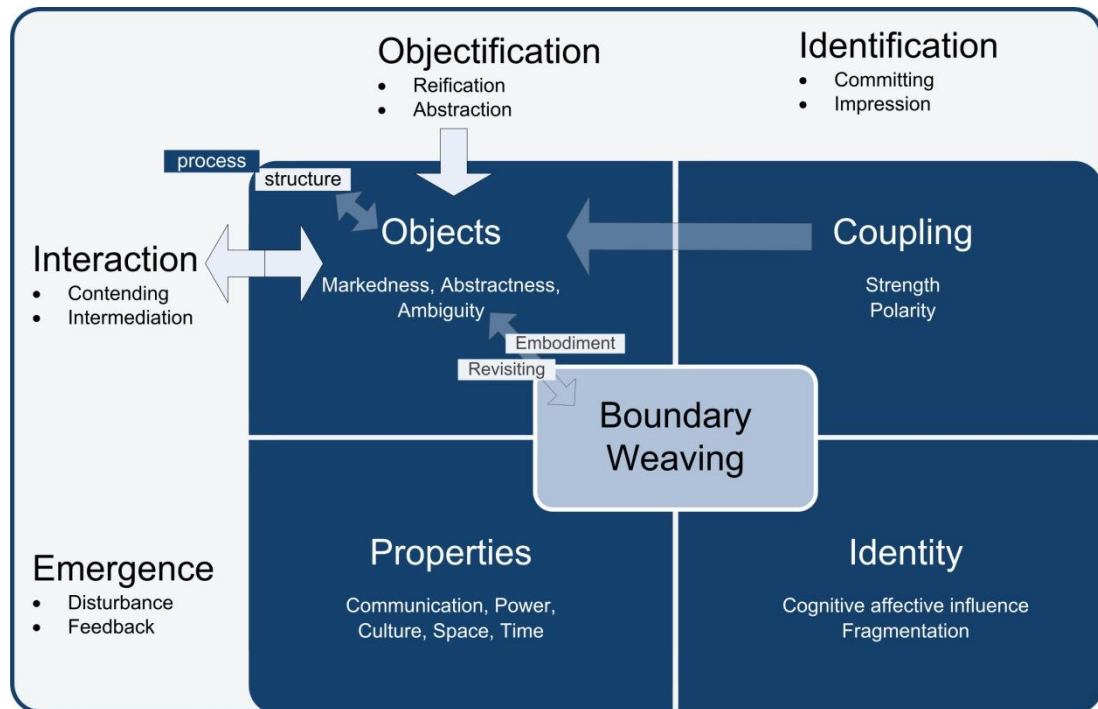
Figure 5: The relationship of the object category with other categories

Objects arise from the process of *objectification* and normally they are created for the purpose of *interaction* with others. It is possible to conceive of circumstances where individuals create "private" *objects* in the course of internal processes such as reflection and fantasy. Stacey (2001, p. 106) however, argues that such internal processes are in fact a case of *interaction* between different states of self, e.g. between a current and future self, as in the case of a note designed to jog the memory. An underlying premise of this thesis is that something is not an object unless a person identifies with it and establishes a *coupling*, which is discussed further in section 4.2.2.

The *markedness* of an object arises from the particular ways people *objectify* the world and this is a key aspect of *boundary weaving* – that *objects* need to be *marked* in order to be noticed and to make an *impression*. Similarly *ambiguity* arises from the equivocal nature of the way people *weave boundaries* – i.e. people regularly modify the meanings they have of *objects* depending on the context, as discussed in

section 3.4.2.1.1. When people couple with *objects*, they do so with differing *strength* and *polarity* according to their differing *identity* and the constantly changing context of the *interaction*.

The *abstract* nature of boundary *objects* is related to *interaction* because people rely on abstractions to communicate around complicated topics without having to spell out the full context of any particular term or phrase. *Abstractness* is thus essential to effective communicative *interaction*.

The difference between *objects* and *properties* is a subtle one because it can be argued that *properties*, while *emergent*, are subject to reflexive processes that allow people to *reify* them as *objects*. This is discussed further in section 4.2.3.

As noted in the next sub-section, multiple objects are woven together to create boundary **structure**. This is a key aspect of *boundary weaving*. People constantly **revisit** objects, iteratively affirming or developing them, thus strengthening or altering the boundary in the process, as was discussed in section 3.4.2.1.2. Not all boundaries are characterised by high levels of rigidly-defined objects, relying instead on ***embodiment*** to facilitate relationships. The relationship with *boundary weaving* is discussed further in section 4.4 and embodiment is discussed in section 4.4.2.2.

This section has set out the key relationships of this category with the other theoretical categories. Relationships with other theoretical categories, along with a number of additional insights that arose during the research, are discussed in the next section.

4.2.1.3.　　Discussion

In this section the following points will be discussed:

- How *objects* contribute to boundary infrastructure
- The fractal nature of *objects*
- How objects reflect identity
- How *objects* require a balance of *ambiguity* and clarity
- How *markedness* reflect people's boundary architecting skill.

The main observation about *objects* arising from the research is that they are omnipresent in our socially constructed environment and boundaries seem to consist of many *objects*. As will be discussed later in the category on *boundary weaving*

(section 4.4), it seems that *objects* are interwoven (by people) into a boundary "structure" or, at a wider scale, into "boundary infrastructure" (Bowker & Star, 1999; Carlile, 2002).

Objects may be thought of as fractal in nature rather than a singular monolithic entity. As people go about their daily *interaction*s, they will be constantly jumping between levels of *objectification*. In one instant they may be dealing with detail in a document while the next instant they may be negotiating the role of entire organizational units as boundary *objects* mediating *interaction* between different parts of the organization. This is reminiscent of the *hermeneutic* circle discussed in sections 3.4.2.1.2. What may be seen as the *objects* facilitating any particular *interaction* is thus a matter of choice and people may move fluidly between levels in line with the twists and turns of *interaction*.

A key insight of this research is that *objects* reflect the *identity* of the participants. *Objects* have no inherent properties of their own that are independent of human cognition. Any attributes an object may have must arise with the human imagination and, as such, the attributes reflect the way in which the person imagines that object. In section 4.2.4 it is discussed how *identity* is the source of these imaginative attributes of object. For example, an object's *abstractness* or *ambiguity* relate to people's mental models of the world – what is highly abstract or ambiguous for one person may not be for another. Similarly, the *markedness* of an object may arise because it resonates with some aspect of an individual's / group's *identity*.

> ## Theoretical Memorandums
>
> ### People as objects
>
> It can be seen from the examples given in section 3.2.1.2 that both **roles** and **groups** can be considered as *objects*. The logical extension of this thinking is that people themselves can be considered as *objects*. This notion arises from the idea that as people interact with others, they are always dealing with one or another objectified representation of a person (e.g. as a manager, parent, community member etc) or a combination of these. This doesn't preclude the idea that people are also agents but they deal with others as objects in their construction of the world. This concept is discussed further in section 4.3.1.2.
>
> ### Context
>
> It's important to note that the opposite of abstract is not "physical", as it is commonly thought of, but is more related to the quality of being embedded and undistinguished from the context. Something that is abstract has been removed from its context. The opposite of physical, then, is more akin to "virtual" or electronic. Context is thus situated in this theory as an inherent aspect of *abstractness*. Note also that the physical world is located in this theory as an attribute of *properties* (see section 4.2.3).

It is this difference in people's perception of an object that led to a related insight – that boundary structure may require a balance of *ambiguity* and clarity in its

boundary *objects* in order to facilitate *interaction* effectively. If *objects* are too ambiguous for others, the desired *interaction* may not occur. Yet if all the *objects* are too specific, then people may drown in a sea of *objects* that bureaucratically constrain *interaction*. It would appear this is an art in which "boundary architects" must become skilled.

Another skill required is in developing *markedness* in *objects*. *Markedness* relates to how many people may notice an object. In that sense, *abstracting* an object from its context may not be enough to make an object *marked*. People routinely use rhetorical skills to increase an object's *markedness* relative to others as they contend their place in the wider boundary structure. Also, the "positioning" of an object in this wider structure may be important, such as its location in the organizational environment, both physical and virtual, and its proximity to active boundaries.

4.2.1.4. Connection

In summary we can see that *objects* are a cornerstone of organizational boundary theory, with some clearly defined attributes of *markedness*, *abstractedness* and *ambiguity*. We also saw that *objects* are building blocks of what might be called "boundary infrastructure". Yet *objects* alone do not make up structure, as discussed in section 4.1.2. To understand structure we need to understand how these *objects* are tied into it. To that end we can now move on to discussing another of the nine theoretical categories making up organizational boundary theory – *coupling*.

4.2.2. Coupling

4.2.2.1. Introduction

In section 3.2.2, attributes of the way people couple to *objects* were presented along with a review of related literature. In this section we develop and integrate these concepts.
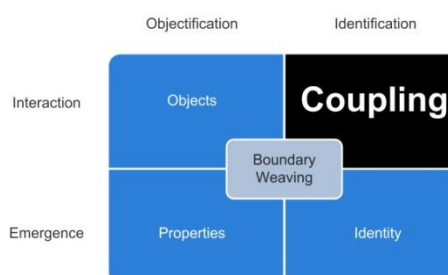
Having examined the data we are now in a position to offer a new conceptualization of coupling, in the context of organizational boundaries, as follows::

A coupling is the attachment that people form with an object.

By attachment, we mean there is a connection that makes a difference to the individual/group (and/or the object) thus forming an integrated unity. As Juarrero (1999, p. 109) says, the relationship is that of a system, not a simple aggregate of *objects* that happen to be in proximity to each other. Once coupled, the individual/group and the object must be treated as one and the same, because interacting with one is to interact with the whole. The critical point here is that *objects* should not be treated as separate from people.

Some key attributes of coupling can also be defined as follows:

- ***Strength*** is the degree to which an attachment between the individual/group and the object is firmly held.
- ***Polarity*** is the basic orientation of the coupling in terms of positivity or negativity.

In the next section, the relationship of this category and its attributes to all other theoretical categories is discussed.

4.2.2.2.　　Relationship with other theoretical categories

Figure 6 below illustrates the key relationships of the *properties* element with other theoretical categories and their attributes. These relationships are discussed in this and the following section.
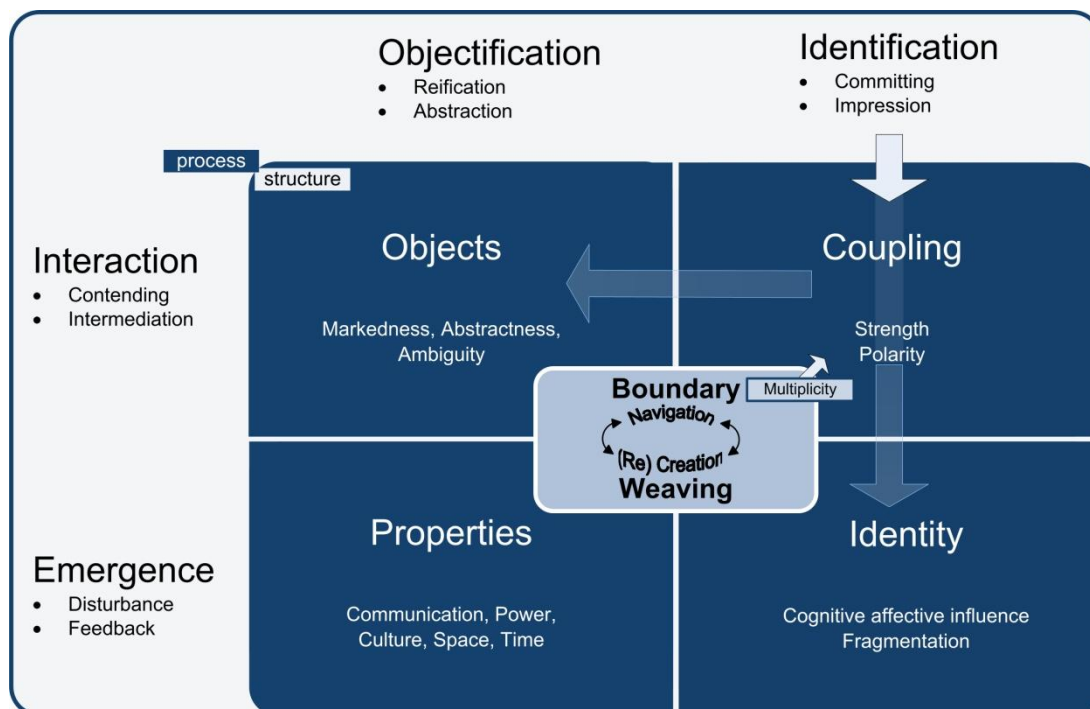
Figure 6: The relationship of the coupling category with other categories

Couplings arise as people *identify* with *objects*. In other words, couplings are the result of the process of *identification*, hence the large arrow in figure 6.

Coupling also has a very close relationship with that of *identity* whereby each time people couple with an object, this coupling contributes to the development of an aspect of their *identity*. As discussed in section 4.2.4.2, these couplings may be the lower level components by which the process of *emergence* leads to the development of *identity*. Vice versa, *identity* may also influence which *objects* people choose to couple with so as to manage any *identity* conflicts (discussed further in section 3.4.2.2.4).

Coupling may also relate to the higher order *properties* of a boundary in that their constant change in *strength* and *polarity* may provide the necessary energy to drive the process of *emergence*. This is discussed further in section 4.3.2.3 on *identification*.

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In general, couplings are created during the course of *interaction* as people *objectify* the world, creating *objects* and use them for communicative purposes. To be effective in *contending* and *intermediation*, people must also *identify* with *objects*, thus creating the couplings. For example, if one does not have a strong coupling with the idea they are contending they may not be effective in the goals of their *interaction*.

Couplings are a key result of *boundary weaving*. Indeed, a very large number of couplings will form as people identify with multiple objects and multiple people identify with the same objects. Furthermore these couplings will change depending on the context. This large number of couplings leads to a **multiplicity** of organizational boundaries. The relationship with *boundary weaving* is discussed further in section 4.4 and multiplicity in section 4.4.3.3.

By definition (see the introduction in the previous sub-section), coupling is closely related to *objects*, being the focus of the attachment. However, because people can have more than one coupling with a given object and that this coupling can change, couplings are distinguished in this theory from the *object* itself.

This section has set out the key relationships of this category with the other theoretical categories. Relationships with other theoretical categories, along with a number of additional insights that arose during the research, are discussed in the next section.

4.2.2.3. Discussion

In this section the following points will be discussed:

- The variability of *strength* and *polarity* in couplings
- Dialectic tension in couplings arising from changing context
- The implications arising from having multiple couplings
- The constructivist nature of couplings

A number of more general observations can be made about the above attributes that summarize the related comments in the findings chapter. It is clear that the degree of coupling *strength* ranges from being so weak as to be negligible through to so strong as to form an inviolable bond. In many cases the coupling *strength* will remain consistent over a life time, such as people's coupling with their gender, but in other

cases it will vary over time. The variation may be slow but may also change quickly or even instantaneously as *polarity* flips. The *strength* of a coupling may often arise from the personal investment that people make in a particular object or set of *objects*. This is normally the case where considerable time and effort have been expended in creating the coupling. For example, this is usually the case for experts as they come to understand an existing *domain* of *objects* (e.g. a topic or skill) over a long period of time. Also, a coupling may be present but essentially latent or absent from consciousness, until something occurs to activate it.

The above general observations are complicated by a more paradoxical observation – that people may be attracted to an object at the same time as they are repelled by it (as suggested by the theory on relational dialectics discussed at the end of section 3.2.2.2.2). For example, a person may be attracted to some aspects of being an officer (e.g. the command privileges) but repelled by other aspects (e.g. the social constraints). The implication is that the *polarity* of a coupling may be constantly changing depending on the context and this may be a contributor to the complexity of organizational boundaries, discussed further in section 5.3.3.

Another complication is that people identify with multiple *objects* and differing *domains* of *objects*. This may explain the common perception that individuals and groups have "multiple boundaries". Every object/structure that an individual or group couples to creates a new boundary with anyone else also coupling with the same object/structure. So the more couplings people have (and the more people coupling to the same *objects*/structure) the greater the *multiplicity* of

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Theoretical Memorandums

Organizational memory

A related **insight** of the research is that objects need to be periodically revisited (i.e. used) so that coupling *strength* is maintained. If they are not periodically revisited then they can "fade" or become decoupled from boundary structure.

The implication is that particular objects may have a greater durability than others. Some may fall out of current use and hence out of the current boundary structure but may take a longer time to fade from people's memory (and prominence in cognition). The above memo may provide an explanation of the concept of organizational memory.

Group cohesion

The role of coupling provided an **insight**, or concept, about the formation and cohesion of groups. The concept is that groups form when individuals develop similar couplings to the same *objects* / boundary structure. The stronger the *strength* of coupling, the higher the group cohesion. This view of groups is discussed and compared to the literature in section 5.2.3.

Relationships

An insight arising from the work of Bowker and Star (1999), outlined in section 3.2.2, is that people couple with objects rather than other people per se. So when we talk about a relationship between people, we are talking about one person identifying with an objectified view of the other person. i.e. the coupling is with their role, personality, quirks etc. Of course there may be multiple couplings present in a relationship which allows the relationship to vary, so that a person might trust another person in one context but not in another. This insight opens the theoretical gate for people to couple with any kind of object, not just other people.

boundaries, which is discussed further in section 4.4.3.3.

A key driver of this multiplicity is that different people will identify with different *objects* in different ways, resulting in subtly different *couplings* that need to be reconciled through *interaction*. For example, one person may couple with the *object* of an "officer", by virtue of being in such a role, but will also couple with the notion of a "soldier" they command. A soldier will couple with the same *objects* in reverse. As the two individuals interact together the apparent relationship between these *objects* manifests in the range of behaviours that are constrained and enabled by the associated emergent *properties*.

It's important to note that the apparent relationship between some *objects* (e.g. the concept of an officer makes no sense in the absence of the concept of soldier) are an illusion, as *objects* have no agency to couple to each other. Instead, this apparent relationship exists only in the mind(s) of people identifying with different *objects* in a way that relates them together and this arises from the process of classification discussed in section 3.4.2.2.2.

Lastly, it should be noted that the term "coupling", as used in this research, is used as a noun (a gerund) rather than a verb and is the result of the social process of *identification*. In essence, it relates to a state at any given point in time and not a process of attachment.

4.2.2.4.   Connection

In summary, we can see that coupling explains how *objects* are tied into boundaries, helping to form structure. However, *objects* and their couplings are not the only elements of structure. There are also a number of emergent *properties* and it is suggested that the constant variation of strength and *polarity* in couplings may be a contributor of the emergence of *properties*. Therefore it is appropriate to now discuss the next of the nine theoretical categories making up organizational boundary theory, that of *properties*.

4.2.3. Properties

4.2.3.1.   Introduction

In section 3.2.3, the concept of emergent
properties was introduced along with the
background of complexity theory and a set of criteria for identifying such phenomena
in organizations. In section 3.2.3.2 a number of examples were given of potential
emergent properties, such as trust, relationships and reputation. It was shown how
these emergent properties enable *interaction* as well as constrain it. In section 3.2.3.3
a number of attributes were suggested building on the core dimensions of Giddens'
(1984) structuration theory.
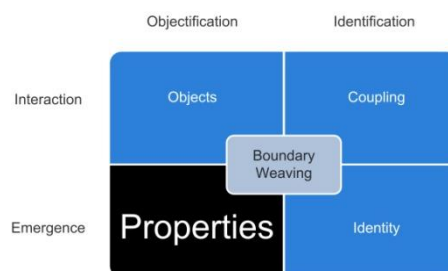
Having examined the data we are now in a position to offer a new conceptualization
of the attributes of emergent properties as follows:

- ***Communication*** is the range of linguistic and symbolic devices, as well as
  human behaviours, that enable or constrain *interaction* at a syntactic and
  semantic level.

- ***Power*** is the attribute of emergent properties that enable or constrain
  interaction through the creation and acceptance of distinctions.

- ***Culture*** is the attribute of emergent properties that enable or constrain
  interaction through a range of shared assumptions.

- ***Space*** is the attribute of emergent properties that enable or constrain
  interaction through the physical characteristics of its context.

- ***Time*** is the attribute of emergent properties that enable or constrain
  interaction through the temporal characteristics of its context.

To a certain extent, the exact definition of the above attributes is not that important,
as they are all large and controversial fields of research in their own right. In the
literature review of these topics, it was found they are overlapping in many ways and
it is difficult to define them in a mutually exclusive way. The key point to be made is
each emergent property of an organizational boundary will have some aspect of each
of the above attributes present, albeit to a varying degree. So some boundaries may
be strongly characterised by communication barriers (enablers) and others may be
more characteristic of power (e.g. political boundaries). The recommendation here is

to gracefully accept a reasonably loose definition of these attributes and focus on the main definition of *properties,* as follows:

> **The properties of an organizational boundary are emergent phenomena that enable and constrain interaction.**

By "emergent phenomena" we mean aspects of the organization that arise during the course of *interaction* and affects the operation, performance or state of the wider system. These phenomena do not arise as a direct result of deliberate human actions but exist due to interlevel causality, as was discussed at the end of section 3.2.3.1.

In the next section, the relationship of this category to all other theoretical categories is discussed.

4.2.3.2. Relationship with other theoretical categories

Figure 7 below illustrates the key relationships of the *properties* element with other theoretical categories and their attributes. These relationships are discussed in this and the following section.
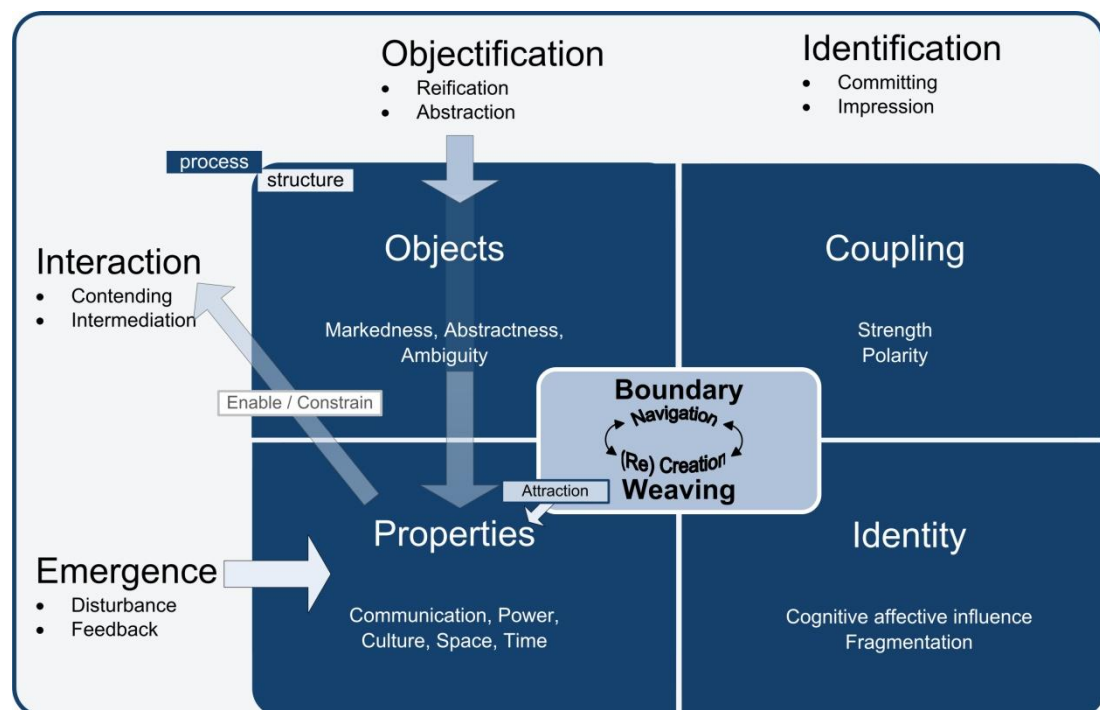

Figure 7: The relationship of the properties category with other categories

The most obvious relationship is that between properties and *emergence*. As will be discussed later in section 4.3.4, properties "emerge" during the course of *interaction*, nucleating around *disturbances* and amplified by *feedback* processes.

As noted in section 4.3.4, the engine of *emergence* is the process of the *identification* that occurs during *interaction*. As people *identify* with *objects* they create the assumptions and distinctions that give form to and drive the *emergence* of the key attributes of *culture, power* and *communication, space and time* – e.g. people collectively decide what is acceptable, important, different, urgent and too close. These attributes combine and manifest themselves in a myriad of ways to produce phenomena that then **enable and constrain** *interaction.* In particular we can see a relationship between the attributes of *power* and the *contending* attribute of *interaction*. Similarly, *intermediation* requires the attributes of *communication.* The attributes of *space* may emerge over time as people adapt to and adapt the physical world around them to suit the cross-boundary *interactions* they undertake but simultaneously constraining them. Similarly *time* is ordered and punctuated to facilitate ordered interaction but deadlines, linearity, intermittency and other factors effectively constrain these same *interactions*.

The basic social process of *boundary weaving* permeates the way in which properties emerge as discussed in section 4.4. In particular, as we weave boundaries, certain pattern of *interaction* may form, which we may label (objectify) as having a certain properties, and these may become basins of ***attraction*** for further interaction. Attraction is discussed further in section 4.4.3.5.

This section has set out the key relationships of this category with the other theoretical categories. Relationships with other theoretical categories, along with a number of additional insights that arose during the research, are discussed in the next section.

4.2.3.3.   Discussion

In this section the following points will be discussed:
- How properties may be objectified
- How identity can also be viewed as an emergent property
- Properties are unique, with differing combinations of attributes.
- The emergent nature of the physical world
- The designed versus natural nature of properties

Perhaps the most subtle relationship to discuss is that with the category of *objects*. In the diagrammatic representation of this theoretical model in section 4.1.2 (figure 4) it can be seen that properties of boundaries, along with *objects*, falls in the *objectification* column. This illustrates the point that properties, while emergent, may also be objectified and this is because of the reflexive ability of humans. In the examples given in section 3.2.3.2, properties such as trust and credibility, may be openly discussed and given labels which can only occur if they have been objectified. As *objects*, they may then become the focus of *interaction* and enable/constrain *interaction*.

The category of properties is also similar to that of *identity* in that both are emergent. The *identity* of individuals and groups emerges during the course of *interaction* as they identify with *objects* and *properties*. The main difference between the two is that *identity* is coupled with individuals and groups where as emergent properties are not. Emergent properties, such as trust and reputation, are more commonly associated with the relationships between individuals/groups.

A key insight in this category relates to the uniqueness of properties. Other researchers have suggested that boundaries have many "dimensions" such as being political, geographical, cultural and functional. In this research we suggest that these dimensions may be thought of as the dominant attribute of emergent properties. Instead of defining a set list of dimensions that may inform some sort of typology, it is argued that any given property of an organizational boundary is unique, with a different combination of the above attributes (and there may be an infinite number of combinations given that each of the above attributes have a wide spectrum of variance).

> **Theoretical Memorandums**
>
> **Structure/action**
>
> Another **insight** is that for each of the attributes of emergent properties there is both an element of structure and a corresponding interactional element. For example, power includes a range of interpersonal influencing tactics such as coercion and communication encompasses the range of rhetorical techniques used to influence others but both are underpinned by structures relating to language.
>
> **Culture as underlying objects**
>
> A related **insight** is that culture should not be defined as a defining attribute of groups. Rather, culture arises through *interaction* and emerges as people form assumptions that enable and constrain further interaction. These assumptions, at the conscious level, may be considered as objects in the context of this research. So an additional **insight** is the emergence of culture may be a process of boundary objects "fading" from salience until they are no longer noticeable (not objects anymore) and are just part of the fabric (boundary structures) of the organization.

As was seen in the findings in chapter 3, relating to each of the attributes of properties, we saw that there are certain dimensions that do seem to be common to boundaries in many different organizations, as illustrated by the wide variety of examples (e.g. the different dimensions of culture or the various communication barriers). However, it is expected that upon close examination these examples will be subtly different in every organization, reflecting the unique context of any given *interaction*. For example, while we may give similar "types" of properties a label, such as trust, the actual trust-like emergent phenomenon that exists between any given set of individuals/groups will always be subtly different and unique to that relationship.

The basic argument of this section, that properties are unique and multi-dimensional, rings true when we consider the findings of section 3.2.3.3 in which we examined a wide variety of emergent properties relating to communication competence, cognitive processes (such as group-think) that affect communication, the evolution of language, the creation of discipline, the development of shared underlying assumptions, culturally-driven behaviours, geographical dispersion, the adaption of technology and the built environment, the linearity and intermittency of business process, and the creation of urgency.

All of these factors seem to be interdependent and it is somewhat meaningless to consider them in isolation. Rather they seem to be constantly combining and recombining to give each context and moment its own unique set of enabling and constraining properties. Trying to identify common or persistent emergent properties makes sense only in organizational boundaries that are themselves stable or common to a large number of organizations.

A related observation is that physical aspects of the world may also be treated as emergent properties (see

> ### Theoretical Memorandums
>
> **Labelling properties**
>
> In the introduction to section 3.2.3 it was suggested that, in line with the arguments of Stacy (2001) and Giddens (1984), the emergent properties of organizational boundaries may be social practices. Certainly, it seems that social practices are emergent properties but we can see from the examples in section 3.2.3.2 that properties seem to be more than that. It would be difficult to describe technology, resource availability or urgency as social practices. In particular the focus on social practices seems to ignore the influence of the physical world. So the general approach of this research is to avoid labelling properties in organizational boundaries of being of any particular type, such as a practice. Rather, as the definition of the previous section suggests, properties can be any phenomena at all that are emergent and enable / constrain interaction.

the theory of emergence in section 4.3.4). This insight arose initially while exploring the constraining nature of the workplace and also that of technology. Later the researcher decided to remove "physicality" as an attribute of the *objects* category. This was because of the realization that while *objects* often do have a physical aspect to them, this is not what makes them an object per se. Rather, the physical nature of *objects* emerge through the context of their use, reflecting the biology of humans and are a product of the society from which it emerges rather than being an inherent attribute of the object. A "rock" is only "rock-like" because humans find them hard and nature is oblivious to the variety of rock types – such types arise only as sentient beings categorize them. As society changes, the physical nature of everyday *objects* change, as we can see in the transition from letters to email and phone texts as the dominant written mediums. It is argued that these technologies, along with the rest of our physical world, are emergent phenomena that enable and constrain the way we interact.

This observation raises an important question – "to what extent are properties designed versus being 'naturally' evolved?" In looking at the list of possible example properties in section 3.2.3, we can see that some properties seem to have a designed feel about them – like technology. Other properties, like trust seem to "occur naturally", although arguably a person intent on gaining someone's trust could consciously act in a way designed to create it.

Another related question is "how can you tell the difference between a property and an object?". It is clear that in some instances there is a somewhat confusing overlap between what may be considered an *object* and a property. For example, individual procedures and reified practices can clearly act as boundary *objects*, while the whole bureaucratic structure of policy/procedures and the tacit taboo-like aspects of practice are more like an emergent property. Yet procedures and policy would be difficult to separate in practice.

The main difference between *objects* and properties is that *objects* are created directly by people as part of the *objectification* process while *properties* emerge and enable/constrain *interaction* regardless of whether people *objectify* them or not. The implication is that some properties will be known and recognised by us but that other properties may influence us at a subconscious level.

The theory of emergence is discussed later in section 4.3.4 but the implication of this discussion is that *objects* and the designed aspects of properties may in fact also be *emergent* and it is only through the reflexive process of *objectification* that they become *objects*.

Returning to the example of policies and procedures, it is argued that they may be both designed and emergent. They are clearly created intentionally by people but it can also be said that they arose from the need to deal with a specific types of *interaction*s that kept coming up and have continued to evolve as people learn what works and what does not. They emerge as a result of a repeated *interaction* among lower order parts and are only effective in the context of acceptance by the whole – individuals acting on their own could not enforce them. A better term for this property may be "bureaucracy" – as an emergent characteristic of an organization. Not many organizations specifically set out to be bureaucratic yet often become so in the course of *interaction*.

4.2.3.4.   Connection

In summary we can see that properties are a key element of social structure and that each property may have attributes relating to *power, culture, communication time* and *space*. We saw that properties may be emergent. However, it may not be the only emergent feature of social structure. It is argued that *identity* is likewise emergent, resulting from the same process of *identification.* It is appropriate to now move on and discuss *identity*, which is another of the nine theoretical categories making up organizational boundary theory.

4.2.4. Identity

4.2.4.1.   Introduction

In section 3.2.4, different aspects of identity that were noted in the research are outlined

with examples, attributes and related literature. We can now summarize the role of identity in relation to organizational boundaries.
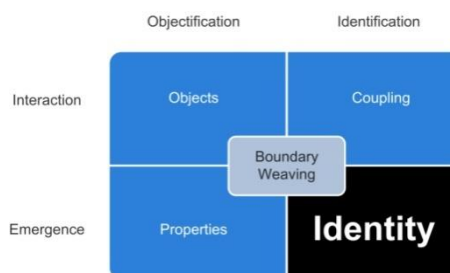
It was seen that identity manifests itself in many ways during the course of *interaction* as people reveal their attitudes, develop interests, form habits and display aspects of their personality.

From the related literature we can see that there are many different ways of conceptualizing identity but two particular threads stand out – one because of its prominence in the literature (the fragmentation of identity) and the other because of the close alignment with observations in the interview data (relating to cognition and emotion). We take particular note of Burke's call for more research to understand how identity emerges from the affective and cognitive responses to *objects*.

Having examined the data we are now in a position to offer a new conceptualization of identity, in the context of organizational boundaries, as follows:

> **Identity in organizations is the aspects of people that motivates interaction across boundaries and shapes behaviour in doing so.**

Similarly, we can now define the key attributes of identity.

- The ***cognitive-affective influence*** of identity is the way people modify their *interaction*s based on what they know and feel.
- ***Fragmentation*** is the number, variability and distinctiveness of parts that make up identity.

By variability, we mean the relative difference in strength of the cognitive-affective influence exerted by the different aspects of identity.

In the next section, the relationship of this category and its attributes to all other theoretical categories is discussed.

4.2.4.2.   Relationship with other theoretical categories

Figure 8 below illustrates the key relationships of the *properties* element with other theoretical categories and their attributes. These relationships are discussed in this and the following section.
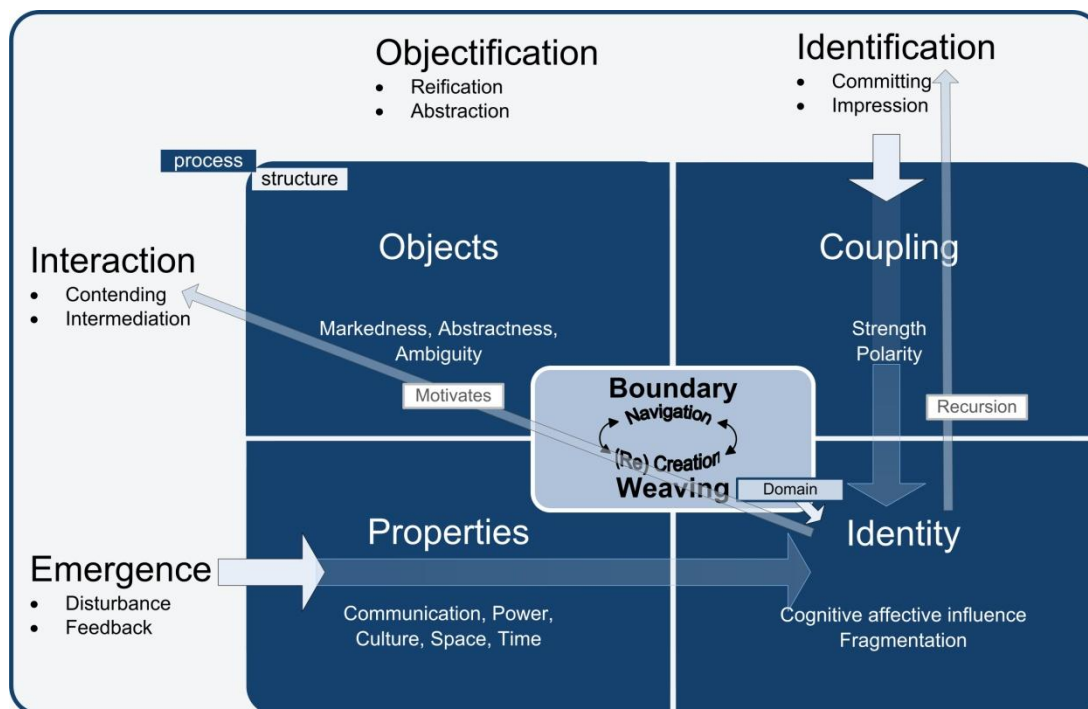
Figure 8: The relationship of the identity category with other categories

Identity arises from both *identification* and *emergence*, as shown by the large arrows in figure 8. In particular, as discussed in section 4.2.2.2, *identification* and the development of *couplings* may be the lower level components by which the process of *emergence* leads to the development of *identity*. However, identity construction seems unlikely to be a linear, cause-and-effect process. Rather, identity may also be emergent in the same way as higher-order boundary *properties* emerge, as discussed in Section 4.3.4 on *emergence*.

Identity also has a direct relationship with the category of *interaction,* in that purposeful actions may be **motivated** by the *cognitive and affective influence* of identity. This in turn may result in *disturbances* that feed the process of *emergence* of *properties.* It may also instigate the *contending* of objects, thus resulting in people

(re)identifying with objects driving *identification,* thus contributing to the further development of identity.

Similarly, the way in which people *identify* with objects may be **recursively** influenced by *identity* itself, as in the phrase "I identified with that". Identity influences what people *identify* with, i.e. what resonates with them. This influences the way people *identify* with objects, thus maintaining or developing *identity* itself, recursively. A by-product of this process is that the *objects* people construct and *identify* with may reflect the identity of people, as discussed in section 4.2.1.3.

The *cognitive-affective* attributes of identity also relate to the *strength* and *polarity* of a *coupling*. If a person has made a strong positive emotional connection with an *object* then the *coupling* will be stronger and positive. Similarly, if an *object* (or what it represents) makes cognitive sense to a person they may also have a stronger attachment to it.

The fragmented nature of identity may help a person *weave* their way through boundary structure at multiple levels. Because some aspects of identity relate to the social level, this allows people to *identify* and *navigate* the world at this level. In the next moment, the same person may be *identifying* with the minute particulars of a specific object, e.g. a particular procedure, and some part of their identity at that level will facilitate the *navigation* of boundary structure at that level.

As people identify with a range of different objects, they may begin to *weave* them together, i.e. relate them to each other according to distinct aspects of their identity, and thus form a ***domain*** of objects. These domains of objects form the basis of boundary infrastructure. The relationship with *boundary weaving* is discussed further in section 4.

This section has set out the key relationships of this category with the other theoretical categories. Relationships with other theoretical categories, along with a number of additional insights that arose during the research, are discussed in the next section.

4.2.4.3.   Discussion

In this section the following points will be discussed:

- How some aspects of identity are stronger than others

- How *couplings* are energised by identity

- The *emergent* nature of identity

- The enabling and constraining role of identity

- How identity relates to *power* and other attributes of *properties*

- How *fragmentation* of identity fragments *objects* and boundary structure.

The view of identity outlined in the previous section is a significant departure from the mainstream thinking on identity theory, which is focused on the way individuals identify with roles or groups. It is assumed that individuals/groups have multiple aspects to their identity relating to the number of roles a person has or functions that a group has. However, as shown in section 3.2.1, roles and function are only two of a wide range of possible *objects* in organizations.

It is argued that key aspects of identity partly arise from those *objects* to which an individual/group is tightly coupled, in both the affective and cognitive sense of the word. This makes intuitive sense when one considers the scenario of an extreme event where a person may be "emotionally scarred" for life – certainly that single event/object would have a one-to-one correspondence with an identifiable aspect of identity. This is supported by Kreiner et al (2006, p. 1317) who note that some aspects of identity are more salient than others and this would relate to those *objects* to which people are *strongly coupled*.

The way in which identity lends *strength* to a *coupling* may also help explain a key issue in the

Theoretical Memorandums

Group influence

One insight of the research is that group identity may emerge from the *influencing tactics* that individuals employ to promote boundary *objects*. For example, coalition tactics are often used whereby people enlist the support of others to promote or defend a particular object. As people work together to *contend* a particular *object* they may develop a sense of identity as a group, based on the *object*. Even if people have different reasons for promoting/contending the object (i.e. equifinal reasons), a group identity can still emerge by virtue of the common connection with the boundary *object* – so called strange bedfellows. They may then begin to support each other regardless of their cognitive view i.e. right or wrong, as part of a conscious or unconscious coalition-based influencing strategy.

Fragmentation of objects

The attribute of *fragmentation* was initially focused on that of objects, after noting that some objects had many parts. However, the focus moved to identity for two reasons. Firstly because it was seen from the literature that identity consisted of multiple aspects and also because the research was taking an increasingly constructivist approach. Taking a constructivist view, any fragmentation of objects is only because people make it so and hence is a reflection of that person in some way i.e. a reflection of their identity.

literature on complexity as noted by Anderson et al (1999) who said:

> *"[Complexity models will] gain explanatory power when scholars take into account how a continuous injection of energy is necessary to sustain a pattern of interactions in a network. Most simulations abstract away the problem of how to energize the making, breaking, and maintenance of ties."*

Couplings only exist in the first place because people create them and sustaining them requires a process of ongoing *committing* that may arise from an individual's/group's interest in the *coupling*. The stronger the interest, the greater the *strength* of the *coupling* and the more likely there will be a "continuous injection of energy" as suggested by Anderson et al above.

While the simplicity of the above model of identity is attractive, much of people's identity cannot be explained in such linear terms. In section 4.3.2 on *identification*, it will be argued that identity is also *emergent*. What is being suggested is that the "lower-order" components from which identity (as a "higher-order" *property*) emerges are in fact the individual *couplings* that may be discretely identified but identity is more complex than just a linear mapping of *coupling*s to parts of identity – i.e. it is more than the sum of its parts.

In the previous section we noted that identity may be just another type of emergent *property*. The implication of this is that identity may also act as a constraint and an enabler of *interaction*. The various aspects of an individual's identity such as their values, beliefs or assumptions, as outlined in section 3.2.4, allow individuals to take *action* and *navigate* the boundaries they participate in. They would also constrain what kinds of activities they would be willing to participate in. Indeed sense-making is said to be grounded in identity construction (Weick, 1995a). So identity may enable or constrain *interaction* by underpinning the *cognitive-affective* processes that enable people make sense of the world and take action.

Stets and Burke's (2000) observation that identity driven activity "revolves around the control of resources" provides a direct link with the *power* attribute of boundary *properties* outlined in section 3.2.3. So another insight is that identity may drive *interaction*s that result in the emergence of the *power*-related *properties* of structure

in organizational boundaries (see section 4.2.3). The implication is that identity may be the core driver of a key characteristic of *interaction*, that of *contending*.[5]

The *fragmentation* attribute of identity may have multiple functions. Firstly, it allows individuals/groups to connect to a variety of *objects* in different ways depending on the circumstances. As noted in section 3.2.4.1, some parts of identity may influence across a wider range of contexts, while others may only relate to a particular situation/object. Secondly, having multiple parts to an identity may enable people to create multiple *objects* of the same phenomenon. So a particular physical *object* may serve more than one purpose as a boundary *object*. In essence, the *fragmentation* of identity facilitates the fragmentation of *objects* and boundary structure.

4.2.4.4.   Connection

In summary we can see that identity is the last of the key elements of social structure and is characterised by its *fragmented* nature and also its ability to influence people actions in a *cognitive and affective* way. It is therefore appropriate to now move on to discuss the range of social processes that are affected by identity. The first of these is *objectification*, another of the nine theoretical categories making up organizational boundary theory.

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[5] The clear link between identity and *power* inspired another insight, that identity may also be a driver of the other attributes of *properties* relating to *communication, culture, time* and *space*. The suggestion is that the way people communicate, the culture they develop, their attitudes to time and the way they shape their physical environment are all emergent reflections of their identity. This could be the subject of future research.

4.3. Social processes of boundaries

4.3.1. Objectification

4.3.1.1.   Introduction

In section 3.3.1 different aspects of
objectification were noted in the research
including examples, attributes and related

literature. We can now summarize the role of objectification in relation to
organizational boundaries.

While there are other interpretations arising in the literature, the term objectification
was considered a useful in describing all the processes associated with the creation
and development of *objects*.

Having examined the data we are now in a position to offer a new conceptualization
of objectification, in the context of organizational boundaries, as follows:

> **Objectification is the process by which individuals/groups create objects
> that form the basis of boundary structure.**

In reviewing the data, including the related literature, two key sub-processes were
identified that seem to underpin that of objectification, namely *abstraction* and
reification.

The dictionary definition of abstraction given in section 3.3.1 emphasizes the process
of separation, and this is what the researcher wishes to associate with the term
"abstraction". To be clear about the connection with *objects*, the process of
separation is also the creation of a new and different entity which we may choose to
label – creating an *object* in the process.

The two processes are closely inter-related and in fact one can be defined in terms of
the other, as follows:

- *Abstraction* is the process of separating out aspects of a boundary into an
  identifiable entity.
- *Reification* is the process of giving form to an abstraction that may be used
  to facilitate *interaction*.
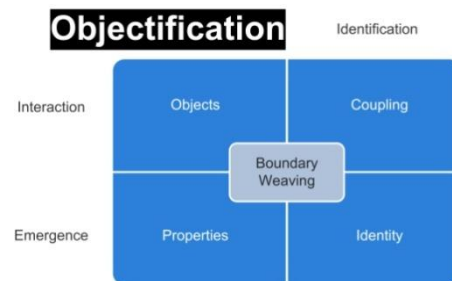
In the next section, the relationship of this category and its attributes to all other theoretical categories is discussed.

4.3.1.2.   Relationship with other theoretical categories

Figure 9 below illustrates the key relationships of the *properties* element with other theoretical categories and their attributes. These relationships are discussed in this and the following section.
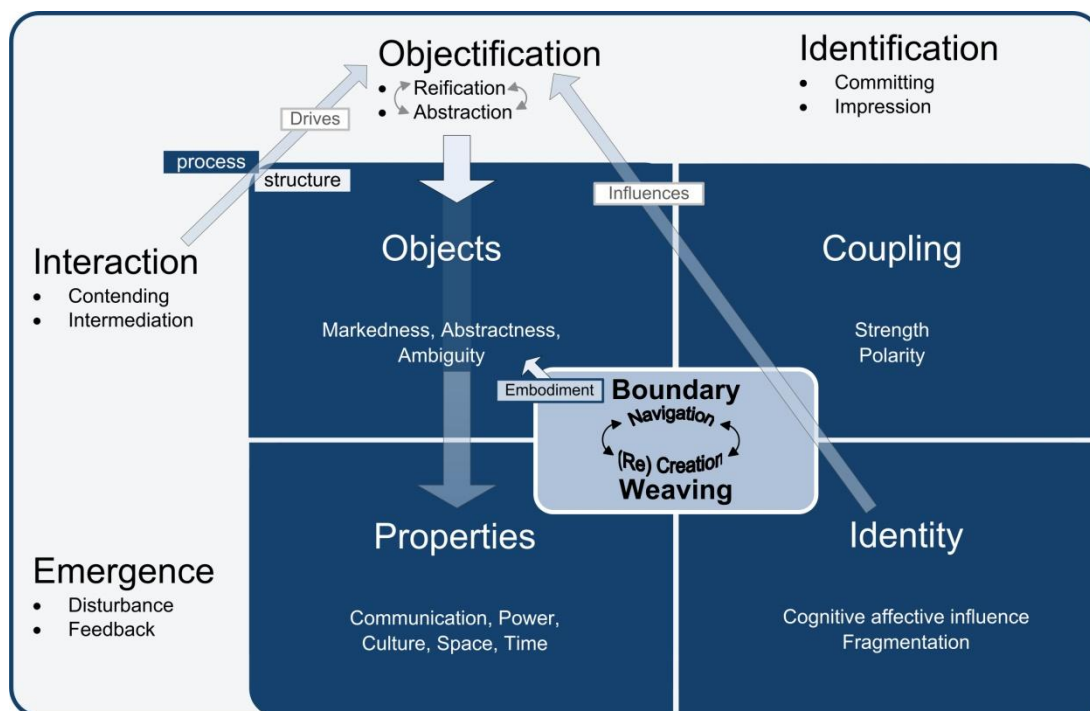
Figure 9: The relationship of the objectification category with other categories

Objectification has an obvious connection with the *objects* category. Simply put, *objects* are the end product of the objectification process. It's also important to note that objectification occurs naturally and inevitably in the course of *interaction*, regardless of whether *objects* are created intentionally or not – as soon as there is *interaction*, there are *objects*. Objectification is also related to the *properties* category in that individuals, being reflexive, may objectify *properties*.

Objectification is also deeply interrelated with the process of *identification* discussed in the next section. Many actions involved in objectification also result in people *identifying* with that *object*. For example, in objectifying options into "highly recommended" through to "not recommended", the author is developing degrees of attachment to each option, *identifying* most strongly with their recommended option.

Similarly, objectification is directly related to the *identity* category because the way individuals objectify things is a reflection of their personal *identity*. For example, what is considered good by one person may be considered bad by another. So people classify, interpret or notice phenomena according to their unique individual perceptions.

The process of *abstraction* gives *objects* their attribute of *abstractedness*. The more removed from its context, the more abstract it is and often it is more ambiguous, although *ambiguity* also arises from the equivocal way people weave boundaries to suite the context. Similarly, *reification* relates to *markedness*. The more reified an object is the more likely it is to be marked, although again other factors may also contribute to its markedness.

The way in which people objectify the world around them is a key aspect of boundary weaving, as discussed in section 3.4.2.2.2, and this is primarily reflected in the relative levels of **embodiment** that people employ. It can also relate to how people attempt to design boundaries, as discussed in section 3.4.2.2.3. The relationship with boundary weaving is discussed further in section 4.4 and embodiment is discussed in section 4.4.2.2.

As discussed in section 4.2.4.2, interaction may be motivated by the cognitive and affective influence of identity and this **influence** is particularly noticeable in the way people objectify the world, as was discussed in section 3.4.2.2. Objectification is also **driven** by the context of *interaction*. As will be discussed further in section 4.3.3, *objects* are often created to facilitate *interaction*.

This section has set out the key relationships of this category with the other theoretical categories. Relationships with other theoretical categories, along with a number of additional insights that arose during the research, are discussed in the next section.

4.3.1.3.   Discussion

In this section the following points will be discussed:

- The iterative relationship between *abstraction* and *reification*
- The progressive nature of objectification
- The unconscious versus intentional nature of objectification

The main insight relating to objectification that emerged during the research is that *abstraction* and *reification* are inter-related in a developmental and somewhat iterative process which, together, we may call objectification. The following memo illustrates the concept:

> *Memo: As people draw distinctions about different aspects of their environment they are abstracting parts of it, often unconsciously as they go about the day-to-day activities. In certain circumstances, the abstraction may rise to the conscious level where they are further reifying it as they take vague impressions and begin to crystallize or conceptualize what they are thinking and feeling. Later they may reify the abstractions even further by articulating them verbally (using rhetoric to link related concepts) and writing them down in words and documents. As they develop their ideas people may formulate models, arguments and propositions that are expressed in devices such as easy to understand diagrams. These "fully reified" abstractions equate to the traditional "boundary object", which are essentially designed for communicative purposes and facilitating interaction.*

A related insight is that some things may become progressively objectified over time. In particular it was realized that individuals (as well as groups) are progressively objectified in the course of developing relationships. For example, a person may be initially objectified as an employee and later be further objectified as a reliable or as a difficult employee.

Objectification may vary in the level of "designedness" and an insight that emerged is that objectification may take place subconsciously in one way even while boundary *objects* are being deliberately and consciously designed or used in another way. For example, in making a complaint (see example in section 3.3.1.2.1) a person may

> **Theoretical Memorandums**
>
> **Objectification as a skill**
>
> Another **insight** arose from the research is that objectification may be a core skill that explains the effectiveness of some people in interacting across boundaries. Firstly, some people have a good *abstraction* ability, being able to conceptualise their thoughts and feelings. Secondly, they are able *reify* these abstractions into *objects* that help facilitate interaction, often in persuasive ways. In other words, they can create *objects* that are *marked* and useful in *contending*.

consciously think through, write down the issues and file a formal protest but, in doing so, they unconsciously reify their role as an employee who has no power to change their own circumstance without approval from their manager.

Finally, it is worth noting at this stage that the term "abstraction" can also be used as a noun – and in common parlance relates to an object that is "highly abstracted", like scientific terms, that lay people simply don't understand. In this model, such *objects* relate to both the separation out (abstraction as a verb) of aspects of the topic from the background and its reification into a term or label.

4.3.1.4. Connection

In summary we have seen how objectification is a key social process that is primarily responsible for creating *objects*, the building blocks of organizational boundaries. Objectification is characterised by processes of *abstraction* and *reification*. However, these processes almost always occur hand in hand with another major social process, that of *identification*. It is appropriate to now move on to discuss *identification,* which is another of the nine theoretical categories making up organizational boundary theory.

4.3.2. Identification

4.3.2.1. Introduction

In section 3.3.2, different aspects of identification were outlined with examples,

attributes and related literature. We saw that the process of identification may be associated with a wide range of commonly known phenomena such as arguing, decision making, and influencing which are reinforced by repetition and good presentation. These factors may all be combined in basic knowledge processes, such as training in ways that encourage people to *identify* with a range of *objects*.

We saw in the literature that there are a number of different ways of using the term "identification". In this research the term is used in the sense that one "identifies with" some object, that is "to associate in feeling, interest or action" (*The Macquarie Dictionary*, 1991). In this sense of identification, association or *coupling* with an *object* is the focus of the social process.
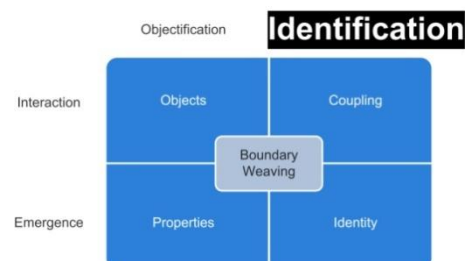
Having examined the data we are now in a position to offer a new conceptualization of identification, in the context of organizational boundaries, as follows:

Identification is the process by which people develop a connection with an object or boundary structure.

The qualification relating to boundary structure recognizes that *objects* may cluster together to form features in the wider boundary structure.

Some key attributes of identification can now be defined as follows:

- *Impression* is the way people become aware of *objects* and boundary structure.
- *Committing* is the strengthening of a connection to an object.

In the next section, the relationship of this category to all other theoretical categories is discussed.

4.3.2.2. Relationship with other theoretical categories

Figure 10 below illustrates the key relationships of the *properties* element with other categories. These relationships are discussed in this and the following section.
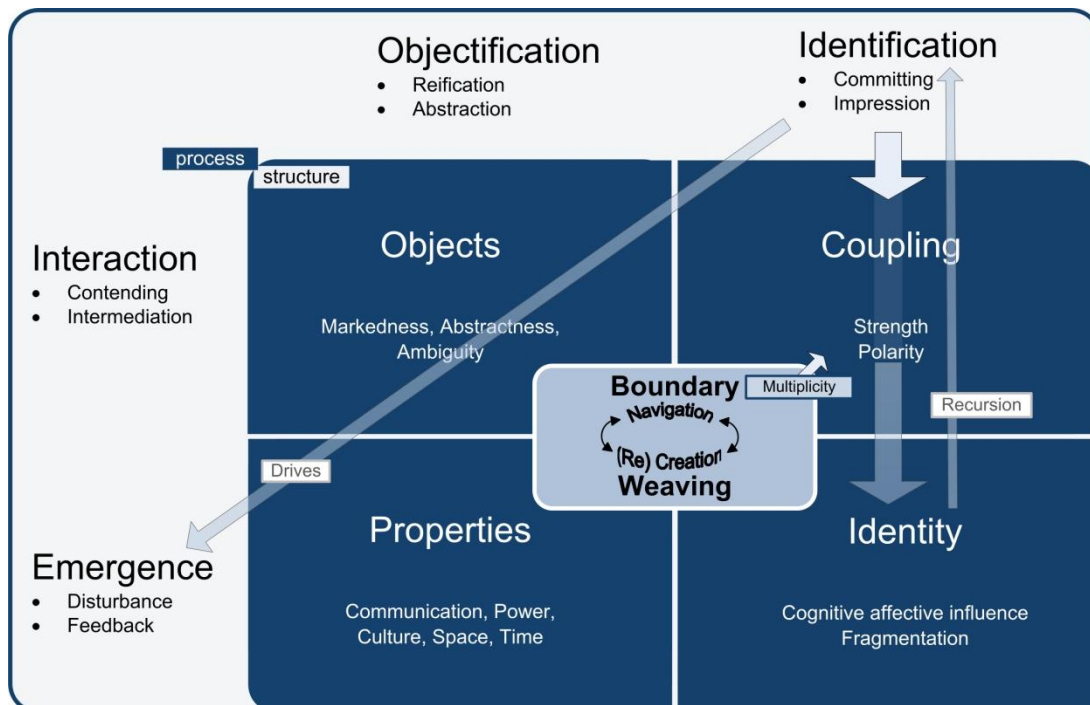

Figure 10: The relationship of the identification category with other categories

As people identify with *objects*, it results in *couplings* between people and *objects*.

These couplings in turn contribute to the development of *identity*. Since people can objectify *properties,* as discussed in section 4.2.3, it follows that people can also identify with *properties* that have been objectified and that these likewise contribute to identity.

Impression relates to *markedness* in that *objects* that are more marked may make a greater *impression*. *Impression* also contributes to the *emergence* of *properties* such as reputation. It is also related to the *interaction* category in that *impression* can be affected by a number of factors such as the frequency and duration of *interaction* as well as proximity.

As noted earlier, identification often seems to occur at the same time as *objectification*. As people make sense of the world around them and draw distinctions they are also, to some extent, being *impressed* by and starting to *commit* to a particular view of the world. So identification and objectification seem to be deeply interrelated.

 As people promote *objects* they are similarly *committing* themselves to what is represented by that object – in particular they are *committing* to all of its interconnections and its place in the wider boundary infrastructure (or its proposed place in the case of change or innovation).

The *emergence* of higher-order *properties* may by **driven** by the process of identification. We can see from the related complexity literature in section 3.3.4 that *properties* arise through "endlessly repeated *interaction*s" that are "iterative, recursive, and self-referential". The continual "re-identification" of an individual's / group's *coupling* with an object may provide the necessary preconditions for the complex social process of *emergence*. This concept was also discussed in section 4.2.2.2 on *couplings* and it is noted that identification is what drives constant variation of *coupling strength* and *polarity* that directly feeds the *emergence* process.

Vice versa, the process of identification may be strongly influenced by *identity* itself, **recursively**. For example individuals may identify strongly with *objects* that resonate with aspects of their *identity* such as values and interests (Boninger et al., 1995). This recursive relationship was discussed in section 4.2.4.2, and recursion as a general feature of boundary weaving was discussed in section 3.4.2.1.4.

Finally, the attributes of *impression* and *commitment* both have a *cognitive* and *affective* aspect arising from *identity*, as discussed in section 4.2.4. People may identify with an object for purely emotional reasons, for example if the impression is one of profound shock, and at other times they may identify with *objects* in a purely intellectual way.

In some respects, identification is the key process underpinning boundary weaving and it is only through a process of constant re-identification that boundary structures are maintained, as discussed in the next section. The relationship with *boundary weaving* is discussed further in section 4.4.

This section has set out the key relationships of this category with the other theoretical categories. Relationships with other theoretical categories, along with a number of additional insights that arose during the research, are discussed in the next section.

4.3.2.3. Discussion

In this section the following points will be discussed:

- The object-focused nature of identification
- The relationship between *impression* and *committing*
- The motivation for identification
- The role of (re)identification in maintaining boundary structure

The main insight that emerged from the research is that identification in organizational boundaries may be conceptualized as focused on *objects* rather than social groups, roles or aspects of a person. This view is a significant departure from traditional views of *identity* and is supported by recent thinking in the literature whereby *identity* is seen to arise not just from self-categorisation into social categories but from the "knowing" of practices, as suggested by Orlikowski (2002). In other words, *identity* can arise from identifying with a whole range of *objects*. These multiple *couplings* may also explain the *fragmentation* of *identity*.

In examining identification a little more closely, we saw there are at least two key attributes – those of *impression* and *commitment*. One insight that arose is that people cannot identify with an object if it does not exist for them. In other words, if an object is not visible, recognizable or comprehendible at either a conscious or sub-

conscious level, then it follows that they cannot couple with it. It makes sense that some kind of *impression* needs to be first established. Only then can people begin to *commit* to that object in one way or another. This insight underlines the importance of the attribute of *markedness* in *objects*. If an object is not marked it is not likely to make much of an *impression*.

As discussed in section 3.2.3.3.3, researchers have postulated that individuals are motivated by a desire to reduce factors such as anxiety and uncertainty (Griffin, 1997; Stets & Burke, 2000) and others argue that people are trying to manage *identity* conflict (Kreiner et al., 2006). This observation led to another insight of this research – that individuals may identify with *objects* in ways that manage anxiety, uncertainty or other such factors. For example, a person may *identify* with a particular way of doing things because they are comfortable with that practice and will strenuously *contend* any attempts to change it.

This desire to optimize a particular aspect of *identity* may be analogous to the concept of a fitness function in complexity theory (Anderson et al., 1999). Similarly one can imagine that the fitness function being optimized may change in any given situation, adding to the complexity of *interaction*s and thus encouraging an even broader diversity of emergent phenomena.

> ### Theoretical Memorandums
>
> **Duality of people**
>
> If people are successful in promoting the object, not only do they further *objectify* the boundary and cement their *commitment* to that object, other people come to associate (identify) the person with that object. Thus individuals themselves become objectified, that is they are both an agent and an object, and this is an inevitable consequence of *interaction*.
>
> **Levels of identification**
>
> Noting Burke's argument, in section 3.3.2.1, that identity development occurs at the levels of the social, the role and the person, we can hypothesise that the identification must relate to objects at these same levels of analysis. For example, social identification may relate to boundary infrastructures while personal identity may relate to internalised objects or representations of self.

Another insight relates to the need for regularity of interactions to provide opportunity for reaffirmation of the original identification. The suggestion here is that boundary structure is only held together by continual "re-identification" with *objects* – thus maintaining *couplings* over time. As people continually affirm their identification with certain *objects*/clusters, a familiarity and comfort with the status quo of the structures may develop. These stable configurations of couplings may then be labelled as named boundaries.

It is likely that (re-)identification occurs continuously as people go about their day-to-day *interactions*. Thus identification may happen sub-consciously as people accept the world around them, and its associated structure, as it is. However, it is suggested that identification is more pronounced, and conscious, in some actions, such as decision making, where people/groups *commit* to various *objects* such as a course of action or points of view.

4.3.2.4.　　Connection

In summary, we can now see that identification is a key social process contributing to the creation of organizational boundaries and is characterised by sub-processes of *impression* and *committing*. However, it is argued that these processes are greatly influenced by what occurs during *interaction*. It is now appropriate to move on to discuss *interaction*, which is another of the nine theoretical categories making up organizational boundary theory.

4.3.3. Interaction

4.3.3.1.　　Introduction

In section 3.3.3, different aspects of interaction are outlined with examples,

related literature and attributes. We saw in the findings that people seem to interact in two primary ways – through *contending* and *intermediation*.

Contending primarily takes the form of the creation and promotion of *objects*. *Contending* gives rise to resistance, which itself is a form of contending. People may be inclined to support the promotion of an *object* but may just as well resist it, paving the way for processes such as the negotiation of communicative meaning, the exercise of power and cultural sanction.

Intermediation is a less confrontational form of interaction than *contending* and *objects* tend to be less defined (i.e. lower markedness with higher abstractness and ambiguity). In particular, the interaction may not be as direct, perhaps involving intermediaries such as boundary spanners. The term "intermediate" is defined as "being situated, or acting between, two points, stages, things, persons etc" and an "intermediary" is a person "serving as an intermediate agent" who is "acting between
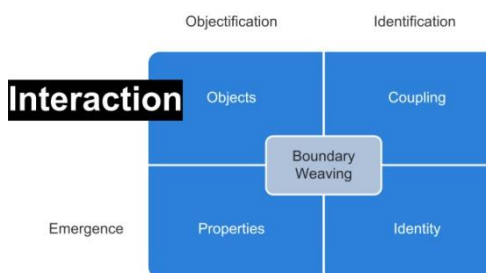
persons, parties, etc" (*The Macquarie Dictionary*, 1991). Note that the term "mediate" refers to specific situations where the intermediary is trying to bring about an agreement or peace between conflicting parties in a relationship and is thus narrower in focus. So the term "intermediation" brings with it a sense of neutrality and being situated between others.

Having examined the data we are now in a position to offer a new conceptualization of interaction and its attributes, in the context of organizational boundaries, as follows:

- ***Contending*** is the way individuals or groups promote and resist the placement of *objects* in the wider boundary structure.
- ***Intermediation*** is the way individuals use *objects* to facilitate outcomes.

We saw in section 3.3.3 that the dictionary definition of interaction and the common sense understanding of the term are closely aligned with its use in the context of organizational boundaries. A suggested definition in the context of organizational boundaries is:

Interaction is the process by which people act on each other through the contending of objects and intermediation of relationships.

In the next section, the relationship of this category and its attributes to all other theoretical categories is discussed.

4.3.3.2. Relationship with other theoretical categories

Figure 11 below illustrates the key relationships of the *properties* element with other theoretical categories and their attributes. These relationships are discussed in this and the following section.
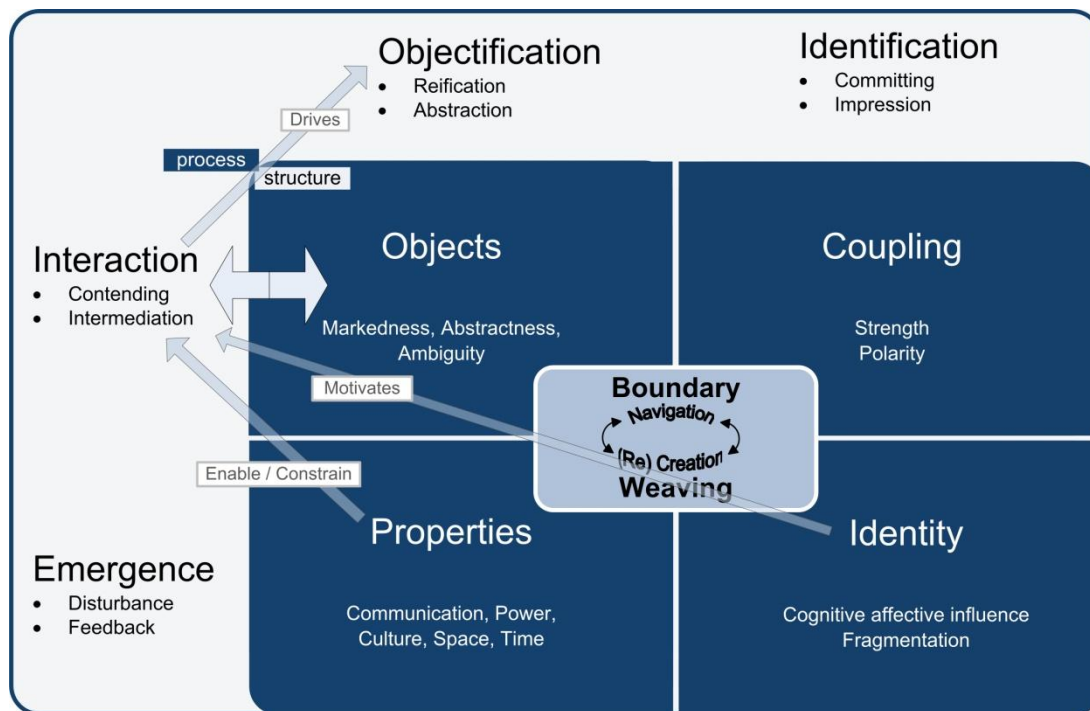
Figure 11: The relationship of the interaction category with other categories

The most direct relationship is between interaction and *objects*. *Objects* are used in both the process of *contending*, as people promote an *object*, and that of *intermediation*, as people cooperatively create *objects* to facilitate interaction. *Objects* are also a point of focus as people resist the promotion of the *object*. In the course of this contention, the *objects* may change and develop as the iterative process of *objectification* and *identification* occurs. In other words, if the promotion of an object is not successful, people may alter it, changing their *objectification* of it. In this way interaction may **drive** the process of *objectification*. In essence, as people encounter each other, *objectification* is required to create *objects* that facilitate the ongoing interaction and the nature of the objects created may be **motivated** by the cognitive affective influence of identity, which is discussed in section 4.2.4.

Interaction is also directly related to *identification*, as the *impression* that *objects* have on people is directly related to frequency and duration of interaction as well as factors such as proximity in interaction.

Interaction is also related directly to the *identity* category in that purposeful behaviour may be motivated by the *identity* of people, reflecting aspects of their *identity* such as *interests* and *habits*. People are constantly trying to balance and manage *identity* conflicts and this may drive the kinds of interactions they engage in and their subsequent behaviours. Similarly, *identification* underpins the *contending* attributes of interaction – people identify with *objects*, develop *couplings* (e.g. take positions, strong feelings) and then *contend* them in the course of interaction. In doing so they develop *commitment* to the *object* and this is reflected in the way they contend that *object's* position in boundary structure.

Interaction is **constrained and enabled** by the *properties* of an organizational boundary as they adhere to *cultural* norms, the realities of *power* structures and the limitations of the *communicative* environment. In addition, interaction occurs in the context of *space* and *time*. *Space* influences interaction in a number of ways relating to *proximity* and the *geographical environment*, as outlined in Section 4.2.3. *Time* also plays a critical part in influencing interaction, partly through frequency and duration but also via the influence of history and the accumulation of experience over long periods.

Theoretical Memorandums

Cross boundary conflict

An insight of the research is that *contending* with other people is always mediated by *objects*. However, because objects are coupled to people they should be considered as one and the same, as noted in the introduction to section 4.2.2.1. Thus to contend with others is to contend with their boundary objects and, vice versa, any "attack" on a boundary object is a confrontation with those who are coupled with it. This basic concept may provide an explanation for cross-boundary conflict.

Dimensional compensation

Another insight that arose is that different dimensions of interaction seem to compensate for each other's shortcomings. For example, where communication is intrinsically challenging, as in the example in section 3.3.3.2.2 on dealing with severe incidents, people may choose to exercise power to compensate for this. In other words, if reasoning is not working and interaction is threatening to spiral out of control, people may just order others to do things in a certain way, if they have the authority. Similarly, one can imagine circumstances where neither communication nor power arrangements are needed because the organizational culture encourages or inhibits behavior just as effectively. It may be that this "dimensional compensation" is an intrinsic feature of all interaction.

Lastly, *emergence* can only occur in the context of interaction. For example, *feedback* is essential to the *emergence* process (see section 4.3.4) yet is obviously a key part of interaction and a typical feature of *intermediation*. Similarly, aspects of interaction, particularly that of *contending*, may introduce *disturbance* and initiate the emergence of new *properties* and other changes in the social system.

Interaction almost seems to be the medium by which other social processes occur. People *objectify* the world around them during and for the purposes of interaction. The same can be said of *identification* while *emergence* only occurs because of the ongoing interaction.

The creation of boundaries through interactions arises from repetition, as people create initial *objects*, classify those they encounter and then continue to use them to facilitate ongoing interaction. Through ongoing interaction, people are constantly revisiting objects that have previously contended or accepted, thus reinforcing the boundary, lest it fade from organizational memory through lack of use. However, boundaries are never static and much of the interaction that goes on is driven by the equifinal choices people make, as they deal with the ambiguity of objects (along with varying context) that characterise boundary structures. The relationship with *boundary weaving* is discussed further in section 4.4.

This section has set out the key relationships of this category with the other theoretical categories. Relationships with other theoretical categories, along with a number of additional insights that arose during the research, are discussed in the next section.

4.3.3.3. Discussion

In this section the following points will be discussed:

- The relationship between *contending* and *intermediation*
- The relationship of *contending* to *power*
- The polarity of *intermediation*

There is a pleasing interplay and balance between the concepts of contending and intermediation. While *contending* is often characterised by confrontation, many *interactions* are characterised by a more collaborative atmosphere where people work together to "span boundaries". This facilitation of interaction is characterised

by seeking behaviours as people look to collaboratively construct useful *objects*. In any given situation both processes may be occurring simultaneously. *Contending* and *intermediation* may also have an iterative relationship. For example, an object may be developed or created in collaboration (*intermediation*) and once formed, is promoted (*contending*) to others.

One of the most elegant aspects of the *contending* attribute is that it neatly links into the characteristics of power, outlined in section 3.2.3.3.2. From the review in section 3.3.3.2.1, we can see that people *contend* the very distinctions and nuances of language that characterise the emergent properties of power. It is in the course of this *contending* that the *objects* underpinning power structures are created, including the development of accepted practices and associated language. In addition, contending inevitably leads to the changes in *coupling*. As people interact, one or more of the parties have to compromise their "position" (i.e. the nature of their *coupling* to the object) if they are to continue to interact in a manner acceptable to all. If they do not, this may lead to all out "war".

A final insight is that intermediation has a polarity in that it functions to both facilitate and block cross-boundary interaction. This agrees with Tushman's (1977) observation that boundary spanners also need to buffer units from uncertainty and information overload. It is also a logical fit in the context of this research because any theory of boundaries needs to explain not only examples of highly cooperative and interactive boundaries but the opposite.

A number of further insights were developed in relation to the subject of boundary spanning and this is discussed further in section 5.2.2.

4.3.3.4. Connection

In summary we can see that interaction is a key social process in that it seems to be medium by which other social processes occur. It has two key sub-processes being *contending* and *intermediation* and these explain much, but not all, of what occurs in boundaries. They are insufficient in explaining how *properties* emerge in organizational boundaries. Therefore it is appropriate to now discuss another of the nine theoretical categories making up organizational boundary theory, that of *emergence*.

4.3.4. Emergence

4.3.4.1. Introduction

In section 3.3.4, different aspects of
emergence that were noted in the research
are outlined with examples, attributes and

related literature. We can now summarize the role of emergence in relation to
organizational boundaries.
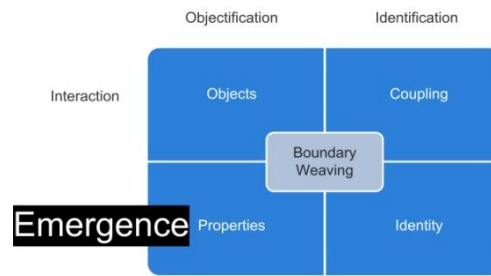
The role of the emergence category is to explain how certain enabling and
constraining *properties* of boundaries come into existence. We can see from the
introduction to section 3.3.4 on emergence that organizational boundaries are
constantly changing in ways that cannot always be explained by the intentional acts
of people. Rather, some changes appear to emerge spontaneously during *interaction*
and this category accounts for this.

Having examined the data we are now in a position to offer a new conceptualization
of emergence, in the context of organizational boundaries, as follows:

> **Emergence in organizational boundaries is the process by which higher-
> order properties of boundary structure and the identity of
> individuals/groups are (re)created during the course of interaction.**

Some key attributes of emergence can be defined as follows:

- *Disturbance* is the process by which changes to boundary *properties* are
  initiated.
- *Feedback* is the process by which boundary *properties* develop and form.

In the next section, the relationship of this category and its attributes to all other
theoretical categories is discussed.

4.3.4.2. Relationship with other theoretical categories

Figure 12 below illustrates the key relationships of the *properties* element with other theoretical categories and their attributes. These relationships are discussed in this and the following section.
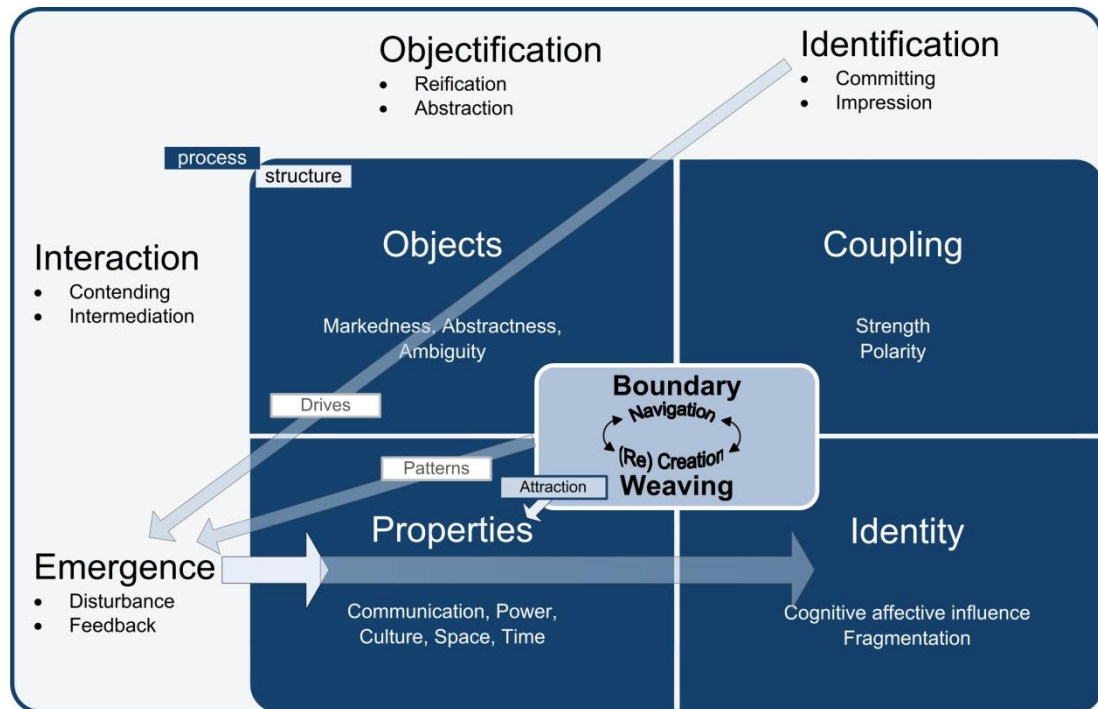
Figure 12: The relationship of the emergence category with other categories

The most obvious relationship is with *properties* which are the result of the emergence process. *Properties* "emerge" during the course of *interaction*, nucleating around *disturbances* and are amplified by *feedback* processes. These disturbances may arise from the *contending* nature of interaction and feedback certainly seems to be an inherent aspect of *intermediation*.

It is suggested that the same processes are occurring for the emergence of *identity* in people, although for *identity* there is also a more direct relationship with the process of *identification*.

A key insight of this research is that the **driving** force behind emergence of higher order *properties* in organizational boundaries may be *identification.* A key assumption or aspect of complexity theory is that the emergence of higher order *properties* occurs in situations with a "large number of agents interacting frequently together" as noted in section 3.2.3.1. It is normally assumed that, in organizations,

this frequent *interaction* is that of communication between people i.e. "human relating" (e.g. Stacey, 2001) and in this theoretical framework this would relate to the way people *objectify* and *identify* with each other. However, people are only one kind of object and there is no reason to attribute the process of emergence to just one type of *identification*. In addition, people *identify* with *objects* on an almost continual basis as they go about their day-to-day activities. Certainly it is frequent enough to support processes of emergence. As people revisit *objects* they are confirming the place of these *objects* in the structure by *(re)identifying* with them and providing the opportunity for higher-order *properties* to emerge – *properties* such as

> **Theoretical Memorandums**
>
> **The power law**
>
> One aspect of complex systems is that they are resilient to changes and it is unpredictable when disturbances will result in small, medium or large changes, if there is any change at all. However, it has been observed that such changes do follow a power law, with small changes being frequent and large changes being relatively rare. An **insight** of this research is that changes to organizational boundaries may follow just such a power law. For example there are often small changes to local practices and team structure, while organization-wide restructures happen only once in a while and changes to industries are even rarer but still happen every few decades.

relationships, norms or reputation. For example, a person may *identify* with someone on their first meeting but it is not till many *interactions* later that trust emerges.

A related insight is that emergence may nucleate around sudden changes in *polarity* or *strength* of a *coupling*. For example, it is easy to imagine a relationship between people or between an individual and an object that suddenly switches from positive to negative as, for example, in the wake of an argument or some revelation. This may impact on other related couplings and may result in a reordering of all couplings making up the local boundary structure.

The relationship with *boundary weaving* is somewhat indirect, as conscious human activity does not usually drive emergence directly. However, a general theme running throughout the discussion of boundary weaving in sections 3.4 and 4.4 is the idea that emergence of *properties* arises from **patterns** in interaction. These patterns may be an unconscious activity in *boundary weaving* and this is discussed further in section 4.4.

This section has set out the key relationships of this category with the other theoretical categories. Relationships with other theoretical categories, along with a

number of additional insights that arose during the research, are discussed in the next section.

4.3.4.3. Discussion

In this section the following points will be discussed:

- The relationship between *disturbances* and *feedback*
- The polarity of *feedback*

The emergence processes nucleate around small *disturbances* and higher-order *properties* are established via processes of *feedback*. Disturbances vary greatly in their nature, being both intentional and natural in origin, and can be anything from directives by people in authority through to changes in personnel or the introduction of new technology. Not all *disturbances* result in changes to boundaries. Rather, people choose what to notice and be disturbed by. Once disturbed, changes in organizational boundaries may be magnified by *feedback* in a wide variety of manners and is inherent in many cross-boundary activities such as building relationships, making decisions, the establishment of norms and the adoption of technology.

An insight of this research is that the polarity of *feedback* (i.e. positive or negative) seems to be a key aspect of developing or maintaining boundary structure. It may be that negative feedback helps maintains structure while positive feedback helps evolve or change it. For example, formality in feedback processes (such as the 21 day complaint period in posting processes and procedures for dealing with serious incidents) seemed designed to take the emotion out of *interaction* and allow people to deal with them calmly and rationally. In essence, negative feedback will return a system to its status quo while positive feedback processes may amplify change to the point where major change to a boundary occurs. A related insight is that people may naturally identify with particular *objects* (e.g. a fixed position, attitude or belief) in order to constrain the destabilizing effect of positive feedback. This is to avoid being overly influenced by others and swayed by every new idea that comes along.

4.3.4.4. Connection

In summary, we can see that emergence is a social process that explains how some aspects of social structure, such as *properties* and *identity*, come to be. Its primary

sub-processes of *disturbance* and *feedback* are important in that they begin to explain how people may consciously or unconsciously begin to weave the fabric of organizational boundaries. Yet emergence is just one of four social processes, so it is now appropriate to examine how all of these processes may work together and this is the focus of the last of the nine theoretical categories making up organizational boundary theory, that of *boundary weaving*.

4.4. The basic social process – Boundary Weaving

4.4.1. Introduction

The first chapter of this thesis laid out the central concern of this research – namely, "What is the nature of organizational boundaries?" In section 4.1.2 we introduced

a possible model for explaining boundaries, Section 4.2 detailed the major elements of social structure and section 4.3 laid out the key social processes relating to the phenomena of organizational boundaries. We are now in a position to examine how these may be integrated via a basic social process, that of *boundary weaving,* as suggested in the related findings of section 3.4.

Throughout section 3.4, a number of examples were given of how people deal with the elements of organizational boundaries, such as noticing them and developing understanding. It was found that a number of general processes, already noted in the literature, may be at work such as sensemaking, hermeneutics and recursion. In addition it was found that the way in which boundaries are created, and recreated, relate to the actions and beliefs of individuals and how they classify the world around them according to the dictates of their *identity*.

Having examined the data we are now in a position to offer a definition of the key attributes of *boundary weaving* as follows:

- **Navigation** is the way people develop and apply their knowledgeability of the world around them as they *interact* with other people.
- **(Re) Creation** is the way in which elements of boundary structure arise from the actions and beliefs of people as they unconsciously or purposefully classify the world around them in order to maintain or develop their *identity*.

The above attributes perhaps form the basis of *boundary weaving*. However, it was found that a number of other attributes are useful in explaining the key attributes of boundary weaving, as follows:

- **Embodiment** is the degree to which people cooperatively interact with each other in developing boundary *objects*.
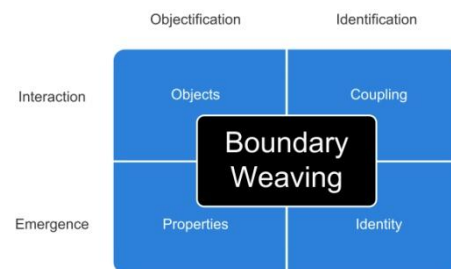
- **Multiplicity** is the extent to which people develop variety and variability in their *couplings* with *objects*.

- **Domain** is the set of *objects* that people *identify* with in cross-boundary interactions, reflecting their identity.

- **Attraction** is the pattern in *interaction* that gives a boundary its most notable *properties*.

It was noted in section 3.4.1 that the term *weaving* is a metaphor with two different meanings relating to the two key attributes identified above. With these metaphorical aids in mind, we can now define the basic social process of *boundary weaving* as follows:

> **Boundary weaving is the process by which people continually *(re)create* the structure of organizational boundaries at the same time as they *navigate* their way through them.**

By "structure" of organizational boundaries, we mean the four categories outlined in section 4.2, relating to *objects, coupling, properties* and *identity*.

As *boundary weaving* is the core category it is worth elaborating on the above attributes and their relationship with other theoretical categories. This elaboration is set out in the next six sections.

4.4.2. Relationship with other categories

Figure 13 illustrates the relationship between boundary weaving and the other theoretical categories. This diagram includes those relationships already discussed so far in chapter 4 as well as a few extra ones that complete the picture.
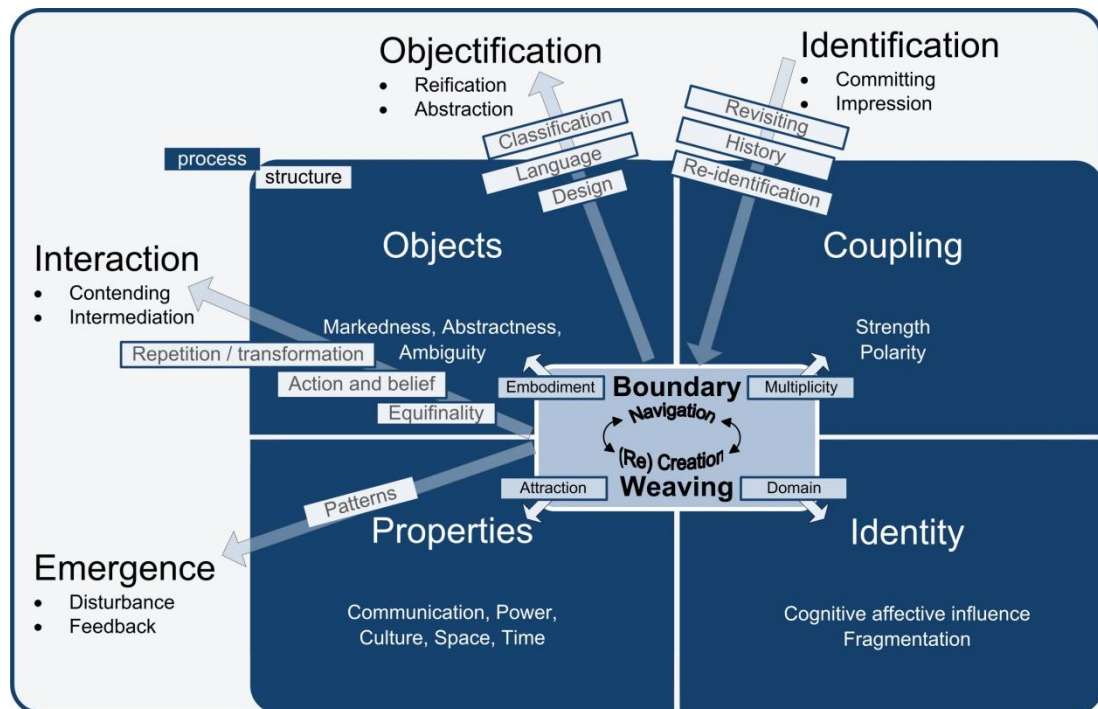
Figure 13: A summary of boundary weaving relationships with key categories

In figure 13, a number of key words used to explain the theory have been superimposed over the diagram in white text blocks. These key words are highlighted in **bold** in the discussion of the following section.

In this section the following key points are discussed:

- How people call forth boundaries through noticing and choosing
- The role of equivocation and equifinality
- How boundaries arise through repetitive and transforming actions, either by design or through patterns
- How people invest in domains of objects and alter their couplings with changes in context
- How classification and language underpin navigation and (re) creation
- How identity conflict drives purposeful behaviour

- How revisiting and re-identification with objects develops knowledgeability and reinforces the structure at the same time.
- The role of embodiment, multiplicity, domain and attraction in boundary weaving.

A general point arising from the findings on *boundary weaving* in section 3.4 is that boundaries are products of people's imagination. In that sense people "call forth" a boundary, "selecting" those *object*s to which they will pay attention and "choosing" what to be disturbed by. In this way people create and recreate boundaries. This noticing and choosing is a key step in the sensemaking process that prevents people being overwhelmed by the myriad of *object*s around them. It is also a key aspect of navigation as people notice *object*s and other aspects of boundary structure, weaving their way around them.

This selective choosing may arise from the *fragmented* nature of *identity*. One aspect of a person's *identity* may ignore a particular disturbance while another aspect may be greatly moved by it and as a person manages these conflicts of *identity* they inevitably must choose a response, even if this is done sub-consciously.

This idea of boundaries being "what we choose them to be" is also implicit in the discussion of equivocation and equifinality in section 3.4.2.1.1. People always modify their actions to suit the context and actions vary from person to person according to their *identity*. As a result, the meaning people attribute to *objects* is equivocal, changing with the situation, and this contributes to the *ambiguity* attribute of *objects*. In this sense people are active agents, changing the nature of a boundary as they equivocate and contributing to their complexity. However, this does not seem to hinder cross-boundary *interaction* as people accommodate equivocation by acting with equifinality – people do not need to agree on the meaning of *object*s in order to cooperate across boundaries.

We make sense of boundaries by taking actions, as noted in section 3.4.2.2.1 and also through beliefs that drive our actions. **Repetition** of actions, and the associated beliefs underpinning them, leads to the creation of boundary *objects* to facilitate ongoing *interaction*. Similarly, boundaries may be changed by **transforming** actions as people *contend* the nature of *objects* and their position in boundary structure. Some aspects of structure, such as *object*s may be **designed** or activated

purposefully, and this may lead to the impression that overall boundary structures are being designed as people embed *objects* to facilitate *interaction*. However, this impression is somewhat misleading as the *emergence* of particular properties and aspects of *identity* cannot be predicted.

Alternatively, boundaries may just evolve, or *emerge,* naturally from **patterns** generated in the course of the continual *re-identification*, that arises during *interaction*. These patterns may not be explicit and, as Giddens (1984) suggests (see section 3.2.3.3), may only be inferred from surface manifestations. Indeed these patterns form basins of *attraction* that work below the surface to subtly influence all the social processes of organizational boundaries. In other words, our boundary weaving may unconsciously produce patterns that recursively influence boundary weaving itself.

As people *interact* over long periods of time and develop more refined and nuanced boundary structures, they develop expertise, essentially investing themselves in a particular domain of *object*s, developing a strong *coupling* with it. In such a case, the polarity of the *coupling* would generally stay the same. However, even with strong *couplings*, the *polarity* can abruptly switch due to a change in context.

One of the most fundamental actions by which we enact the boundaries around us is through the process of **classification**, which we do intuitively, often unconsciously, as we go about our day-to-day *interaction*s. As Bowker and Star (1999, p. 1) say, "to classify is human". So as people navigate boundaries they are, as Weick says, "bracketing it", creating distinctions and, in particular, developing **language** that characterises the organization and its boundaries. This process of creating distinctions not only helps people navigate and make sense of the different things they are encountering but weaves the fabric of the boundary structure itself at the same time. Bracketing has the effect of creating parts that fragment the wholeness of the boundary, inherently encouraging iteration between the parts and possibly initiating a hermeneutic circle.

In complex systems agents may strive to increase a fitness function and, as noted earlier in section 4.3.2.2, the fitness function of organizational boundaries may be the sense of *identity* of individuals and groups. In other words, people will navigate, create and modify boundaries in a way that helps manage their *identity* conflicts and

weave the boundary in the process. Similarly, the need to manage conflicts between different aspects of *identity* may underpin purposeful behaviour, including design of boundaries, *contending* of *object*s and *committing*.

In line with the recursive nature of boundaries, we can also say that as people create boundaries they are also creating their own *identity* (which is of course implicit in this theory as *identity* is one of the key elements of boundary structure). As people identify strongly with individual *objects* or domains of *objects*, such as a body of knowledge underpinning their expertise, they are also creating identifiable aspects of their *identity*. As the context of *interaction* changes, the different aspects of a person's *identity* may come into conflict – through processes of intrusion or distance, as outlined in section 3.4.2.2.4.

Despite the uncertainty arising from the *fragmentation* of *identity*, equivocal actions and *emergence* of unpredictable *properties*, people do become familiar with particular boundaries, leading to an accomplishment in navigating them. This arises as people continually **revisit** aspects of boundary structure and **re-identify** with particular *object*s and clusters of *object*s (domain), developing understanding with each visit. This iterative process involves coming to understand the narrative-like storylines that are occurring in the organization and the broader **historical** context. Knowing the history, allows people to develop the mutual expectations that characterise *interaction*.

These iterative processes lead to a "knowledgeability" which, in the context of this research, is a basic ability to navigate boundaries. This is a hermeneutic awareness that arises though experiential understanding of both particulars and the whole of a context, switching frequently between ontological levels from the individual to broader society. People develop a deeply intuitive understanding of the world around them and how to navigate the myriad of boundaries they encounter, including organizational boundaries, albeit with differing levels of competence.

This knowledgeability not only underpins the ability to navigate organizational boundaries but it is also the basis of power, as discussed in section 3.4.2.2.2. As people draw distinctions in organizations, label *object*s and create descriptive language, we not only develop knowledge but set the boundaries of it at the same time. Our knowledgeability creates the reality of organizational structure.

These iterative processes of revisiting boundary object not only helps develop knowledgeability and facilitates navigation but they also drive the (re)creation of boundaries through constant re-identification. As time goes by people navigate boundaries, they are constantly reinterpreting and re-identifying with their various structural elements, effectively changing history and the structure of boundaries. At the same time as they are (re)creating boundaries, they are also (re)constructing their own *identity*. So navigating the historical context of boundaries also (re)creates them – a basic recursive process.

The above take on the role of knowledge has important implications for the field of knowledge management and this is discussed further in section 6.4.2.

All of the discussion in this section so far has focused primarily on the role of the key attributes of navigation and (re)creation. This section finished with a summary of the role of the remaining attributes of *embodiment, multiplicity, domain* and *attraction.*

The key points arising from this diagram are as follows:

- *Weaving* boundaries involves the *navigation* and *(re)creation* of *objects* and this is done with varying levels of ***embodiment***.

- In *weaving* boundaries, people *identify* with a *multiplicity* of *objects*, resulting in the *(re)creation* of a ***multiplicity*** of *couplings* which must also be *navigated*.

- As people *identify* with and *navigate* a variety of *objects* and *couplings*, they are classifying them and relating them to each other to create ***domains*** while also (*re)creating* their own *identity*.

- As people continue to *navigate* and *(re)create* boundaries, *properties emerge* that enable and constrain ongoing *interaction*. In doing so, patterns may form that act as complex basins of ***attraction***.

4.4.3. Discussion

4.4.3.1.   Navigation and (Re) Creation

This section discusses the following:

- The role of people in boundary theory
- The balance of design and emergence in boundaries

- How boundaries reflect identity

A key point to note is that in all of the above discussion of navigation, there is no objective "out there" that is separate from the navigator. The discussion of recursion in section 3.4.2.1.4 makes the point that we create the environment at the same time as we navigate it. To a certain extent, this explains why "people" do not feature as a separate category of the research, they are an implicit aspect of the basic social process.

An insight of this research is that boundaries seem to have a mixture of designed and naturally evolved (or *emergent*) features and the distinction between them may be quite blurred. While it may be difficult or impossible to predict the detail of emergent *properties* in foresight, in hindsight we may see a logical path, whereby people's deliberate actions led to the emergence of new *properties*. Conversely, in labelling some aspects of boundaries as "designed" one may miss some of the complex dynamics which led to the moment of design.

In the same way that *objects* are a reflection of *identity* (see section 4.2.1.3) boundaries may also reflect the *identity* of people. People either interpret the aspects of boundary so they are compatible with their *identity* (e.g. view of the world) or they are forced to alter their *identity*.

4.4.3.2.   Embodiment

This section discusses the following:

- The relative nature of highly *objectified* and embodied boundaries
- The relative complexity of embodied boundaries
- Embodiment as a source of friction

The idea that boundaries have a greater or lesser degree of reliance on *objects* is an intuitive one. The suggestion is that a highly "objectified" boundary may involve an intensive use of *objects* that tend to have static qualities (e.g. physical or rigid) and lend themselves to being "exchanged" as part of some transaction. Such boundaries are likely to be characterised by agreed procedures and processes as well as communication systems for the exchange of information. By contrast, highly "embodied" boundaries may involve *objects* that are less well defined, co-operatively *created* "on-the-fly" and are flexible, evolving to meet the changing circumstance of

the relationship. Such boundaries would be characterised by strong relationships based on trust. So in certain contexts people intuitively behave in ways required to make cross-boundary relationships work, rather than relying exclusively on objectified rules of engagement. As noted in section 3.4.2.3, boundaries will always have a mix of embodiment and objectification, lying somewhere on the spectrum between highly objectified and highly embodied.

Boundaries that are highly embodied may be inherently more complex than highly objectified ones because of the fluid nature of relationships and the way they are constantly changing. Boundaries characterised by a large number of highly reified *objects* may merely be complicated, although it should be recognised that having a large number of *objects* may reflect attempts to reduce the complexity of a boundary.

Lastly, an insight of this research is that embodiment may help explain the metaphor of "friction" in an organizational boundary. Organizations seeking to improve efficiency typically try to increase *objectification* with the introduction of rigid procedures and computerised systems. Here people have objectified as many conceivable modes of *interaction* as possible and developed systems to support them. However, it could be argued that increased *objectification* may also reduce the potential for innovation as people feel constrained to use only approved *objects* in facilitating *interaction*. Friction is discussed further sections 5.4.3.2 and 6.4.1.

Embodiment is just one of six attributes of *boundary weaving*. The next section discusses another attribute, that of *multiplicity*.

4.4.3.3. Multiplicity

This section discusses the following:

- The role of *objects* in creating multiplicity
- How a singular boundary cannot exist
- Multiplicity as a source of tension

The idea that organizations have multiple boundaries is again an intuitive one. However, it would be misleading to think of this multiplicity in terms of connections between multiple individuals or groups of people. As noted in section 4.2.2.2, boundaries should not be thought of in terms of differences between groups but by the *objects* that connect them. Therefore the idea of multiple boundaries relates more

to the number and clustering of *objects* (into *domains*) that are used to facilitate *interaction*. As Abbot (1995) says, groups are only objectified and named after the connection has been established.

As soon as one begins to conceive of boundaries in terms of *objects* and the way individuals/groups identify with *objects*, the notion of multiplicity becomes clearer. People can, and commonly do, develop *couplings* with multiple *objects*. As multiple others identify with the same *objects*, then multiple boundaries begin to form with a variety of people interconnected by these *objects*. Also, boundary *objects* can and often do have multiple purposes and facilitate multiple forms of *interaction*, depending on their level of *ambiguity*. This again would encourage the development of multiple connections/boundaries.

There are a few implications arising from this view of boundaries. It seems that people are surrounded by a continuous spectrum of *objects* that connect them with a myriad of others. So the first implication is there is never any single defined boundary as such between nominally defined groups, even though an analyst could artificially define one. Even in the simplest case of two nominal "groups" interacting with each other, there will almost always be multiple boundaries between these groups relating to the different focuses of *interaction* (i.e. *objects*). Secondly, where people do conceive the notion of a particular "boundary", which they label with a name, this arises mainly due to the *markedness* of the *objects* (and *properties*) that characterise it. This *marked* boundary will be interconnected with multiple other boundaries that may be much less marked and hence, not noticed.

In addition to multiple connections, we can see from the attributes of *coupling* in section 4.2.2.1 that these connections may vary greatly in *strength* and *polarity*. If multiple people have a strong attachment to an object but different polarity (e.g. differing views of the way things should be done) then this may be a source of tension. Similarly, as people increase their commitment to particular *objects*/domains over others (e.g. a body of knowledge) then they will resist changes that threaten the place of these *objects* in the wider boundary infrastructure. The metaphor of tension is discussed further sections 5.4.3.2 and 6.4.1.

The multiplicity of boundaries is a source of complexity in organizations because, being so deeply interconnected, changes to one object or a named "boundary" would

affect multiple other boundaries, *disturbing* the whole system which may (or may not) result in catastrophic (from a complexity theory point of view) changes.

Multiplicity is just one of the six possible attributes of *boundary weaving*. The next section discusses another attribute, that of *domain*.

4.4.3.4. Domain

This section discusses the following:

- The concept of boundary infrastructure
- Differences with the concept of domain in communities of practice theory.
- The explicit and tacit dimensions of knowledge
- Domain as a source of permeability

When interviewees in the study site were asked to *identify* the people and groups they interacted with, they invariably did so in terms of the activity or function that was the focus of *interaction*. So domain, as discussed in section 3.4.2.5 and grounded in identity, is an intuitive aspect of boundary structure.

Chapter 3 presents an overall picture of a loose interconnection of structural elements (*objects*, *properties, coupling* and *identity*) being organized into "clusters" as people interact together and identify with a variety of *objects*, forming relationships between them as they compare *objects* and classify the world. Over time, these clusters may be similarly associated with other clusters to form what could be called "boundary infrastructure", particularly as the number of participants grow. The term "domain" can be used to describe these clusters at any level, from *interaction* at the individual level through to an industry-wide or international level.

It should be noted that the term domain is a key element of practice theory, as in the concept of "communities of practice" (Wenger, 1998). The key difference in the use of this term in the theory being developed in this chapter, is that domain does more than define the *identity* and scope of a community. In this theory, domain serves to facilitate any kind of *interaction* at all, not just those between practitioners of different types. In the context of organizations, the huge variety of different roles and activities can make it difficult to identify practitioners of any particular type. So any attempt to define particular domains of practice will miss a large percentage of an organization's activities. This can be even greater in the context of *interaction*

between organizations including, for example, customers/consumers, suppliers, or regulators.

An insight of this research is that explicit and tacit dimensions of knowledge may be explained in terms of how well defined these clusters are. Where people relate *objects* to each other and they are *marked*, then people are able to reflexively articulate these relationships as a labelled, definable domain of knowledge. However, for every *marked* cluster of *objects*, there will be a large number of other *objects* that make up the background context of that cluster. These unmarked *objects* play an important role, because they provide the contrast for what the domain does not relate to and, critically, a knowledgeable person must be aware of these in order to appreciate the contrast. This awareness may provide the basis of tacit knowledge, in that they still provide people with the ability to *navigate* and *(re)create* boundaries yet they cannot reflexively articulate the domain of knowledge which enables them to achieve this.

Where domains overlap with others, the boundary seems likely to be more complex as people contend boundary *objects*, potentially changing them in unexpected ways. An insight of this research is that this attribute may also explain the metaphor of permeability in boundaries. The notion here is that as people familiar with one domain of *objects* interact with others employing a different domain of *objects*, they may introduce *objects* from one domain to the other simply through using them for communication purposes if nothing else. Thus *objects* such as ideas or concepts may leak from one domain to the other and these commonly shared *objects* become the basis of a boundary between the two domains. If the sharing of *objects* stops there then it would be a relatively impermeable and sharp boundary but if over time a large number of *objects* came to be shared, the boundary may become relatively permeable and so soft that its hard to notice a boundary at all. Permeability is discussed further in sections 5.4.3.2 and 6.4.1.

Domain is just one of six attributes of *boundary weaving*. The next section discusses another attribute, that of *attraction*.

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4.4.3.5. Attraction

This section discusses the following:

- How attraction drives patterns of *interaction*
- The resilience of organizational boundaries
- Attraction as a source of stability

The suggestion underlying this section is that *interaction*, and hence boundaries, may be characterised by a wide variety of attractors that are influenced by *marked objects* and emergent *properties*. It makes intuitive sense to think of boundaries as characterised by people being attracted to certain styles of *interaction* – we all know of relationships that are "stuck in a rut".

It's important to understand that individual *objects* or *properties* do not act as point attractors, no matter how *marked*. Rather, the *interaction* forms patterns by which we may characterise and label the overall boundary. For example, we may describe a boundary as "political", meaning that *interaction*s always follow a certain pattern related to the exercise of power. Importantly, we saw from the findings in section 3.4.2.6 that boundaries are characterised by a variety of attractors working together.

We also saw that this aspect of complex systems may explain the resilience of boundary to change for most of the time, i.e. a boundary may be disturbed but usually returns to its pre-disturbance configuration or equilibrium as influenced by the attractors. We also saw that complex systems occasionally tip over into a new phase-state with a different regime of attraction and that the scale of the change follows a power law. This makes intuitive sense for organizations where minor change to roles and processes are far more common than organization wide restructures and radical changes with the organization's customer and supplier base is even rarer.

An insight of this research is that attraction helps explain the metaphor of stability of boundaries. Once patterns of *interaction* are established, people tend to stick to them. Any disturbance may change the patterns of *interaction* at a boundary but according to complexity theory it is unpredictable whether the changes will be minor or major, if there is any change at all. Stability is discussed further in sections 5.4.3.2 and 6.4.1.

Attraction is the last of the six attributes of *boundary weaving* to be discussed. The next section discusses the relationship of *boundary weaving* and its attributes to the other categories of this theory.

4.5. Summary

This chapter has set out a theory of organizational boundaries. A total of nine theoretical categories have been present that are divided into four elements of social structure, four elements of social process and a basic social process that integrates all of these. The relationship between each of the categories and their attributes was explained, along with a discussion of a variety of insights that arose in the course of the research.

The theory developed in this chapter shall henceforth be called **organizational boundary theory**. The next chapter compares organizational boundary theory to a range of related theories in the literature.

5. Discussion

5.1. Introduction

5.1.1. Structure of chapter

The previous chapter outlined the theory that was developed and grounded in the findings of research. The discussion in the previous chapter was self-referential i.e. it discussed the theory in terms of itself and in relation to any literature that was directly relevant to key points of the theory and data. The purpose of this chapter is to discuss the overall theory in relation to alternative and related theories in the literature.

Section 5.2 discusses theory relating to boundaries and section 5.3 discusses the relation to activity theory, systems theory and complexity theory. Finally, in 5.4, the appropriateness of the boundary metaphor is discussed and reframed in order to better convey the nature of organizational boundaries.

For the purposes of comparison, the grounded theory developed in chapter 4 shall now be referred to as "organizational boundary theory".

5.2. Extant theories of boundary

5.2.1. Typology approaches

If it can be said that there is a dominant view of organizational boundaries, then it would be simply that they are "multi-dimensional". The multi-dimensionality approach is attractive because it suggests that in analysing boundaries, one only needs to be aware of and consider the implications of a (short) predefined list of dimensions. The discussion of the *multiplicity* attribute of *boundary weaving* (section 4.4.3.3) outlined a different view of this multi-dimensionality. What this section didn't discuss was the actual dimensions and associated typologies that were suggested by a wide range of researchers. Table 4 below summarises the findings of key researchers in this field.

Researchers	Suggested dimensions / typologies
Blomberg et al (2007)	Interests, interpretive frameworks, trust, private/organizational, priority
Carlile (2002)	Syntactic, semantic, pragmatic
Espinosa et al (2003)	Geographic, functional, temporal, identity, organizational
Hernes (2004)	Mental, social, physical
Kolb (2008)	Geo-physical, technical, interpersonal, group, organizational, networks, economic, cultural, political, philosophical
Orlikowski (2002)	Temporal (time), geographic (space), social, cultural, historical, technical, political
Santos and Eisenhardt (2005)	Efficiency, power, competence, identity
Watson-Manheim (2002)	Physical, temporal, work group, organizational affiliation, relationship with organization, culture (functional, organizational regional, national)

Table 4: Suggested dimensions of organizational boundaries

A few authors claim to have identified the groupings by clustering observations in their research (e.g. Blomberg et al., 2007) and others attribute them to commonly accepted frameworks (e.g. Hernes, 2004) but most acknowledge that their lists are not exhaustive, requiring further research to validate them.

One of the basic issues of the typology approach is that any one of the above typologies could be further divided into a whole range of possible "sub-dimensions". For example in the early stages of this research a range of other possible dimensions were identified relating to: personality, relationship style, preferred work mode, ICT comfort level, entrepreneurial attitude, experience/expertise, training, capability, operational knowledge, legal, legitimacy, distance/proximity, office and building design, communication medium and technical platform, connective device availability, security classification, synchronicity, linear dependency, speed/urgency, time pressure/prioritization, deadlines, language, transmission quality, communication competence, absorptive capacity, critical thinking skills, trust and authority.

This researcher initially made an attempt to identify a core set of dimensions that were grounded in the research data. However, this attempt quickly foundered in the sheer diversity of the above "sub-dimensions" and the difficulty of categorising phenomena as being mutually exclusive to one or other of the dimensions.

The key point is that the typologies suggested, while often having one or two categories in common, are substantially different from each other. This indicates that no consensus exists among these researchers. It would appear that no one has done enough empirical research specifically aimed at justifying a set of categories or dimensions to have any confidence in such an approach.

Also, researchers had difficulty in isolating any particular dimension for study. Espinosa et al (2003, p. 159) said:"Although researchers may attempt to draw conclusions about the effect of one type of boundary, such as distance, we often cannot be sure that the effects we observe are not due to other boundaries".

The researcher concluded early on that defining the structure of boundaries in terms of dimensions alone was a problematic and flawed approach, particularly as it did not explain the role of *objects* and *properties* outlined above.

This conclusion is supported by Hernes (2003, p. 50) who said:

> *As much as we would like to classify boundaries, the closer we get to life in organization, the more we appreciate that boundaries are in themselves deep structure with elements of all ... types... A richer appreciation of boundaries in organizations could usefully be done with studies that do not order boundaries into predefined categories.*

This theory offers an alternative way to thinking about the multi-dimensionality in two ways. Firstly, as discussed in section 4.4.3.3 on *multiplicity*, multi-dimensionality is seen as arising primarily from the diversity of *objects* that characterise organizational boundaries. Secondly, many of the dimensions suggested above may be thought of as emergent *properties* that are unique to the context of any particular *interaction*, as discussed in section 4.2.3.2.

It could be argued that the above list of dimensions are "typical" of many organizations as they undoubtedly are – but they are inadequate for providing a theoretical model of organizational boundaries. Analysts need to be aware of other aspects of boundary that also need to be considered and these are set out in Chapter 4. The issue in the discussion of this section is not whether typologies are useful

analytical tools. The issue is that they should not be used as a starting point for theory on organizational boundaries.

The organizational boundary theory of this research offers several possibilities for developing a new approach to typology in boundaries. For example, a typology could be constructed based on the four secondary attributes of boundary weaving, being embodiment, multiplicity, domain and attraction. Such a typology might range from boundaries that are highly embodied, with black and white multiplicity, a small domain and a very strong attraction through to those are highly objectified, grey, a vast domain and loose attraction. Development of such a typology could be the subject of future research.

5.2.2. Boundary spanning

In section 4.3.3.1, the role of so-called "boundary spanners" was recast as *intermediation* and in section 3.3.3.2.2 the literature on the topic was briefly reviewed. In general, the literature was found to be relevant and useful but only in explaining certain boundary situations where particular individuals were acting as boundary spanners. Based on the findings of this research and the model proposed a number of key arguments can be made as follows.

Firstly, there is a need to broaden the scope of the boundary spanning literature. This literature primarily focuses on characteristics of good boundary spanners (they must be legitimate, peripheral, and inclined (Levina & Vaast, 2005)); their different modes of engagement (external gatekeepers versus internal organizational liaisons (Tushman, 1977)); and the contrast between nominated boundary spanners versus those that emerge in practice (Levina & Vaast, 2005). In general, this literature seeks to explain the observed phenomena of "communication stars" (Tushman, 1977) rather than normatively suggesting how boundaries ought to be spanned.

A key observation by the researcher led to a divergence from this focus. The observation was that everyone in the headquarters was engaged in boundary spanning activity of one sort or another, even if they were not stars of this activity. Indeed, boundary spanning seemed to be more of a general competence than a specialised skill, a view supported by Johnson and Chang (2000).

If boundary spanning is a general competence, we can now look at the model of chapter 4 to consider, in more detail, the key aspects of this competence. For example, we can see that traditional boundary spanning skills would fall under the *intermediation* aspects of *interaction* but that people need to be equally good at *contending* (e.g. skills relating to influencing tactics). We need to think about boundary spanning as encompassing a range of activities relating to all aspects of boundaries. So looking at the *properties* of boundaries we can see that in addition to communication activities, boundary spanners would also need to engage in power broking, crossing cultural divides and dealing with the effects of space and time. In addition, they would need to understand the role of *objects* and encourage *objectification* where required, possibly designing new ones themselves as needed. Ideally they would also play a psychological role in facilitating processes of *identification* and assisting people to manage *identity* conflicts. They may even play a leadership role, disturbing systems where necessary and providing feedback to encourage new emergent *properties*.

These suggestions are but a few of the potential lines of inquiry. Further work would be needed to flesh out all the implications of the model.

In looking at this diversity of activities, it seems that "spanners" would be better described as "boundary architects". In essence, these people are actively encouraging and managing the processes by which the structure of boundary emerges. This role may well be beyond the capabilities of any one individual and certainly overlaps with key leadership and management functions. We may therefore be better served in thinking of boundary spanning as a cross-functional team activity rather than the preserve of talented individuals.

The above observations on competence leads to a second, related, argument – that we need to think of boundary spanning as more than information sharing. This insight arose from examining the activities of the one obvious "boundary spanner" in the study site as noted in section 3.3.3.2.2. The key phrase they used to describe their spanning activity was "they come to me and from there I either respond to or direct to right place". This second option of choosing not to interact directly but to facilitate a connection to another more appropriate person is essentially the creation of a new connecting boundary and a subtle shift in the overall the boundary structure of the study site.

Only a few researchers (e.g. Cranefield & Yoong, 2007) have examined the actual boundary spanning activities and these are largely related to knowledge management processes, such as filtering and searching for information, defining and articulating information that needs to be shared, then presenting and disseminating the information. It seemed to this researcher that information exchange was simply one means to a wider end, which is about facilitating productive *interaction* and boundary spanning should be aimed at a range of management outcomes such as better efficiency and innovation, as outlined in section 6.4.1.

A third key argument is that we need to avoid thinking of boundary *objects* as specially designed, concrete artefacts used for communicative purposes. Boundary *objects* can, of course, be just that. However, restricting thinking about *objects* to this narrow definition means that the wider concept of boundary structure can be lost from view.

A key insight of this research was that anything could be considered a boundary object as long as it is *abstracted* and *marked* i.e. it stands out from its context. These attributes, outlined in sections 3.2.1.3 and 4.2.1, stand in contrast to the attributes of boundary *objects* set out by Wenger (see section 3.2.1.2) being modularity, abstraction, accommodation and standardisation. These attributes apply to what might be considered an "effective" boundary object and generally refers to the designed features of the object. However, they do not account for the nature of boundary *objects* that are not designed, such as the CT scanning machine example given in section 3.4.2.2.1. These kinds of *objects* are not modular, standardised or abstracted in Wenger's sense of the term, where features are deleted, and in that example, the object was not accommodating to all users. Nonetheless, it served as a point of focus for the reconstruction of boundaries between technicians and physicians.

Furthermore, the conventional conception of boundary objects is one of a unitary, discrete artefact. However, as the discussion of section 4.2.1.2 makes clear, boundary *objects* may be fractal and inextricably interconnected with the wider boundary structure. The process of classification in which distinctions are drawn between different aspects of boundary, outlined in section 3.4.2.2.2, means that some *objects* only make sense in relation to the other *objects* to which they are compared and cannot be isolated from their wider context.

A final point in this argument, which recasts the nature of boundary spanning, is that boundary spanners themselves should be considered as objects. This is because people routinely objectify others and themselves in their roles, as noted in section 4.3.1, and people are essentially products of power relations or contending, as noted in section 4.3.3. The implication of this is that boundary spanners should not be considered as passive conduits of information but as active elements of boundary structure that both weave and are woven into the fabric of boundary structure.

5.2.3. Reconceptualizing Groups

Boundaries and groups are often spoken of in the same breath, as in the "boundary between groups". For some the "edges" of groups are synonymous with boundaries. A traditional view of groups is that they arise from qualitative properties of their members, who share some common trait or characteristic. Tajfel and Turner (1985, pp. 16-17) said:

> *Social identity theory suggests pressures to evaluate one's own group positively through in-group / out-group comparison leads social groups to attempt to differentiate themselves from each other.*

In other words, a social group is considered to be one where people view themselves as members of the same social category – people are either "in or out".

It is important to understand how this in/out view of groups and boundaries relates to the theory outlined in this thesis and in particular how it is reconciled with an alternative, somewhat disruptive, view of some other boundary researchers as typified by Abbott (1995, p. 857) who argues:

> *It is wrong to look for boundaries between pre-existing social entities. Rather we should start with boundaries and investigate how people create entities by linking those boundaries into units. We should not look for boundaries of things but for things of boundaries.*

Abbott's basic argument, outlined earlier in section 3.4.2.2.1, is that groups are defined by the nature of their boundaries rather than by any inherent qualities of the members. The critical implication of this view is that so-called boundaries between groups should be thought of as zones of connection rather than as lines of distinction. These group boundaries would be primarily characterised by their "boundary *objects*", those *objects* that are shared between the groups.

Complexity theory and in particular the concept of "self-organization", brings yet another perspective on the notion of groups and boundary. Complex systems, particularly autopoietic ones, tend to self-organize via the *interaction* of lower level agents and give rise to patterns or structure that are differentiated from the background environment, in much the same way groups are differentiated entities within organizations.

Juarrero (1999) claims that self-organization, as a theory-constitutive metaphor has significant implications for philosophies of *identity*. She uses the example of autocatalysis, to show how "organizational closure" can differentiate a web of connections from the background "out of which it emerged, partly decoupling them and thereby conferring on the network a particular identity" (p. 123). Such self-organizing systems may be viewed as "meta-stable networks of transformation, nested, hierarchical arrangements of organizational patterns: 'structures of process' " (p. 124).

Similarly, Simon (1962, cited in Heylighen, 1989, p. 2) said:

> *Complex systems ... are characterized by a multi-level structure [where] elements are connected and combined by natural interactions ... thus creating a variety of assemblies. Of these assemblies only those will "survive" which are sufficiently stable, the other assemblies will fall apart before they can undergo any further evolution. The stable assemblies, forming "naturally selected wholes", can then again function as building blocks, to be combined into higher order assemblies, and so the process can repeat itself at ever higher levels, forming a set of hierarchically structured complexes.*

This view of structure in complex systems immediately prompts the suggestion that perhaps people couple with *objects* in ways that similarly cluster them together in "a variety of assemblies" and these clusters relate to the *domain* of a boundary.

A related concept arising from the complexity sciences is that of "patching" or "clustering" coined by Kauffman (1995, cited in Stacey, 2001). Stacey said (2001, p. 177): "Patching means that each cluster of agents pursues its own activities, largely ignoring the effect on other clusters and only weakly affected by activities in other clusters, even though they are all part of wider interaction upon which their survival depends."

A key aspect of Kauffman's theory is that "living systems evolve to the 'edge of chaos' because it is in this dynamic that they are changeable, neither stuck in

repetition nor destroyed by instability" (Stacey, 2001, p. 177). Stacey argues that human communicative *interaction* follows a similar process. He suggests (p. 179) that institutional themes (such as hierarchy, customs or procedures) limit the connections between people and so moves the communicative process toward stability. Stacey is not suggesting that organizations need to be designed as patches but that "human organization spontaneously produces emergent patching, which we call social structure, hierarchy, habit and so on".

The key implication of Stacey's view is that "social structures", such as groups, are temporary emergent phenomena in an ongoing process of communicative *interaction*, rather than something that is stable and fixed. In particular, if lines of distinction did exist at any point of time, they would be constantly changing. Stacey (Stacey, 2001) argues that thinking of organizational identity in terms of distinctions will be flawed because the processes required to sustain identity are about movement which is "both spatial and temporal at the same time... Process as living movement has a fractal temporal pattern where it is meaningless to talk about what is inside and what is outside" (p. 168).

The above viewpoints arising from the complexity perspective reinforces that the phenomena of "groups" should be thought of in terms of connection. If one thinks of groups in terms of a process, as Stacey suggests, then the focus shifts from in/out comparison to the actions that people take to produce the phenomenon of a group.

In terms of organizational boundary theory then, groups can be conceptualised as a temporary alignment in the way that some people *objectify* the world and *identify* with *objects* in the course of *interaction*. These alignments may drive the *emergence* of enabling and constraining *properties* including aspects of *culture, language* and *power*. As people further *objectify* these *emergent properties* and reflexively *objectify* aspects of their own *identity*, they may begin to take on the characteristics of groups as we commonly know them. They may label themselves and others as members of a named group. Initially, people *identify* with the *objects* that facilitate *interaction* but in time they may start to *identify* with each other as objectified "members". The group is sustained by ongoing processes of (re)*identification* with an evolving repertoire of *objects* making up the boundary *structure*. Each member will almost certainly have strong *coupling*s with other boundary structures, (e.g. family or other social ties.) which may raise tensions and conflicts that partly drive

the dynamics of the boundaries. We could perhaps define groups as an ongoing process of *weaving*, localised around a particular *domain*.

5.2.4. Other theories of boundary

As mentioned several times in this thesis, most research to date simply assumes the existence of organizational boundaries. There are very few theories that explicitly focus on the nature of boundaries and some of these are reviewed in this section.

5.2.4.1.   Symbolic Boundary Theory

In the past decade there has been something of an explosion of research around boundaries in sociology (Vallas, 2001). This recent research has focused around the interdependent relationship between social boundaries and symbolic boundaries. Social and symbolic boundaries are defined by Lamont and Molnar (2002, p. 168) as follows:

- **Social boundaries**: Social boundaries are "objectified forms of social differences manifested in unequal access to or unequal distribution of resources (material and non-material) and social opportunities"
- **Symbolic boundaries**: Symbolic boundaries are "conceptual distinctions made by social actors to categorise *objects*, people, practices, and even time and space. They are tools by which individuals and groups struggle over and come to agree on definitions of reality".

Social boundary theory is primarily concerned about how social inequalities are generated and maintained, particularly those of class, gender, ethnicity and nationality. Where it is applied to organization settings it still tends to focus on "occupational jurisdiction" and inequalities between occupational groups (e.g see Bechky(2003)).

By contrast symbolic boundary theory is directly relevant to this research because of its focus on classification systems and how individuals classify the world (Heracleous, 2004). According to Vallas (2001), there are three key inter-relating factors in play in symbolic boundary theory being structure, symbols and human agency.

A key theme running through symbolic boundary theory is the way in which social boundaries are the result of the negotiation and contestation over symbolic boundaries (Vallas, 2001). This has a number of sub themes as follows:

- **Analytical focus**: Boundaries only exist as a result of the boundary-defining acts of exclusion. Thus the analytical focus should be on the interactions at the boundaries, not on defining the characteristics of the so-called groups. (Abbott, 1995; Hernes, 2004; Vallas, 2001)

- **Actor Action**: Actors must continually act in ways that reaffirm and re-establish the boundaries that privilege them their power and ability to act. This is particularly the case when there is overlap between an actor's tasks and that of their subordinates. (Hernes, 2004; Vallas, 2001)

- **Objectification**: It is in the drawing of distinctions (systems of classification) among occupational groups, by the actors themselves, that boundaries are created. These distinctions find material expression in organizational practices through the process of objectification of symbolic boundaries (Vallas, 2001).

Symbolic boundary theory has many similarities to organizational boundary theory. Both have a focus on the role of classification, *objectification* of the world and contention of *objects*. However, symbolic boundary theory remains rooted in social boundary theory by conceiving of boundaries in terms of differences between social groups and acts of exclusion. This in/out concept of boundaries is something that is explicitly rejected by organizational boundary theory as discussed in section 5.2.3 above. Nonetheless, there may be concepts in symbolic boundary theory that could usefully develop organizational boundary theory and further research is needed to compare them.

5.2.4.2.   Knowledge boundaries

A well developed and widely cited model of boundaries is Paul Carlile's (2002) conceptualization of "knowledge boundaries". A key similarity with this research is that Carlile utilises the concept of boundary *objects* and develops it with what he calls "integrating devices", which may differ between levels of the three-tiered model outlined below:

Carlile (2002) describes three different dimensions of boundaries – the syntactic, semantic and pragmatic.

- The **syntactic** dimension relates to information sharing and the necessity for a "shared and sufficient" syntax to enable communication across a boundary.

- The **semantic** dimension relates to the need for people to specify and learn about each other's differences in interpretation of communicative acts across a boundary.

- The **pragmatic** dimension of boundaries recognises that knowledge is "localized, embedded and invested" and as such is "at stake" in any negotiation across boundaries.

Carlile has supported his model with a detailed ethnographic case study. In section 5.2.1, the issues arising from a typology approach have already been discussed and will not be repeated here. A few other criticisms can be made.

Firstly, the main difference between the model of this research and Carlile's lies in our recognition of the pivotal role of *identity* and the underlying complexity of organizational boundaries. For example, Carlisle's model is strongly focused on personal investment in "hard-won" knowledge as a key factor in cross-boundary relations. However, in the context of this research, this hard-won knowledge would be just one of many object domains that people couple with and just one aspect of a person's *identity*.

Secondly, Carlile's model is largely based on the *communication* dimension (i.e. the syntactic and semantic) and only acknowledges one other dimension relating to *power* (although in other work with Howard-Grenville (2006) he does acknowledge the role of *time*). For example, he does not deal with *culture* or *properties* such as trust.

Another criticism of the model is that it is based on a fairly simplistic view of communication. The suggested dimensions arise from historical approaches as far back as Shannon and Weaver (1949). These approaches do not take into account or explain the wide range of more recently developed communication theory such as that outlined in section 3.2.3.3.1.

An overall issue with Carlile's model is that it is based on the premise that boundaries arise from "the problematic nature of knowledge" (Carlile, 2002, p. 444),

which effectively restricts its scope to one of "knowledge boundaries" as opposed to organizational boundaries in general.

The main contribution of his model lies in its description of knowledge as "localized, embedded and invested in practice". He says that knowledge is localized around particular problems faced in a given practice. In the context of this research, these problems are effectively boundary *objects*. Similarly, knowledge that is embedded in practice would relate to local structures or *domains* in the overall boundary structure and these structures are created as people "invest" in them or *identify* with them, in the terminology of this research.

Carlile's contribution is significant. However, this approach does open his model to the myriad of difficulties arising from understanding the nature of knowledge itself. For example it would be challenging to explain the way that knowledge "localises" around a particular problem. It seems that a different way of dealing with the concept of knowledge and boundaries is required and this is discussed further in section 6.4.2.

5.2.4.3. Emergent coordination structures

Kellogg et al (2006) built on the work of Carlile in developing the idea of an "emergent coordination structure" - which they call a trading zone. These structures are said to be characteristic of fast-paced, temporary and volatile organizations where they facilitate coordination and respond quickly to any changes in the environment. They said (p. 39):

> *A coordination structure is recurrently enacted as [actors] engage in cross-boundary practices to make their work visible, legible and aligned. Structure in this view is understood as an ongoing accomplishment, emerging from actors' continuous engagement in everyday life, rather than a static property of social systems.*

This coordination structure cannot be planned or prescribed, they say, being highly dependent on the context of engagement. However, they do argue that this structure is "enacted through practices of display, representation, and assembly" which entails "a set of norms, interpretations, and facilities that [the organization's] members produced/reproduced in their everyday project activities."

Kellogg et al (2006) argue their findings differ from that of Carlile in that people coordinate with each other through "a process of juxtaposition, adaption, and dynamic alignment, rather than engaging in joint transformation" (p. 46).

This description is reminiscent of the urgency-related emergent *properties* such as those characteristic of rapid response environments described in section 3.2.3.3.5. Indeed Kellogg et al (2006) suggest these differences arise from the nature of their study site (a frantic and flexible web-development company at the height of the dot com boom) versus that of Carlile's, which was a stable and hierarchical product development company.

The primary relevance of this research is that the characteristics of both boundary structure and the associated social processes will be different from one organization type to another. Kellogg et al's (2006) conceptualisation of boundary structure is very loose, perhaps in line with the concept itself, and does not appear to be able to explain boundaries in other kinds of organizations or contexts. There is a potential for further research to characterise the nature of emergent structure in rapid response organizations in terms of the model outlined in this theory.

5.2.4.4.   A psychoanalytic view

A very different view is offered by Diamond et al (2004) who developed a theory of boundaries from the viewpoint of psychoanalytic object relations theory. They argue that conventional concepts of organizational boundaries "contain a conceptual concreteness that belies their ultimate experiential significance" (p. 31). They suggest that the concept of boundaries should be extended to include the way humans experience the world through tactile sensations such as "hardness or softness, warmth or cold, pattern and shape, and most of all a sense, at the point of surface-to-surface contact, of containment" (p. 31). They suggest that is within this "autistic-contiguous mode of experience that the sensation of organizational boundaries is located and with it, the ultimate psychological meaning of organizational structure" (p. 31).

They then explain how this view leads to the formation of boundary structure (2004, p. 36) :

> *We assume that boundaries are essential constructs in that they signify markers of*
> *differentiation between self and others, and self and organization, and that temporal and*

spatial dimensions are often points of ambiguity and anxiety that must implicitly, we note, include an unconscious and unarticulated nature – an autistic and contiguous surface. It is at the spatial/temporal boundary that relationships are engaged and where individuals are simultaneously separated and connected. And, it is out of these unwitting processes of differentiation and integration that social structures emerge.

Diamond et al (2004) describe three modes by which people "organize experience" being the depressive, paranoid-schizoid and the autistic-contiguous. In the "depressive" mode, people interpret objects as symbols, separate from self, and thus builds up a sense of identity and difference from others. The "paranoid-schizoid" mode relates to how people may both love and hate an object at the same time. People deal with this by splitting the object and oneself into separate parts. In the autistic-contiguous mode people experience the world as surfaces and fear a loss of continuous connection – as in complete sensory deprivation.

Diamond et al's (2004) work arose from studying the concept of organizational "silos" and the way people use this metaphor to "describe the cognitive and emotional quality of their often fragmented and constrained personal (and interpersonal) engagements at work". Surfaces are felt as anxiety affecting the whole body. They argue that silos are constructed in people's imagination as a defensive mechanism against anxiety, in which they construct their own world safely disconnected from the reality around them.

The psychoanalytic approach described above is largely consistent with the findings of this research in relation to the influence of *identity* (section 3.2.4.3.1). It confirms the importance of *identity*, provides a deeper, alternative view of *identification* and illustrates further possible motivations for the *weaving* of boundaries as outlined in section 4.4. However, the "*objects*" underpinning the psychoanalytic view are representations of people only and not the broader view outlined in this research. Therefore this view does not attempt to explain the pragmatic utility of boundary *objects*. Similarly, it does not address the inherent complexity of boundaries including the phenomena of *emergence* and influence of enabling and constraining *properties*. There is an opportunity for further research to combine the psychoanalytic view with the model of this research.

5.2.4.5.   Infrastructure

As noted in section 3.4.2.2.3, Bowker and Star (1999) developed the concept of "boundary infrastructure" to account for classifications as artefacts that "link thousands of communities and span highly complex boundaries" (p. 287). They said (1999, p. 287):

> *The institutionalization of categorical work across multiple communities of practice, over time, produces the structure of our lives, from clothing to houses. The parts that are sunk into the built environment are called here boundary infrastructures – objects that cross larger levels of scale than boundary objects.*

It is important to note the difference between Star's earlier conceptualization of boundary *objects*, that are essentially unitary and designed for a purpose, and those that make up the complex and heterogeneous environment of boundary infrastructure in society. The latter become *objects* "only in the context of action and use" (Bowker & Star, 1999, p. 298) and consist of multiple types of *objects* having different structural characteristics. They are not necessarily easily recognized as boundary *objects* and, within established communities, are often so naturalized as to be invisible or taken-for-granted. The *objects* of boundary infrastructure include "tools, artefacts, and techniques, and ideas, stories and memories (p. 298)", very similar to the range of object examples outlined in section 3.2.1.2.

Bowker and Star's concept of boundary is consistent with the basic social process of this research – in that classification underpins the *weaving* of boundaries and is premised on the notion of boundary objects and associated *objectification* processes. It differs from this research in that it does not have a strong focus on individual *identity*, although it is implied, and in certain ways it goes beyond this research in discussing moral and ethical implications of classification at a social level. The main difference arises in this research's accounting of complexity which is not recognised by Bowker and Star. The key implication of their model is to emphasise the *multiplicity* of boundaries and highlight that organizational boundaries are deeply interconnected with societal boundaries.

5.3. Other theory

Organizational boundary theory examines the general context of *interaction*. There are several other theories that also do this. Following are two such theories that the research considers to be closely related. There may be any number of other such theories that may be relevant. For example, Nardi (1995) notes the importance of "situated action models" and "distributed cognition". However, it is beyond the scope of this research to examine all of these. Further research may be required to identify all such related theories.

5.3.1. Activity Theory

Organizational boundary theory needs to be compared to activity theory because they are both focused on the context of *interaction*. The unit of analysis in activity theory, an activity, comprises both action and its context, including tools, *objects* and community. This is similar to organizational boundary theory which covers elements of both social processes and of social structure.

A key element of activity theory is the idea that, as people engage in *interaction*s with other people, tools or instruments (in the broadest sense of the term) naturally emerge to aid further *interaction*. Tools can include "signs, procedures, machines, methods, laws, forms of work organization," (Kuutti, 1995). Tools shape and are shaped by recursive activity. The role of tools in activity theory is similar the role of *objects* in organizational boundary theory, outlined in sections 3.2.1 and 4.2.1.

The term "object" is also used in activity theory but with a meaning more akin to that of goals, as Kuutti (1995, p. 27) explains:

> *An activity is a form of doing directed to an object and activities are distinguished from each other according to their objects. Transforming the object into an outcome motivates the existence of an activity. An object can be a material thing, but it can also be less tangible (like a plan) or totally intangible (like a common idea) as long as it can be shared for manipulation and transformation by the participants of the activity.*

While tools are considered central they are also accompanied by the emergence of rules and cultural norms that likewise mediate an individual's *interaction* with their community. Again this is similar to the emergence of enabling and constraining *properties* in organizational boundary theory.

Figure 16 below shows a model developed by Engestrom (1987) that is a commonly accepted depiction of activity theory. Here the term "subject" refers to the individuals that carry out the activity.
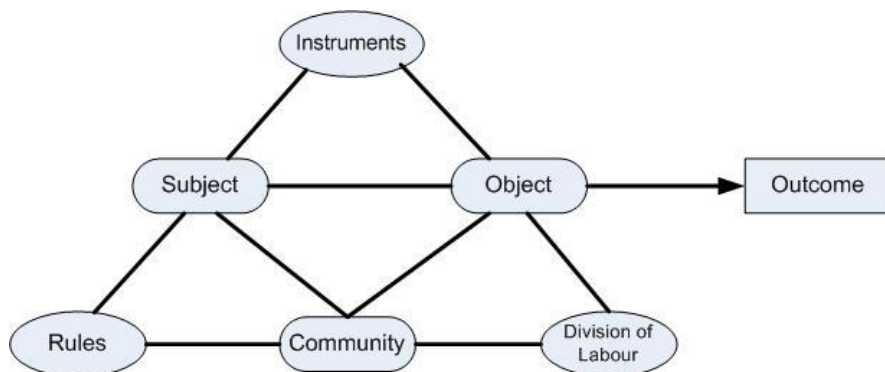

Figure 14: Engestrom's (1987) structure of human activity

Despite the similarities outlined above, there are several differences between activity theory and that of organizational boundary theory. The main difference lies in the focus on *identity* and complexity, which are absent (at least explicitly) in the first and prominent in the second. Activity theory is much more strongly focused in the nature of *interaction*, with multiple levels of analysis, including operations, actions and activities. It also has a focus on divisions of labour, reflecting its Marxian roots.

There are also a number of explicit differences in theory. For, example in activity theory instruments and objects are held to be different, although in the application of the theory there seems to be quite an overlap depending on the action being analysed. Organizational boundary theory avoids this difficulty by making no differentiation between instruments and objects.

Also, in organizational boundary theory, the focus is on facilitation of *interaction* rather than transformation of objects into outcomes. Boundary *objects* may evolve and change but this may not be the intention of the interaction. In particular, organizational boundary theory places an explicit focus on the way people contend with each other, wherein any outcome cannot be known in advance. If anything is transformed in cross-boundary *interaction*, it is the nature of the entire boundary rather than any particular object. Even then, transformations are subject to the power laws arising from the complex nature of boundaries. Boundaries may be stable for a very long time and then suddenly completely change, but when this happens is unpredictable.

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Nardi (1995, p. 40) argues that a key element differentiating activity theory from other approaches to analysing particular "contexts" is that of motivation. In activity theory, objects in the form of goals precede and motivate action. However, in other approaches such as "situated action" or practice theory, goals are not a condition for action. Rather, goals are "musings out loud about why we did something after we have done it". This is the same point made by Weick (1995a, p. 24) who highlights the retrospective nature of sensemaking. This latter view is inherently supported by this research which assumes that the motivation for *interaction* and the development of boundary structure arises from the need to manage *identity* conflict as noted in section 3.4.2.2.4.

Nardi also points to the emphasis in activity theory on the distinct difference between people and artefacts. She said (1995, p. 43): "Activity theory, with its emphasis on the importance of motive and consciousness—which belong only to humans—sees artifacts and people as different. Artifacts are mediators of human thought and behavior; people and things are not equivalent."

By contrast, this theory emphasises the notion that people may in fact be objectified in a variety of ways as discussed in sections 4.2.1.2 and 4.3.1.2. Another difference is that in activity theory, artefacts are primarily designed for the purpose of facilitating the achievement of goals, whereas organizational boundary theory places an equal emphasis on the designed and emergent nature of elements of boundary structure.

Despite the differences, there is no doubt there are some strong overlaps between organizational boundary theory and activity theory. Further research is needed to understand how the contributions of activity theory may help develop organizational boundary theory.

5.3.2. Systems theory

General systems theory, developed over much of the 20th century, is of relevance to this research firstly because it is underpinned by the concept of boundaries and has been influential in a whole range of management disciplines and approaches. Organizations are seen to consist of subsystems which evolve to deal with particular tasks and each subsystem takes on its own unique characteristics, differentiating it

from other subsystems (Tushman, 1977). Systems theory then provides a basis for establishing congruencies or alignments between the subsystems with a focus on identifying and addressing potential dysfunctions. For example, the principle of requisite variety, where it is held that the internal environmental of a subsystem must be as complex as the external environment it is dealing with, may be used to "design" boundaries and associated control mechanisms (Kast & Rozenzweig, 1972).

The role of boundaries is summarised by Kast and Rozenweig (1972, p. 450):

> *The open system can be viewed as a transformation model. In a dynamic relationship with its environment, it receives various inputs, transforms these inputs in some way, and exports outputs… It follows that systems have boundaries that separate them from their environment. The concept of boundaries helps us understand the distinction between open and closed systems. The relatively closed system has rigid impenetrable boundaries; whereas the open system has permeable boundaries between itself and a broader supra-system. Boundaries are relatively easily defined in physical and biological systems, but are very difficult to delineate in social systems, such as organizations.*

The phrase "it follows that" summarises my criticism of general systems theory – it appears that the existence of boundaries is simply assumed. In all references to systems theory the researcher was unable to find any more detailed examination of the nature of boundaries from a general systems theory point of view. However, the literature on this theory is admittedly vast and this could be the subject of future research – to locate and integrate any such material with the theory of this research.

In addition, while general systems theory was the orthodoxy in organizational thinking for a large part of the 20th century, a few researchers are increasingly criticising the theory as a basis for explaining complex systems. For example, according to Stacey (2001), systems thinking is an inadequate basis for explaining the role of knowledge in organizations. Systems theory treats knowledge as a thing which is located in people's minds. Knowledge transfer across boundaries is thus treated using a simplistic model of sender-receiver communication. By contrast, Stacey argues that knowledge is "an ephemeral, active process of relating" (p. 4) where "self-organizing processes [are] patterning themselves in coherent ways" (p. 5). In other words, Stacey rejects the notion of knowledge as a thing that can be transmitted across boundaries. Indeed he questions the usefulness of the boundary metaphor at all and this is discussed in section 5.4.1.

Despite Stacey's criticisms, general systems theory is still used as a basis for much of organizational theory and others are attempting adapt it to account for more recent developments in theory, such as that relating to complexity. Further research is required to fully understand the implications of systems theory for organizational boundary theory.

5.3.3. Complexity theory

Throughout this thesis, the suggestion has been made that organizational boundaries may be complex and the purpose of this section is to explicate what is meant by that suggestion. Complexity theory was introduced in section 3.2.3.1 but the discussion of its relevance is spread throughout the thesis. The aim of this section is not to compare complexity theory to organizational boundary theory, but to summarise arguments that have been put forward so that readers may more easily understand the complex nature of organizational boundaries.

We can make the following observations about the complex nature of organizational boundaries as follows, noting the related section number for more detailed information:

- That *emergence* is driven by the continual process of *(re)identification* (4.3.2.2, 4.3.4.2) which is characterised by a constant variation in the *strength* and *polarity* of *couplings* (4.2.2.3, 4.3.4.2)
- That the multitude of *couplings* in an organizational network are the lower-order components from which higher-order *properties* of organizational boundaries emerge (4.2.4.3). In other words, the *multiplicity* of boundaries makes them inherently complex (4.4.3.3)
- That *multiplicity* may also provide the redundancy of connections that fosters stability in the face of disturbance (3.4.2.4)
- That *identity* provides the energy to maintain the complex network of *couplings* (4.2.4.3)
- That *identity* itself is also an emergent *property* (4.2.4.3)
- That the "fitness function" of complexity in organizational boundaries may be the management of *identity* conflict (4.3.2.2, 4.4.2)
- That complexity in organizational boundaries may arise from the *fragmented* nature of *identity* and the equivocal behaviour of people (4.4.2)

- That changes in organizational boundaries follow a power law characteristic of complex systems (4.4.3.5)

- That highly *embodied* boundaries may be more complex than highly reified ones (4.4.3.2)

- That complexity may arise from the overlap of *domains* of *objects* (4.4.3.4)

- That *interaction* may form patterns that fall into a basin of *attraction* (4.4.3.5)

Summarizing, it is suggested that organizational boundaries are complex because of the constantly changing *strength* and *polarity* of *couplings* arising from repeated (re)*identification* with multiple *objects* which gives rise to the *emergence* of the enabling/constraining *properties* and *identity*.

There does not appear to be any accepted consensus or definition of how organizations are complex, much less the idea that organizational boundaries are complex. It is hoped that the above conceptualisation will make a contribution to the ongoing understanding of how organizations may be complex.

It is important to understand complexity so that we can fully appreciate the dynamics of organizational boundaries. Change in organizational boundaries is not simply a matter of cause and effect. The changes resulting from even small *disturbances* are unpredictable and difficult to explain, even in hindsight. Some *properties* may simply *emerge* and readers need to be comfortable with these notions.

Lastly, it is worth noting the inherent tension between the concept of structure, with its connotations of rigid well-defined systems of organization, and the complex view of organizations, which see them as fluid and ever changing. This is a tension that needs to be embraced in order to understand the nature of organizational boundaries being, as they are, the product of both intentional design and emergence.

5.4. Exploring the boundary metaphor

5.4.1. Introduction

Despite being commonly used in organizations, the term "boundary" carries with it some difficulties. In dictionaries, boundaries are defined as "something that indicates bounds or limits" (*The Macquarie Dictionary*, 1991) and is commonly illuminated with metaphors such as lines and edges which, in organizations, typically demarcate differences between groups.

However, it is clear from this research that organizational boundaries have as much to do with connection and continuity as they do with difference and involves structural characteristics, such as *objects*, for which the line metaphor may not be appropriate. Boundaries are not fixed as they are forever changing and they can be viewed as multidimensional or fundamentally blurred rather than sharp divisions.

At least one researcher argues against the notion of boundaries altogether. Stacey (2001) argues that the concept of a boundary is not appropriate for thinking about human *interaction* because it does not account for its process oriented nature. He said (2001, p. 168):

> *[In systems thinking] the concept of boundary is essentially a spatial metaphor that has no temporal aspect. If one shifts from systems thinking to [process thinking], then the concept of boundary has no place. This is because process is essentially about movement, which is both spatial and temporal at the same time but not boundaried. Process as living movement has fractal temporal pattern where it is meaningless to talk about what is inside and what is outside.*

In other words, social processes have no start or end and any conception of groups or divisions would be artificial, reflecting a snapshot in time.

A key point is that Stacey's (2001) argument is rooted in what he calls conceptual flaws of system thinking. His objection (p. 168) is based on a rejection of sharply defined system components inherent in general systems theory with its implicit adoption of an in/out concept of boundaries. However, this view of boundaries is only one way of looking at them and this research has itself criticised the in/out approach. Therefore Stacey's black and white rejection of the boundary metaphor is inappropriate. What is required are alternative metaphors of boundary that do not

rely on "lines of distinction" and this is discussed in section 5.4.3. The next section explores the nature of metaphors and supports the reframing of the boundary metaphor in section 5.4.3

5.4.2. The nature of metaphors

This research has developed a detailed structural and social model of certain phenomena associated with *interaction* in organizations which we have CHOSEN to call an "organizational boundary". We emphasise the chosen nature of this term because, as noted in section 1.6.1, the word "boundary" is itself a metaphor and we could easily have chosen any other modifier (of the word organization) to reflect the phenomena described by this research. While we started this research with the specific aim of understanding the nature of "organizational boundaries", it is important to understand that this research is actually an exploration of a metaphor. Therefore it is critical to understand firstly the nature of metaphors, which is discussed in this section, and secondly to critically reflect on whether the term boundary is actually an appropriate metaphor to be using (and this is discussed in the next section).

A metaphor is "a figure of speech in which a term or phrase is applied to something to which it is not literally applicable, in order to suggest a resemblance" (*The Macquarie Dictionary*, 1991). Technically speaking, metaphors are just one of a range of linguistic analogical devices including similes, allegories and parables. There are a number of authors that have contributed significantly to theory around the nature of metaphors (e.g. Lakoff & Johnson, 1980) and their application in organizations (e.g. Morgan, 2006). The purpose of this section is not to critique their work but simply to summarize as concisely as possible the general body of knowledge on metaphors.

Metaphors work through the mapping of entities, structures and relations from one domain (called the "source" or "modifier") onto a different domain (referred to as the "target"). Attributes that a person wishes to highlight in target domain are used to locate an appropriate source domain that has similar attributes, even though they are not directly comparable. For example, organizations and pyramids both have levels that get smaller towards the top and hence we may employ the metaphor of the "organizational pyramid", if we wish to highlight that aspect of organizations.

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However, other metaphors such as the "organizational machine" may be used to highlight different aspects. In this research, the term "boundary" modifies that of the "organization", thus creating the metaphor.

Many metaphors have become so well known that they become convention or cliché and permeate our speech, often employed without conscious awareness to enrich and facilitate high levels of communication.

Where metaphors become powerful is when the comparison employed strikes someone as odd and focuses their attention. Metaphors may then serve a communicative purpose of clarifying a concept or a generative purpose of encouraging novel insights and conceptual advances (Cornelissen & Kafouros, 2008b). Cornelissen and Kafouros argue that the higher the "within-domains similarity" (i.e. similar features) and the more comprehensible (easy to understand) then the higher the impact of the metaphor. It has also been suggested that the target and source domains need to be sufficiently different to jar the reader into awareness through the incongruity of the comparison. It would appear that creating good metaphors is something of an art.

Cornelissen and Kafouros (2008a) also makes a distinction between complex and primary metaphors. Complex metaphors are often made up of multiple primary metaphors. For example, the "glass ceiling" is a complex metaphor derived from the primary metaphors relating to constraint in an upwards direction (the ceiling) and the difficulty in seeing the source of the constraint (something transparent i.e. glass). Primary metaphors relate to source domains of which we have direct experience and, from a psychoanalytic point of view, are often based on our sensory experience of the world and how we imbue these experiences with meaning (Diamond et al., 2004). Thus the metaphor of a "cold" reception may derive from a primitive understanding that warmth represents safety and happiness arising from experiences beginning in the womb and being held against the skin as a child.

Other researchers (e.g. Alvesson, 2002; Lakoff & Johnson, 1980; Morgan, 2006) talk about root metaphors that reflect underlying world views and may have many "surface" or "organizing" metaphors. For example, the "organizational machine" as a root encourages a whole range of surface metaphors such as focusing on "inputs and outputs", getting to the "nuts and bolts" of a problem and getting the

organization "running like clockwork", by "reengineering" if necessary. The implication is that metaphors are more than just useful, illustrating devices. As Alvesson (2002) said, they profoundly influence the way people experience reality. He said (p. 18): "All knowledge is metaphorical in that it emerges from or is 'constructed' from some point of view, some people argue."

For example, managers who see organizations as a "war" may behave in a combative way, trying to win battles and protect their troops, leading to a generally confrontational approach to *interaction* rather than a cooperative one.

It is increasingly accepted that metaphors have an important role to play in research. Indeed "many organizational scholars have argued that metaphors ... constitute one of the primary ways of framing and understanding the world of organizations" (Cornelissen & Kafouros, 2008a, p. 957). Metaphors are generally used to suggest research directions and heuristics, prior to development of formal theory, and are not subject to empirical testing. As such researchers might create and discard a whole range of metaphors in the early stages of research. Metaphors are useful tools in the early stages of research because they enable researchers firstly to analyse and think about their subject in novels ways and secondly to express their reasoning where literal language is insufficient, prior to the development of formal theoretical language. This is certainly the case in this research where the metaphor of "boundary" was used to guide development of a theoretical model. Researchers must be aware, however, that while adoption of a particular root metaphor may illuminate the subject from a new point of view, it may also conceal other points of view afforded by other root metaphors.

Researchers often employ a "theory-constitutive metaphor", a phrase adopted by Boyd (1979, cited in Cornelissen & Kafouros, 2008a), which is defined as one that "constitute(s), at least for a time, an irreplaceable part of the linguistic machinery of a scientific theory: cases in which there are metaphors which scientists use in expressing theoretical claims for which no adequate literal paraphrase is known" (p. 960). In other words, a grounded theorist may use other theories as the "source" domain, thus stimulating the reader to think about the developing target theory in terms of the established source theory. This approach was used in this research by using aspects of complexity theory to generate insights into the nature of organizational boundaries.

Lastly, it is important to note that most metaphors have a lifespan or career, evolving over time. This arises from the inherent polysemy of words – their ability to have multiple meanings. At any time, people may take a term and use it as a metaphor for a different target domain than we are used to. Vice versa, people may use a range of different metaphors to illuminate a target domain. The key point is that the metaphor of "boundary", like all other metaphors, is open to development and this is the focus of the next section.

5.4.3. Reframing the boundary metaphor

5.4.3.1.　　Heuristics for making metaphors

This section assumes that we may view the term "organizational boundary" as a root metaphor. However, from the discussion in section 5.4.1, we know it is problematic. Alvesson (2002, p. 16) encountered similar problems in exploring the metaphor of "culture" in organizations and he dealt with this issue by exploring a number of surface metaphors for culture itself.

Alvesson notes the argument of positivist critics of the use of metaphor in theory, who argue that only literal terms should be used in describing an objective reality. However, he also notes the argument (Morgan, 2006) that "all perception is guided by conceptualization of the object through a gestalt created by metaphorical thinking; it is impossible to let the 'objective data' speak for themselves (p. 20)". Alvesson (2002, p. 20) argues that the use of metaphor in research "must balance creativity and imagination with discipline and carefulness".

Researchers must guard against "catchy" metaphors that have more rhetorical appeal than theoretical value and avoid using too many root metaphors, which may lead to superficiality or even mislead the audience. Alvesson (2002, p. 23) argues that researchers must master their chosen metaphor and fully understand its "paradigmatic" roots.

The following sections will examine the metaphorical nature of the organizational boundary metaphor, starting with the commonly known and progressing through to suggestions for evolving and reframing the metaphor.

5.4.3.2.   Common analogies

Boundaries are almost always associated with **lines or edges**, whereby people think of distinctions that can be drawn between characteristics between entities on either side of the line – those who are "in" and those who are "out". However, this in/out approach is problematic as discussed in section 5.2.3. The basis issue is that this metaphor hides far more about the nature of boundaries than it reveals and reinforces a perception that needs to be changed. The only real merit in this metaphor is that it is readily accepted and commonly used in organizations. As such it may be used by way of introduction, to help take people on a journey from one understanding of boundary to another.

The metaphor of **boundary spanners** is also commonly used in the literature and this may conjure images of some gap that needs to be bridged or perhaps a dividing range that needs to be crossed. This metaphor is rooted in that of the line metaphor above and carries with it all the associated difficulties. An alternative term, boundary architects, is offered by this research and discussed in section 5.4.3.4.

In addition to lines, there are some other phrases used in relation to boundaries which correspond closely to the attributes of *boundary weaving* (*embodiment, multiplicity, domain* and *attraction*) as discussed in sections 4.4.3.2 to 4.4.3.5. These metaphors are outlined as follows:

- **Boundary permeability:** This metaphor immediately invokes the image of a semi-permeable membrane where some things get through but not others. This is commonly invoked in the context of knowledge transfer across boundaries, where knowledge is seen to have varying degrees of "stickiness" (Awazu, 2007; Blomberg et al., 2007; Carlile, 2002; Chai, 2003; Ciborra & Andreu, 2001; Evaristo, 2007; Fitzsimmons & White, 1997; Leonard, 1995; Mason, 2003; Miller, 2005a; Moller & Svahn, 2004; Smith, 2007; Szulanski, 1996; Wai Fong, Yuqing, Kiesler, & Bussjaeger, 2007; Wenger et al., 2002, p. 151). Permeability relates to the *domain* of a boundary, outlined in section 4.4.3.4, arising from the way that people introduce *objects* from one domain to another. For example, ideas, tools and language may all originate in one domain and migrate to other domains through people who participate in both domains. Where there is little or no overlap (i.e. commonly shared *objects*)

between domains we might say that there is a "sharp" boundary and, vice versa, a "blurred" boundary where there is a strong overlap.

- **Boundary friction**: This metaphor gives the idea of two surfaces rubbing against each other, like tectonic plates grinding away at each other, raising mountain ranges as barriers and occasionally resulting in earthquakes. This image is of a surface full of irregular shapes. This relates to the concept of *embodiment* (section 4.4.3.2) and how many sharply defined "objects" are used and how well they facilitate *interaction* across the boundary. So *objects* may be seen as a lubricant or an abrasive and the same can be said of behaviour. Friction is a phrase commonly used in the context of innovation, where it is acknowledged that "sparks fly" at boundaries and should even be encouraged through processes of "creative abrasion" (Leonard, 1995). Organizations seeking to improve efficiency often choose to increase the amount of objectification in a boundary. However, they may also recognise that face-to-face meetings help avoid misunderstandings that can cause friction. So it seems that a balance of objectification and embodied relations is called for to minimise friction in boundaries. A good example of this would be a typical meeting. Business meetings are often characterised by boundary *objects* such as an agenda, rules of conduct for the meeting and a governance framework. Agendas can constrain free-flowing conversation while at the same time ensuring that something is achieved, issues are resolved and decisions are approved.

- **Boundary tension:** This metaphor seems to draw on at least two root metaphors – that of war, which conjures up images of struggle and cold-war like tactics that may occasionally break out into heated conflict, and that of a network or spider web, with various strands pulling in multiple directions to maintain the structure. It relates to the attribute of *multiplicity*, outlined in section 4.4.3.3, with its multiple connections. Particular *interaction*s may be compatible with some aspects of *identity* while simultaneously being in conflict with others, thus causing *identity* conflict. Resolution of *identity* conflict is a key driver of *boundary weaving* as discussed in sections 3.4.2.2.4 and 4.4.2

- **Boundary stability**: This metaphor invokes a sense of being grounded, of real fences with posts firmly anchored. These boundaries would only change very slowly after much negotiation and laborious adjustments. Of course the implication here is that boundaries may also be unstable, which invokes a contrasting image of movement – of rapidly shifting sand dunes and changing alliances. Stability relates to the attribute of *attraction*, outlined in section 4.4.3.5, in that *interaction* may be tightly constrained to a small range of behaviours, characterised by an enduring set of *objects*.

5.4.3.3.   New metaphors

This section explores some analogous comparisons that arose during the course of research.

- **Boundary fabric**: This metaphor conjures up images of many aspects of boundary that are all deeply intertwined but in a coherent way to create a pattern or "fabric" that serves a purpose. There are a number of attributes of fabric that relate to boundary. Firstly, fabric has many threads, which is analogous to the *multiplicity* of *couplings* that arise in organizational boundaries. Note also that the term "bound" refers to being "tied in bonds" (*The Macquarie Dictionary*, 1991) which implies threads with some *strength* and is again analogous to the *coupling* category of this theory, whereby people are "bound" to particular *objects*. Secondly, the threads in fabric are interwoven, which is the result of weaving in the literal sense and is analogous to the core category of this research. Interestingly, the word weaver in Latin is "textor" which is the root of the word textile (i.e. fabric). Thirdly, fabric comes in many colours and patterns which could be seen as serving the need of the differing aspects of personal *identity*. Lastly, fabric serves a purpose in protecting people from the weather and this is analogous to the *(re)creation* aspects of *weaving* and the way boundaries are created to help manage identify conflict.

- **Boundary architects** – This is a metaphor that sprang to mind when considering the implication of this research on the notion of boundary spanning. While the basic social process of this research, boundary spanning, implies that this is happening all the time as people interact – there is no doubt that certain individuals and activities are actively focused on

identifying cross-boundary issues and designing boundary infrastructure to address these issues.

- **Boundary infrastructure**: This metaphor conjures up images of public works project – of bridges, buildings, plazas, tunnels, power lines, computer networks, dams, pipes and roads. The concept of boundary infrastructure has already been discussed in section 5.2.4.5 and while it was not coined by this research, it is not a term that is in common use. The sheer diversity and messiness of this image is appropriate in that it highlights the complexity and interconnectedness of a huge range of *objects* that make up organizational boundaries.

- **Boundary weaving**: This metaphor, which is also the core category of this research's theory, is a complex metaphor as discussed in section 5.4.2. Both the words used "boundary" and "weaving" are themselves metaphors. Together they serve to illuminate how certain social processes result in certain organizational structures that enable and constrain further *interaction*. As noted in section 3.4.1, *weaving* can relate to the sideways movement of negotiating obstacles as well as the interlacing of threads. So we can talk about weaving our way through the "infrastructure" of organizational boundaries as well as weaving the "fabric" of organizational connections." It is hoped that by pairing weaving with boundary, it gives a sense of person (re)designing a boundary, working to build connectivity and thus illuminate the duality of boundaries. This sense of design conjures the image of an "architect" at work.

The above explorations of the different metaphors of boundary is a structured one that arises from the theoretical model outlined in chapter 4. An alternative approach would be to explore the metaphor from a psychoanalytic direction as discussed in section 5.2.4.4. It may be expected that this approach would yield deep psychological reasons, at a primitive, pre-verbal level, of why the boundary metaphor resonates with so many of us. These could then be integrated with the suggestions above.

5.4.3.4. Analysing metaphors

A final comment that can be made before leaving this section is that the above understanding of the different metaphors of boundary may provide a glimpse of the ways in which organizational boundary theory may be applied. A number of researchers and consultants are now using the analysis of metaphors as a method for better understanding the nature of various phenomena, including that of organization. For example Lawley and Tompkins (2000) have developed a method called "symbolic modelling". In symbolic modelling, analysts aim to facilitate a better understanding of the metaphors used in organizations and the world views that underpin them. It is critical that the analyst does not "contaminate" the metaphors of the client with their own and a technique called "clean language" is employed to ensure this happens. Rather the analyst must honour the inherent logic and ways of being that characterise up their client's metaphorical world. The implication for this section is that it may not be necessary for an analyst of organizational boundaries to retrofit data against any preconceived metaphors of boundary as outlined in this exploration. However, this section should assist any analyst in understanding the nature of any boundary related metaphors encountered.

5.5. Summary

This chapter has discussed the organizational boundary theory developed in chapter 4 in relation to alternative and related theories in the literature. In section 5.2, the way in which others have theorised boundaries was discussed and, while many have made significant contributions, they were all found to have shortcomings when compared to organizational boundary theory. Section 5.3 outlined indirectly related theories and differences were noted. Section 5.4 explored the notion of boundary from a metaphorical point of view and made a number of suggestions for reconceptualising the boundary metaphor.

The next chapter will provide summaries, conclusions, contributions and implications of the research as well as reflections and suggestions.

6. Conclusions

6.1. Introduction

6.1.1. Structure of chapter 6

This chapter summarises the research so far and draws conclusions about the research question posed in chapter 1. The contributions of the research are clearly noted and the implications for theory and practice are discussed. Finally the limitations of the research and other reflections on the methodology are discussed along with suggestions for further research.

6.1.2. Summary of previous chapters

This research is important because boundaries are a pervasive aspect of the way people interact with each other in organizations and is significantly under theorized, as demonstrated by the numerous calls for more empirical research. This means that analysts have little recourse to theory to support proposed solutions for dysfunctional organizational boundaries. In response, this research has set out to answer the question:

> *"What is the nature of organizational boundaries?"*

To address this question, a grounded theory methodology was employed which allowed a free-ranging investigation of the subject in line with the exploratory nature of the research. The research was conducted in a single context in order to develop an in-depth understanding. After setting out clearly what is meant by theory, the researcher embraces the concept of inter-level causality and the use of hermeneutics as a narrative-based method of explanation that is appropriate for complex phenomena, rather than the development of propositional laws characteristic of cause-and-effect philosophies. A middle-range, substantive theory was then developed which describes a model of boundaries in organizations and this is the major contribution of this research.

A distinctive feature of the research is its reliance on data drawn from literature that was used to saturate the theoretical categories in the latter stages of research and this

has facilitated development of theory that is free of the bias arising from theoretical preconceptions yet leverages and integrates the knowledge of previous researchers.

Chapters 3 and 4 outline the findings and developed theory and these are discussed in section 6.2 below. It was found that the theory developed by this research differs significantly in many respects from extant theory relating to boundaries.

6.2. Theoretical conclusions

6.2.1. Answering the research question

Because of the grounded theory methodology, there is no hierarchy of questions that need to be addressed (as is usual in traditional case study methodology). Rather, the conclusions of this research relate to the overall development of the theory in answering the question: *"What is the nature of organizational boundaries?"*

The main point to be made in answering this question is that organizational boundaries consist of elements of structure as well as of process. It makes no sense to consider concepts that exclude one or the other – they must be considered together in order to fully appreciate the nature of organizational boundaries.

In order to answer the above question, it can be said very generally:

> **An organizational boundary is a complex system of objects and emergent properties that are woven together by people as they interact together, objectifying the world around them, identifying with these objects and creating couplings of varying strength and polarity as well as their own fragmented identity. Organizational boundaries are characterised by the multiplicity of interconnections, a particular domain of objects, varying levels of embodiment and patterns of interaction.**

6.2.2. Key elements and relationships

The purpose of this section is to briefly summarise the key relationships between theoretical elements and explain why they are related. This "why" relates to the what, how and why of good theory as set out in sections 2.3.1 and 2.5.3. No new

information is presented here, as they have all been discussed previously in chapter 4. However, at the risk of being overly complicated, the more important relationships are illustrated in a single diagram in figure 17 below:
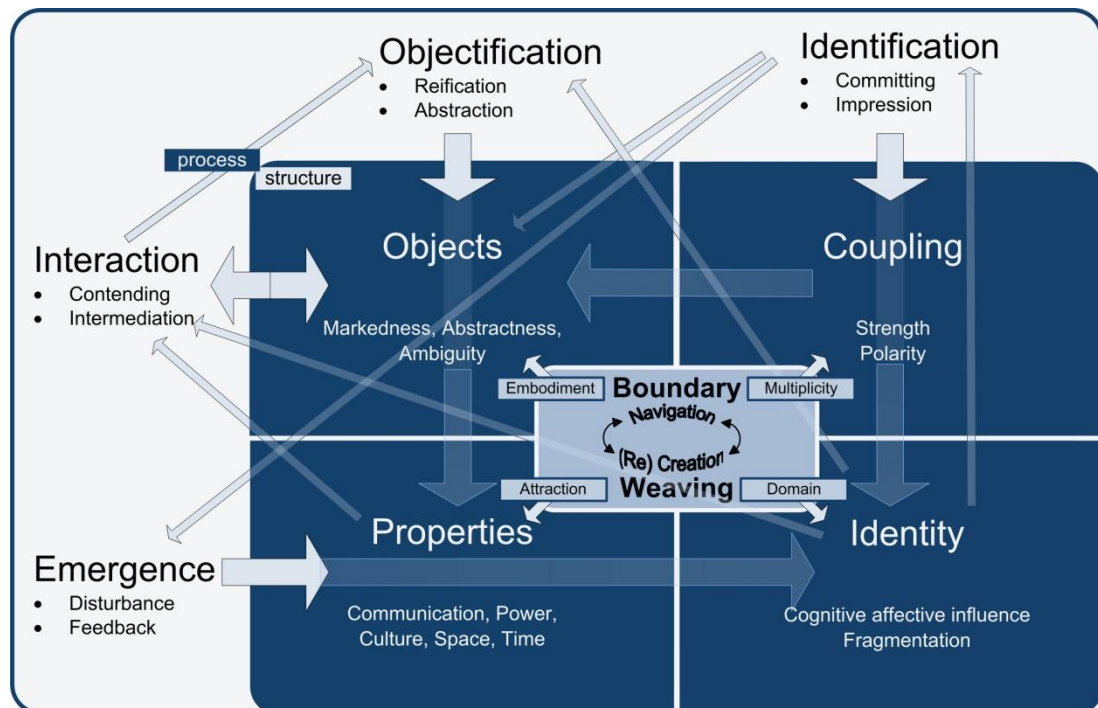

Figure 15: The inter-relatedness of structure and social processes in organizational boundaries

As we have seen in chapters 3 and 4, the elements of social structure include *objects, coupling, properties* and *identity*. The elements of social process include *objectification, identification, interaction* and *emergence*. The core category that integrates all of these is the basic social process of *boundary weaving*. In addition to these categories, a range of attributes were identified. All of these are illustrated pictorially by the diagram in figure 17 above.

The large arrows in figure 17 indicate the main relationships of the processes with structure, although as discussed throughout chapter 4, all of the categories inter-relate to one another to some degree and these are represented by the smaller arrows. We can now attempt to summarise all of the theory set out in chapter 4.

Organizational boundaries can be most simply understood in terms of the *objects* that people create and use to facilitate *interaction*. As people create and use *objects*, they *identify* with them, develop *impressions* of them and then *commit* to them in varying degrees. They may *contend* an object's place in the overall boundary structure or simply use them in an *intermediary* way to facilitate cooperative

interaction. However, organizational boundaries are by no means simple phenomena.

People are progressively and continually *objectifying* the world around them through iterative processes of *reification* and *abstraction*. This continual process of *objectification* is driven largely by the need to facilitate *interaction*. The resulting *objects* have varying degrees of *markedness*, *abstraction* and *ambiguity* which adapt to facilitate *interaction* in any given context. *Markedness* facilitates the creation of *impression* and arises from people's *identity*, *abstractness* is essential to facilitating efficient communicative *interaction* and a*mbiguity* arises from the equivocal way people *weave boundaries*.

Identification is the process by which people develop *couplings* with *objects* and this process is also instrumental in the development of *identity*. However, there is not a linear mapping of *objects* with aspects of *identity* – rather *identity* is *emergent* and *fragmented*. *Identity* is seen to be the key motivator of *interaction* and of the *disturbances* that initiate the emergence of higher-order *properties* that enable and constrain further *interaction*. These *properties* develop and are reinforced by social processes of *feedback*. People are continually seeking to balance and manage *identity* conflict in varying ways, *contending* and *intermediating* with others, guided by its *cognitive and affective influence*. *Identity* also influences both objectification and *identification* (recursively), as people *objectify* and *identify* with objects in ways that reflect their *identity*.

The complexity of organizational boundaries (and the emergence of higher-order properties) arises from the constant and ongoing process of *(re)identification*, with people varying the *strength* and *polarity* of the *couplings* on a continual basis as they *interact* with others. Through *couplings* to people, all *objects* are related to each other and changes in one *coupling* may lead to multiple changes to other *couplings* or none at all. In addition, complexity arises from the *fragmented* nature of *identity* which allows people to *couple* with *objects* in multiple ways, leading to a *multiplicity* of boundaries in any given context.

These social processes of *objectification*, *identification*, *interaction* and *emergence* result in a *multiplicity* of boundaries – a myriad of *objects* loosely clustered into *domains* that form the basis of a wider boundary infrastructure facilitating society

wide *interaction*. Boundary weaving is characterised by patterns of *interaction* to which people are *attracted* as well as varying levels of *embodiment*. Typically, organizational boundaries are built up over time reflecting their turbulent history, with the remnants of ambitious designs thoroughly compromised and adapted to meet the contingencies of changing circumstance.

However, people learn to navigate this confusing array of boundary elements with consummate ease, using their knowledgeability and innate skills of sensemaking to develop a hermeneutic awareness of the world around them. As they *navigate* their way forward in *interactions* with others they also *create* and *recreate* these same elements of boundary structure as they seek to manage *identity* conflict. People act on their beliefs and take action – sometimes with the intention to (re)design or simply to disturb boundaries. In all of this *navigation* and *(re)creation*, people continue to classify the world thus providing both continuity and transformation of organizational boundaries.

So from the above summary of theory, we can see the broad nature of organizational boundaries. Further detail is, of course, found in chapters 3 and 4.

6.3. Implications for Theory

6.3.1. Implications for existing theory

6.3.2. Contributions

The overall contribution of this research is the development of a holistic model of organizational boundaries. Being a relatively complicated model, there are many aspects of the theory that can be defined as contributions in their own right. Therefore a category system was developed to help the reader better understand the contributions of this research, as follows.

6.3.2.1. Types of contribution

Defining the contributions of this research is challenging because so many different researchers have worked around the edges of this unified theoretical model and there may be overlaps with one or more of its parts. The following categories are employed to make clear the nature of the contributions of this research.

- **Novel** – This relates to theory that, to the best of the researcher's knowledge, is completely new.
- **Advance** – This relates to theory that is not necessarily novel but advances our comprehension of the phenomena. In many cases it relates to insights or concepts that may have been noted by other researchers but takes on new meaning in the context of the developed theory
- **Significant** – This relates to theory that has obvious and significant implications for either theory or practice.
- **Minor** – This relates to theory where it is not clear what the implications for theory or practice are. They tend to relate to the insights that are of potential interest for development rather than those that are critical to the developed theory.

These types and levels may be combined as illustrated by the following table, which also outlines the general character of each quadrant.

6.3.2.2.   Significant and novel contributions

In general, the greatest impact of this research is that it breaks new ground in our conceptual understanding of the nature of organizational boundaries. It takes a wide range of disjointed theory that is either directly or indirectly related to boundaries, synthesises it and adds new insight arising from the empirical findings of this research. Below are the most significant and novel of the contributions:

Contribution	Section	Justification
A holistic model of organizational boundaries	4	The theoretical model of boundaries in this research synthesises insights arising from empirical data with a large range of existing theory to produce a new approach to organizational boundaries which is markedly different from any other theorization of boundaries, in organizations or otherwise. In particular, this research integrates aspects of both complexity and identity theory for the first time.
The metaphor of *boundary weaving*	5.4	The core category, *boundary weaving*, is a powerful new metaphor that has the potential to change the way managers manage organizational boundaries. This

Contribution	Section	Justification
		metaphor has the potential to replace other limiting metaphors and it generates a number of secondary metaphors (fabric, friction, tension, permeability, stability) that will assist in developing way of actively managing organizational boundaries.
The *multiplicity* of boundaries arises from the *fragmentation* of *identity* and the process of *identification* with *objects*.	4.4.3.3 4.2.4 4.3.2	The relationship between *multiplicity* and *identity* has not been addressed by other researchers. This is probably because organizational boundaries have not been the explicit focus of much research and so the problematic nature of *multiplicity* has not been understood. In particular, advances in our understanding of the social process of *identification* (see 6.2.2.3 below) provide a unique way of conceptualising boundaries as discussed in 5.2.3.

Table 5: Significant and novel contributions of the research

6.3.2.3.   Significant advances

This research significantly advances our theoretical understanding of organizational boundaries by applying some existing theoretical disciplines in new ways. In particular, some basic assumptions are challenged resulting in different ways of looking at organizational phenomena. The most significant of the advances are listed below:

Contribution	Section	Justification
Identification arises from *impression* and *committing*	4.3.2	The notion of *identification* is extant in the literature but this research takes a very different approach with its focus on a multitude of *objects* rather than in/out membership of social categories. In particular, this research connects *identification* with the *object* category, through the attributes of *impression* and *committing,* thus connecting identity theory into a theory of organizational boundaries.
Properties of boundaries (and their	4.2.3 4.3.2	This contribution spans a number of categories of the research. While the concept of complex adaptive systems including that of *emergence* is now well understood and

Contribution	Section	Justification
complexity) are driven by a process of *emergence* arising from *identification*	4.3.4	increasingly accepted to occur in organizations, its application to boundaries is new. In particular, this is a different approach to theorising the way complex adaptive processes work in organizations. Most other researchers rely on interaction between individuals as the key driver. This new approach offers different ways of conceptualising the processes at work and offers markedly different implications.
People *weave* organizational boundaries by *navigating* and *(re)creating* them	4.4	The concept of *weaving*, synthesises aspects of several other theoretical constructs but stands alone in applying them to the way people *navigate* and *(re)create* boundaries. In particular, the idea that boundaries may be both designed and emergent is a significantly different approach.

Table 6: Significant advances in the research

6.3.2.4. Minor novelties

In addition to significant novelties achieved in this research, there are some minor novelties listed below. These minor novelties do not have implications across a range of management disciplines but are of interest to researchers of boundary theory and need to be accounted for in any future development of related theory.

Contribution	Section	Justification
Markedness of *objects*	4.2.1.1	This may be the first time *markedness* has been explicitly used as an attribute of boundary *objects*, although it may appear in literature relating to graphic design.
Coupling has *strength* and *polarity*	4.2.2.1	The category of *coupling* is a feature of the research that does not appear on other theoretical constructs of organizational boundaries and certainly not with the attributes of strength and polarity. This may provide a new conceptual approach for researchers.
Identity may be emergent	4.2.4.2	The researcher was not able to find any reference that directly links identity theory to processes of complexity.

Table 7: Minor novelties in the research

6.3.2.5.   Minor advances

Finally, there are also a number of advances that, to the best of the researcher's knowledge, have not been noted in previous theory relating to boundaries. These minor advances, listed below, are essentially insights and nuances of boundary theory that deserve to be highlighted so that they are not lost in the detail of the theory outlined in chapter 4.

Contribution	Section	Justification
Objects may be fractal	4.2.1.2	Many researchers have observed fractal like phenomena in organizations but applying this concept to *objects* in boundaries provides a different perspective on the *multiplicity* of boundaries.
Object attributes reflect *identity*	4.2.1.2	That *objects* reflect the *identity* of their creator is a concept that is implicit in other theory but is not one that is applied in the context of organizational boundaries.
People couple with *objects*	4.2.2.2	While the idea that people may become coupled with *objects* is not new, the focus on *coupling* in this theory explains several aspects of boundaries such as their multiplicity, complexity and dynamics.
Boundaries have *properties*	4.2.3	While the kinds of *properties* described in the research are not new to organizational theory, the way they are integrated into a model of organizational boundaries represents an advance in the way we may understand them.
Attributes of emergent *properties* relate to *communication, power, culture, time* and *space*	4.2.3.1	The suggestion of this research that emergent *properties*, whilst individually unique, may have combination of attributes arising from the well understood fields of communication, power, culture, time and space, represents an advance in understanding how these phenomena may inter-relate that will help people better understand the intricacies of cross-boundary *interaction*.

Contribution	Section	Justification
The physical world is emergent	4.2.3.2	While this interpretive stance is not new, its application to boundary theory casts a new light on the scope of boundary analysis.
Objectification	4.3.1	Most of the theoretical aspects of *objectification* already exist in the literature but this theory draws them together, noting the interrelationship of its attributes and its progressive, iterative nature

Table 8: Minor advances in the research

6.4. Implications for Practice

The main implication of this research for practice is that managers and analysts now have a robust way of conceptualising the nature of organizational boundaries. This allows people concerned with dysfunctional relationships across organizational boundaries to examine the issues with a much greater theoretical confidence. In particular, analysts may use this theory as a basis for developing methods of boundary analysis grounded in theory.

6.4.1. General management

There are a number of general implications for managers who may be concerned about optimising coordination within and between organizations. Organizational boundary theory provides a method of analysing such relationships and possibly designing interventions.

The main implications arise from the core category of *boundary weaving*. In particular, managers need to revisit what kinds of organizational outcomes they are trying to achieve in order to optimise "the bottom line" – which is usually related to factors such as efficiency and innovation. From the perspective of organizational boundary theory, key outcomes to be managed may relate to the friction, tension, permeability and stability of organizational boundaries. These metaphors have already been introduced in section 5.4.3.2 and the connection to theory is explained in sections 4.4.3.2 to 4.4.5.5. Some further comments can be made as follows:

- **Friction**: Friction relates to efficiency in organizations and may arise from the relative levels of *embodiment* (see section 4.4.3.2) of an organizational boundary. A high degree of objectification may increase efficiency but may just as well result in inertia if organizations become too bureaucratic. By contrast a high level of embodiment may be required for innovation but may detract from efficiency. Managers need to understand the advantages / disadvantages of having a highly objectified boundary versus a highly embodied one and the relative mixture of both that may be employed. The idea of friction differs from that of tension below in that it is more related to the cognitive influence of *identity*. In that sense friction has more to do with

the mechanics of communication (e.g. syntax and semantics) than any emotional attachment to particular *objects*.

- **Tension**: Tension is normally seen as an inhibitor of cooperative collaboration but organizations employing strategies such as "internal competitiveness" and "creative abrasion" (Leonard, 1995) may actually seek to increase tension in organizational boundaries. Tension partly arises from the *multiplicity* (see section 4.4.3.3) of organizational boundaries as people commit to and contend different *objects*/domains. However it can also arise as a by product of stability as people become resistant to change. As Carlile (2002) and Giddens (1984) might say, challenges to a "hard won" "knowledgeability" of the world will be resisted. Tension differs from friction in that it arises more from the affective influence of *identity* – people may be more disturbed by attacks on *objects* they have an emotional attachment to. Managers need to better understand how to manage boundary tensions.

- **Permeability**: Permeability of internal boundaries is normally considered a good thing in innovation and many organizations go to considerable efforts to encourage "knowledge sharing". By contrast, efficiency driven organizations may wish to keep their teams focused and "on task", inhibiting permeability so they are not confused about the "right way" of doing things. In other contexts such as boundaries with other organizations permeability needs to be controlled for security and competitiveness reason. This can be a problem when organizations with cultures adapted to impermeable inter-organizational boundaries enter into joint ventures or supply chains where external knowledge sharing is required. Permeability relates to the *domain* (see section 4.4.3.4) of organizational boundaries and how *objects* are shared between domains. It can also arise from more *embodied* relations. Managers need to understand how these attributes of *boundary weaving* affect the permeability of organizational boundaries.

- **Stability**: Stability may promote efficiency as organizations are able to develop and "fine tune" *objects* and boundary infrastructure over time. However, stability may also lead to rigidity and inhibit innovation. Stability relates to the *attraction* (see section 4.4.3.5) attribute of organizational boundaries as people are drawn into certain patterns of *interaction*. Managers

need to understand the complex nature of *interaction*s that lead to such patterns and what interventions, if any, they can take. In other words they need to read the literature on complexity in organizations to learn about new methods currently being pioneered and the impact of current methods of management on stability.

The argument being put forward here is that becoming adept at managing organizational boundaries will lead to better control of organizational outcomes such as efficiency and innovation. Management of organizational boundaries may best be achieved, not through an analytical dissection of boundary structure, but through a focus on boundary related metaphors such as friction, tension, permeability and stability. A flexible focus on metaphors such as these will inherently lead to "productive" boundaries that intuitively are required for any organization to succeed. The reader has only has to think of the number of dysfunctional boundaries in their own organization to understand the appeal of this approach.

The kind of skill needed to manage for these outcomes and indeed to "weave boundaries" is related to the *navigation* and *(re)creation* of boundaries. In reading through section 4.4 a number of implications become apparent. For example, managers will need to learn how to balance design of boundaries with their lack of control of the emergent *properties* of boundaries. In general, the role of managers is seen to be in developing the basic knowledgeability of their staff, i.e. their ability to navigate and (re)create productive boundaries.

In the context of organizational boundaries, productivity takes on a different meaning. Productivity relates to the ability of individuals to create *objects* that facilitate *interaction* in which *identity* conflict is managed, i.e. the development of "productive relationships". *Objectification* becomes a core skill that needs to be developed, facilitating the creation of *marked objects* that *impress* people and encourage them to *commit* to *objects* that are critical to the success of the organization.

In the context of organizational boundary theory, the nature of resources can also be reconceptualised. As Pfeffer (1992, p. 87). said, "resources can be almost anything that is perceived as valuable" and can be created "out of thin air" in the hands of a skilled power broker. In essence, resources become *objects* that can be created and

the greater the knowledgeability of staff, the greater the organization's ability to create resources that can be leveraged. Constraint arises not from lack of finance but from emergent *properties* that inhibit the ability of people to produce valuable *objects*.

The endemic presence of power relations in *boundary weaving* means it is unlikely to ever be a smooth process and managers will need to learn how to balance processes of *contending* and *intermediation*.

Over time, boundaries may develop and evolve from simple relationships, involving just a few *objects*, through to complex boundary infrastructure. As boundaries become more complex, induction processes and training become more important and this theory provides a deeper theoretical basis on which to increase the knowledgeability of new staff, i.e. their ability to *negotiate* boundaries and ultimately their ability to contribute to *(re)creation*.

In summary, staff, managers and leaders all need to understand the nature of *boundary weaving* and their role in it. Every person in an organization is inherently involved in *weaving* boundaries. The role of managers is thus to encourage the kinds of behaviour in staff that would lead to boundaries that are productive, as discussed above.

6.4.2. Reflections on Knowledge Management

In section 1.3.2, it was noted that the lack of theory underpinning the emerging practice of knowledge management (KM) was a key motivator for this research. This section reflects on the implications for knowledge management (KM).

While there are many different ways of looking at knowledge management, a consistent thread running through the literature has been the need to facilitate knowledge processes across boundaries, often referred to as "silos" or "stovepipes" which arises from the "stickiness" of the tacit dimension of knowledge (Awazu, 2007; Blomberg et al., 2007; Carlile, 2002, p. 151; Chai, 2003; Ciborra & Andreu, 2001; Evaristo, 2007; Fitzsimmons & White, 1997; Leonard, 1995; Mason, 2003; Miller, 2005b; Moller & Svahn, 2004; Smith, 2007; Szulanski, 1996; Wai Fong et al., 2007; Wenger et al., 2002).

The development of organizational boundary theory gives KM practitioners a different lens through which to understand issues arising from organizational boundaries as follows.

In organizational boundary theory, *objects* play a key role, essentially replacing the concept of information. *Objects* such as symbols, documents, books, and diagrams are obviously information but in this model anything may be used to facilitate knowledge processes, including machinery, windows, and deadlines, as outlined in section 3.2.1.2. The attributes of *objects*, being *markedness, abstractness* and *ambiguity*, indicate the kinds of effects KM practitioners may be trying to achieve in designing new *objects* and also in recognising the nature of naturally occurring *objects*. It is recommended that KM practitioners focus more effort on understanding the role of *objects* in knowledge processes.

Similarly, a better understanding of boundary *properties* may assist KM practitioners in accounting for the range of factors influencing knowledge processes. While *properties* like trust have been known for some time, the KM focus has been on a very limited number of such well known *properties*. What is required is a better focus on understanding the *emergent* nature of *properties*, how they uniquely arise for any given boundary being analysed and how they have attributes of power, culture, communication, time and space. Focusing on any one of these at a time would be a superficial.

The category of *coupling* has implications for the concept of organizational memory. This research indicates the need for periodic revisiting of *objects* to re-energise important *coupling*s in boundary structures. It also relates un-learning, the ability to decouple from ways of doing things.

The implications of *identity* and *identification* is that KM practitioners need to better understand the way people come to think and feel about *objects* and how these might be influenced through *interaction*. Influencing tactics such as rhetoric, training and other soft forms of persuasion are obvious candidates that are often overlooked in KM.

In general, organizational boundary theory allows KM practitioners to better understand the social processes at work and how these result in boundary structure. This may allow them to better conceptualise what end-effect their interventions

might have on organizational knowledge processes and the levers by which they may achieve these effects. Outcomes to be managed in KM are the basic knowledgeability and hermeneutic awareness skills of staff as they go about their *boundary weaving* activities.

Organizational boundary theory may also provide a platform for theoreticians to better conceptualise key underpinning concepts. For example, the tacit and explicit dimensions of knowledge may be explained in terms of the way people create *marked domains*, as discussed in section 4.4.2.4.

Lastly, better understanding the nature of boundaries will also be particularly important for the field of information and communication systems because "teams with multiple boundaries are often mediated by information technologies and typically involve virtual, geographically distributed, asynchronous collaboration" (Espinosa et al., 2003, p. 187).

In summary, organizational boundary theory may provide a theoretical basis for KM and in particular, the emphasis on "hermeneutic knowledgeability" (see section 4.4.2) in the basic social process of *boundary weaving*, may provide a reframing focus for the practice of KM.

6.5. Limitations

In section 2.7.3, the delimitations of the research were set out. Delimitations are known in advance of data collection. This section sets out limitations that arose during the course of the research. There were two main sources of limitation – those arising from the research methods and those arising from practicality.

Much of the value of this research arises from its breadth, tying together a large number of diverse categories into a coherent whole, synthesising empirical data from both a study site and a wide range of literature. However, this approach also generated the main limitation of this research. There were a large number of theoretical disciplines included in the literature search and while most were able to be reviewed in depth, a small number of the larger disciplines could not be reviewed in as much depth. For example, the literature relating to complexity, power, culture

and communication and *identity* is very large. The researcher adopted an approach of reviewing a theoretical discipline at a high level to determine the likely contribution the field could make to the developing boundary theory. Those areas which were found to be rich sources of data were investigated in more depth than those which were not. In all cases the discipline was reviewed to enough depth to saturate the topic. This approach is fully in line with the theoretical sampling approach employed by grounded theory and does not detract from the overall quality of the research.

A practical limitation is that the research was largely restricted to a view of each boundary from the perspective of participants in the study site. Ideally, we would like to have analysed the boundary from both sides, i.e. interviewed other units in the Army and wider defence force, in order to check if perceptions of a particular boundary were reciprocated. However, this was practically difficult in this case primarily to do with reasons to do with security and the difficulties in gaining research permission across the entire defence organization and also from other military organizations. A few internal boundaries were studied from both sides but the theoretical sampling approach tended to lead the researcher in other directions and in any case validation was not a prime focus of the research.

Another very minor limitation arose from the researcher's inability to access a few key meetings, particularly those of the commander, as these were considered classified military business. However, this was mitigated by access to a wide range of other meetings and places of *interaction*.

The above limitations, while important, do not detract from the significance of the findings. The research is exploratory and, having followed a robust methodology, these limitations are unlikely to have flawed the generated theory in any major way. Any shortcomings simply provide an opportunity for further research of the sort outlined in section 6.7.

6.6. Retrospective

6.6.1. Goodness of the theory

In section 2.3.1 the elements of theory were set out and in section 2.5.3 what makes a good theory good was discussed. In retrospect, the development of theory in this

research benefited greatly from these guidelines and it is recommended that theory generating research should include sections on this, with the researcher well versed in these element before theory generation commences.

Table 9 below outlines the elements of good theory identified in chapter 2 and provides some final reflections on the relative goodness of the theory developed by this research.

Aspects of good theory	Aspects of organizational boundary theory
Constructs (What) (Gregor, 2006; Whetten, 1989)	All the key constructs of a theory should be well defined (Gregor, 2006) and they should cover all the "right" factors (Whetten, 1989) being comprehensive and parsimonious. The key constructs in this research are the nine theoretical categories (elements of the theory) corresponding to the sub-sections of chapters 3 and 4. In chapter 4, each of these sub-sections begins with a clear definition of both the element and its attributes. Only time will tell if the elements chosen are comprehensive and parsimonious. However, the feeling of the researcher is that attributes are more likely to change quickly than the major elements of the theory. The researcher finished with a sense of confidence that they were the right ones, buoyed by the inherent logic and elegance of the matrix model. However, further research in different settings may yield further insights into the attributes of these elements.
Relationships (How) (Gregor, 2006; Whetten, 1989)	Describing the relationships between key constructions typically introduces an explanation of causality, even if the relationship cannot be easily tested (Whetten, 1989). In chapter 4, each sub-section included an explicit section devoted to a detailed the relationship with other categories. Furthermore, section 2.3.2 provided a detailed discussion of causality that underpinned the development of the theory. In particular the recognition of centrality inter-level causality in defining the relationship between the key categories is a distinctive feature of the research.

Explanation (Why) (Gregor, 2006; Whetten, 1989)	Explanation goes beyond simple causality to included discussion of the "logic underlying the model. The soundness of fundamental views of human nature, organizational requisites, or societal processes provide the basis for judging the reasonableness of the proposed conceptualisation" (Whetten, 1989, p. 491). Explanation in this theory is largely found in the detail of the discussion section in chapter 4. There is a large amount of material presented in that chapter and effort was made to make it digestible through the inclusion of bullet point introductions of the key ideas and a summary at the end of each sub-section. In addition, section 6.2.2 summarised both the relationships between key categories along with an explanation of why they were related.
Refutability (Quine & Ullian, 1980)	Refutability relates to the development of testable propositions which is characteristic of "predictive theories" (Gregor, 2006, p. 13) . Organizational boundary theory, being interpretive and explanatory in nature, does not require refutability in order to be good theory.
Scope / who-where-when - generality (Gregor, 2006; Quine & Ullian, 1980; Whetten, 1989)	Scope is defined by "statements of boundaries showing the limit of generalisations" (Gregor, 2006, p. 14) and set the boundaries of generalizability (Whetten, 1989). The substantive nature of the grounded theory approach automatically sets the limits of the research to similar organization, as defined in section 1.7 and 2.7.3. Because the researcher did not attempt to formalise the theory, questions of how generalizable the theory is was not as relevant . According to Whetton (1989) theories based on experience of the researcher, "where meaning is derived from the context" (p. 492), have a particular responsibility to define the limits of generalizability. However, this research was only lightly reflexive and hence the issues of scope were largely restricted to issues arising from the delimitations (section 2.7.3) and limitations (section 6.5), which have already been discussed.

Clear presentation / Simplicity (Gregor, 2006; Quine & Ullian, 1980)	In addition, knowing that a good device for representing the theory would be required enabled the researcher to contemplate different options until it all suddenly crystallized resulting in figure 1.
Delving (Vertically and laterally) (Sutton & Staw, 1995)	Where theory is "strong", Sutton and Straw (1995, p. 378) said it "delves into underlying processes so as to understand the systematic reasons for a particular occurrence or non-occurrence. It often burrows deeply into micro-processes, laterally into neighbouring concepts, or in an upward direction, tying itself to broader social phenomena." Chapter 3 is littered with numerous examples of delving. Concepts are borrowed laterally from complexity theory and identity theory, bringing new insights to the nature of organizational boundaries. Similarly it borrows from higher theories such as the recursion of Gidden's (1984) structuration theory.
Balancing conservatism versus challenge. (Quine & Ullian, 1980; Whetten, 1989)	Conservatism relates to the merits of having few conflicts with existing theory (Quine & Ullian, 1980). This stands in contrast to Whetton's (1989) argument that good theory "encourages altering our metaphors and gestalts in ways that challenge the underling rationales supporting accepted theories" (p. 493). Chapter 5 discusses related theories in a balanced way, outlining both the ways in which organizational boundary theory supports and challenges their arguments.
Modesty (believable claims) (Quine & Ullian, 1980)	There is little in this research that stretches the imagination so far as to be unbelievable. The discussion in chapter 5 show similarities with other accepted theories.

Utilisation (so what?)	In a theoretical sense, the theory developed will be quite useful as an input to any other theoretical discipline that employs the concept of boundaries; however, it may need to be confirmed and formalised first. In a practical sense, analytical tools will need to be developed. Recommendations for further research that will address these issues are outlined in section 6.7.
Commensurate (general, simple or parsimonious)	Organizational boundary theory does not try to be simultaneously general, simple or parsimonious and this is discussed in section 2.5.3. The theory developed is not particularly simple but it does have relatively high levels of generality and is parsimonious.

Table 9: Reflections on the aspects of good theory

By and large the theory developed in this research has most of the attributes of good theory. It has well defined constructs with clear relationships between them that explain the "why" of their relationships, not just the how. In particular the theory delves both laterally and vertically to draw on other disciplines to create new insights. The theory is not very refutable but this is not necessary for this type of theory, being interpretive and exploratory. The theory is not particularly simple, but a great deal of effort has been made to provide clear representations, as exemplified by the matrix model of figure 1. The theory builds on and integrates the work of many others, so it is conservative and modest while still providing a significant contribution. Ultimately the utility of the theory will be determined by others but it is expected to be both theoretically and practically useful once the recommendations for further research are undertaken.

6.6.2. The research process

Explanation of the theory was helped greatly by the development of the diagram (see figure 1) and hopefully this will make the theory easily understood by the majority of researchers. The written explanation proved to be quite lengthy but the researcher

takes comfort from Weick's (1979) clock face model of theory which argues that this is acceptable.

The major advantage of the grounded theory method was the process of constant comparative analysis, which yielded a number of insightful attributes that may not have been noticed otherwise. However, it should be noted that this process worked better for some categories than others. Those that were largely based on a theory-constitutive metaphor required considerably more mental gymnastics and benefited primarily from a hermeneutic approach. In other words, the researcher spent a large amount of time looking at the interview data around a key emerging category (which in practice meant looking at several related codes) and considering these in the light of related literature.

A large number of insights emerged from this process that were captured in the memo bank and the method of collating and connecting these was a major feature of the research. A tool of critical importance of facilitating this process was the use of a multi-dimensional mind-mapping tool called The Brain. Without this tool it would simply not have been possible to make the connections that led to the final theory. It is recommended that any other researchers using a grounded theory approach would also benefit from this tool.

Lastly, the researcher was surprised by the lack of discussion on metaphor in the body of literature that was perused. Considering the pervasiveness of metaphors in organizations and in research, it is considered that this is a major weakness of much research. It is highly recommended that discussion of metaphor should be mandatory in most research projects.

6.7. Recommendations for Further Research

A large number of implications for existing theory and practice have already been discussed in chapter 5 and sections 6.3 and 6.4. Due to the exploratory nature of his research, any or all of these implications may be followed up to confirm the suggestions put forward. However, the purpose of this section is not to revisit each of these, but to outline a suggested approach to developing the theory of organizational boundaries itself.

6.7.1. Confirming the theory

Firstly, further empirical research is required to confirm the findings of this research and the theory put forward. This may be achieved in a number of ways.

The most productive method may be to design a multiple-case methodology visiting a number of similar organizations – namely, large organizations with numerous internal boundaries.

It would also be beneficial to move towards formalising the theory (at an organizational level) but studying a range of different types of organizations. Other types of organizations could include a range of sizes from just a few people to hundreds of thousands; contrasting private enterprise against public service organizations and not-for-profits; contrasting organizational environments from rapid- response to bureaucratic settings; as well as contrasting typical boundaries of concern such as HQ / branches, organization / customers or organization / suppliers.

Lastly, some researchers may wish to design more positivistic methodologies to test various aspects of organizational boundary theory, although it is suggested that it would be difficult to approach the whole theory in such a manner.

6.7.2. Formalising the theory

The theory put forward in this thesis is a substantive one at the level of organizations. However, the basic model may also apply to a much wider range of social boundaries such as those relating to class, gender or ethnicity. The fully formalised theory would thus be a theory of social boundaries in general.

A useful line of inquiry would be to examine the validity of this theory across different cultural contexts. As noted in the delimitations (section 2.7.3), this research was conducted in a low-context setting (Hall, 1976, cited in Griffin, 1997, p. 421) and it would be useful to see if this object-centric model applied in high-context societies such as those found in Asia. Organizational boundary theory does account for high/low through the attribute of *embodiment* but this would be worth exploring further to ensure the model can be generalised across cultural settings.

Another obvious step would be to examine the relevance of organizational boundary theory to social and symbolic boundary theory.

6.7.3. Developing analytical tools

As was suggested in section 6.4, organizational boundary theory may provide the basis for alternative approaches to management and the management of boundaries in particular. However, in order to bridge the gap between theory and practice, a number of tools would be required to assist analysts, practitioners and managers. It is suggested that such tools could be developed using an action research approach, where a researcher actively worked to help address known dysfunctional boundaries and developed methods to identify and address the issues.

As part of this research it is suggested that the range of existing management techniques be reviewed with the aim of somehow matching them to organizational boundary theory. For example, a recurrent problem for which there is a known solution may be addressed by adding it to a database of best practices or alternatively a workshop may be held to raise awareness. Having a method of understanding which particular management technique would be most effective in a particular boundary would be of great practical benefit and this researcher is intending to follow this line of inquiry.

In section 6.4.2 some reflections on the implications of this theory for the practice of knowledge management were put forward. Following are some recommendations for further research to develop the ideas put forward.

It is recommended that a systematic review of the KM literature be undertaken in order to compare KM to organizational boundary theory and to more formally identify the full range of implications. A particularly productive line of inquiry would be to examine the range of knowledge processes, such as sharing, learning, collaboration and innovation. It is expected that the suggested knowledge process would be found to be overlapping and that organizational boundary theory may provide a single underlying explanatory framework. Such an achievement would amount to a complete reconceptualization of KM from a boundary management point of view and provide the practice with a unifying platform for the first time.

6.8. Summary

Boundaries are an important field of research because they are a pervasive aspect of organizational life and the theory to date has been fragmented. This research goes some way to addressing this issue, presenting a holistic model of organizational boundaries that integrates a number of previously disparate elements, in particular those of identity and complexity. The organizational boundary theory developed in this thesis thus explains some previously puzzling aspects of boundaries, such as their multiplicity and the role of certain properties that were found to be emergent.

It was found that an organizational boundary is a complex system of social processes and structure. The key elements of social structure include *objects,* which are characterised by their *markedness*, *abstractness* and *ambiguity*; *couplings* between people and objects, which are characterised by their *strength* and *polarity*; emergent *properties* that are characterised by aspects of *power*, *culture*, *communication*, *space* and *time*; and *identity*, which is characterised by its *fragmentation* and *cognitive affective influence*.

The key elements of social process include *objectification*, which involves *reification* and *abstraction*; *identification*, which involves *committing* and *impression*; *interaction*, whereby people *contend* and *intermediate* with each other; and *emergence*, which involves *disturbance* and *feedback*.

The core category that integrates all of these is the basic social process of *boundary weaving*. *Boundary weaving* involves the *navigation* as well as the (*re*)*creation* of elements of social structure and process in organizational boundaries, as well as varying levels of *embodiment*, covering differing *domains* and a *multiplicity* of connections, all the while being influenced by basins of *attraction*.

The theory presented has many of the hallmarks of "good theory", as outlined in chapter 2, including compelling constructs, a clear means of presentation, statements of relationship, simplicity, generality, conservatism, modesty and utilisation.

The theory is strongly grounded in empirical data and the wide range of factors involved are presented in an easily understood diagram. There are a range of implications for the theory and practice of both general management and the

discipline of knowledge management, across a range of organizations. New ways of looking at common problems are provided and these arise not just from the theoretical model but from a deeper appreciation of the metaphorical nature of organizational boundaries. The research suggests that a focus on the better management boundaries would be of great benefit to organizations.

This chapter has drawn conclusions, discussed implications and made recommendations. The overall thesis has presented findings and theory, explained the methodology used in developing these and discussed the relationship with other theory. Above all, this thesis provides a platform for future research that may confirm, formalise and develop the theory as well as providing practical tools that may be of assistance to managers in organizations. It is hoped that others will take up this challenge.

<u>A final word</u>

Congratulations and thanks to those who have read all or most of this thesis. I hope you have enjoyed reading it as much as I have enjoyed researching and writing it. Contact me on timkannegieter@gmail.com if you want to discuss this research.

Tim Kannegieter

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Appendices

A1   Interview protocol

Following is copy of the interview protocol. Part one relates to the introductory discussion prior to discussion of boundaries.

1.   Introduction to the research:

   a.   **Purpose of research**: Dimensions of organizational boundaries – Boundaries arise between groups of people for a number of different reasons. I'm aiming to identify what underpins those boundaries. For example, dimensions of organizational boundaries may be functional, physical, cultural or temporal.

   b.   **Interview Processes**: Firstly identify the people and groups you relate with, then talk about the factors that affect these relationships. Later I will summarise this and relate it to my prior research and discuss this with you.

   c.   **Ethics Reminders**: It's voluntary, its your opinion only (not speaking for Army), no personal names will be given although role titles may be used for non-sensitive info, sensitive info will be treated sensitively, you'll be given opportunity to correct information and COS/COMD will get final copy prior to publication, right to withdraw, will be used to inform my recommendations for IMX fwd planning.

   d.   **Questions?**: Do you have any questions on what the research is about or its intended purpose as outlined in the "Participants Information" document?

2.   Open ended discussion on boundaries:

   a.   **Question**: Could you list the key individuals and/or other groups that you interact with in the course of your work. Note they can be within HQLTDG or external to HQLTDG. These stakeholders should be in relation to:

      (1)   yourself,

      (2)   your cell and for

      (3)   HQLTDG.

   b.   **Question**: Tell me how you interact with these people?

3.   Tell me about the kinds of factors that influence these interactions such as:

a.   Physical factors: Distance, HQ layout, office layout, communication technology etc.

b.   Time differences: Time zones, required speed of response, deadlines, coordination of actions etc.

c.   How many "hats" do you wear? Please differentiate between your role and your practice (i.e. profession).

d.   What factors contribute to communication difficulties? What enables them?

e.   Please characterise the difficulties arising from differences of interests and priorities?.

f.   Please characterise the limitations arising from differences in accepted ways of doing things. Ie culture.

4.   Anything else you want to raise?

A2   Interview Schedule

Following is the list of roles who were formally interviewed.

- The commander of the training HQ
- The chief of staff of the training HQ
- The head of the human resources branch
- An employee in the human resources branch
- The head of the operations branch
- The head of the logistics branch
- The head of the planning branch
- The head of the training branch
- A member of the training branch responsible for the lessons process
- The manager of the organizational change project

A3   Sample ethical consent form

Following is an example of the ethical consent form that each interviewee was asked to sign

RESEARCH CONSENT FORM

INVITATION TO PARTICIPATE IN A RESEARCH PROJECT ON

THE MANAGEMENT OF ORGANIZATIONAL BOUNDARIES

Reference:

A. Defense Force Order ... - Authority to Conduct Personnel Research

Introduction to the research

1.   You are invited to participate in a research project on the management of organizational boundaries at the Headquarters of the [training group]. The research is being carried out in conjunction with an [information management] project currently being conducted in [the study site].

2.   This research is being conducted privately by Mr Timothy Hans Kannegieter as part of a Masters by Research in Information Technology at the Queensland University of Technology.

3.   Like many other organizations, the [study site] experiences difficulty in streamlining its relations with the wide range of stakeholders in the [the wider study site] and externally. The Army's Strategic plan specifically mentions the need to improve information management.

4.   The proposed research will examine the way in which the boundaries between branches within [the study site] are managed, as well as boundaries between [the study site] and stakeholders external to it. The overall aim of the research is to identify the key dimensions of organizational boundaries. Dimensions of organizational boundaries may be functional, physical, cultural, temporal etc.

5.   The key benefit to [the study site] will be a rigorous and structured analysis of its internal and external boundaries that will allow the formulation of strategic recommendations to improve communication and business processes.

What the research will involve

6.   If you choose to participate, you will be asked to assist in developing a model of organizational boundaries. Specifically, you will be asked to provide illustrative examples of the different dimensions of the boundaries. Your input will be through one or more semi-structured interviews. You may also be asked to provide feedback on the model that is developed by the researcher.

7.   Your participation in the research is voluntary. While the Commander of [the study site] has approved the research, you are under no obligation to [the] Army to participate. There are no consequences if you choose not to participate.

8.   It is understood that the views provided by you in the course of this research are yours and may not necessarily represent the official view of [the study site].

9.   You have the right to withdraw your participating in the research at any time with no consequence.

10.   A copy of the Masters thesis will be made available to you via the COMD [the study site]. As per the ... Privacy Act ... you have the right to correct any information that relates to you personally.

11.   The information you provide will be used to complete a [PhD] thesis and may also be used in future research papers and publications. In agreeing to participate in this research, you will be giving the researcher your personal permission to publish information provided by you. While no personal names will be used in the research, people familiar with the operation of [the study site] at the time of the research may be able to infer who made certain comments.

Timeline

12.   A preliminary literature search on boundaries has been undertaken.

13.   The research will commence as soon as all necessary approvals have been given. Including approval of this request and ethical approval from the Queensland University of Technology.

14.   The data collection phase of the research is expected to take no more than four weeks, being in the researcher's own time when he is not working for [the study site]. It is expected this component will start in mid June and be completed by about mid July, [...].

15.   The chapter of the thesis containing your information will then be provided to you for the opportunity to correct any errors. This will need to be completed by early August.

16.   The thesis will then be completed and submitted to the University. If accepted, a copy of the full thesis will then be provided to [the study site] for approval to publish.

T.H. KANNEGIETER

Authority: I, …………………………………….., do hereby declare that I understand the context of the research proposed above and my rights and obligations relating to it. I give my permission for unclassified information that I provide to be published.

Signature:

Date:

A4 Sample interview transcript

Following is a partial example of the notes taken to record an interview.

1. Open ended discussion on boundaries:

    a. **Question**: Could you list the key individuals and/or other groups that you interact with in the course of your work. Note they can be within [the study site] or external to [the study site]. These stakeholders should be in relation to:

        1. yourself,

            (a) I have done presentations on my previous experience overseas to two courses.

            (b) I guess the only other area I have are my personal relationships ie I have been able to facilitate interaction for other PSOs with my former unit. i.e. I have gone to bat for someone because they have been a little too intimidated to do it themselves.

            (c) I know [deputy chief of the Army] personally and it helps me out in that it adds to my credibility.

        2. your cell

            (a) I have built the role of S5 in HQ and now feel I have become the key front person for [the study site] to most of the external agencies in the Army. They come to me and from there I either respond or direct them to the right place. It has developed past synchronising and coordination. It is a true 5 task, doing planning or deep battle ie not close battle, not those directly in front of you but those that are further over the horizon.

                i. I'm now the key front person for interaction between the formations and [the study site] wrt to training activities. Having said that, if the action directly impinges on training, eg it's a 4 issue, it still comes through me because I have a S54.

            (b) We run crisis management and it was worse before I came. I have just been dealing with a course that is two weeks away and we still don't have the support sorted out yet.

> (c) Generally, people in the Army are well trained to deal well with crisis management – in military terms we never know what the opposition is going to do and we are trained to deal with the unexpected. But we are not good at the opposite of crisis management.

NOTE: This is just the start of the interview. The transcript for each interview contained about 3000 words.

A5 Sample of coding

Following is a coded version of the same transcript as in the previous section along with memos. This information is stored in an excel spreadsheet allowing the researcher to filter the data by particular codes.

Line	Role	Interview transcript and codes	Memos
140	S5	1. Open ended discussion on boundaries:	
141	S5	a. **Question**: Could you list the key individuals and/or other groups that you interact with in the course of your work. Note they can be within [the study site] or external to [the study site]. These stakeholders should be in relation to:	
142	S5	20. yourself,	
143	S5	(a) I have done presentations [Mech-interact] on my previous experience overseas [Mech-Objects-Concept] [Mech-hetrogenity] to two courses. [Power-infl-soft-credibility] [IDENT-Experience] [MECH-	

		Spanners]	
144	S5	(b) I guess the only other area I have are my personal relationships [Coms-psych-reln] ie I have been able to facilitate [Mech-interact] interaction for other PSOs with my former unit. i.e. I have gone to bat for someone [Mech-promote] because they have been a little too intimidated to do it themselves. [MECH-Spanners] [IDENT-Individual-Personality] [DYN-Attractor-Reln] OR [IDENT-Individual-Reln]	Still need to work through where the Reln thing sits i.e. Its an aspect of individual Identity, I think.
145	S5	(c) I know [the deputy chief of the Army] personally and it helps me out in that it adds to my credibility. [Power-Infl-soft-credibility] [Coms-psych-reln]	
146	S5	21. your cell	
147	S5	(d) I [IDENT-Individual-Personality] have built the role of S5 in HQ and now feel I have become the key front person [Mech-Objects-people] [Mech-Interactivity] [Mech-Scope] [Mech-facilitation] for [the study site] to most of the external agencies in the Army. They come to me [Mech-interact] [Dyn] and from there I either [Mech-filter] respond or direct [Mech-promote]	[Important] - "Either respond or direct to right place" - This is a good example of Mech-*Objects*-people and the mechanism they represent. See Observations note. Distinction is between those in front of you and those over the horizon. I.e those with an ability to influence wider operations. This visualisation / descriptive language assists the

324		[Mech-activate] [Mech-facilitation] them to the right place. [MECH-Spanners] It has developed past synchronising and coordination. It is a true 5 task, doing planning or deep battle ie not close battle, not those directly in front of you but those that are further over the horizon. [Power-Discp-concept-distinction] [MECH-Spanners] [MECH-Action-Process]	S5 articulate and legitimate his role. Without it, the power is not there because the clarity of intent is not there. Scope: Note how this person/object covers all aspects of [the study site]'s operation. Where as a SME (e.g SWI) only covers one aspect of it.
148	S5	i. I'm now the key front person [Mech-Objects-people] for interaction between the formations and [the study site] wrt to training activities. Having said that, if the action directly impinges on training, eg it's a 4 issue, it still comes through me because I have a S54. [MECH-Spanners] [MECH-Action-Process]	
149	S5	(e) We run crisis management [Cult-orient-time] and it was worse before I came. I have just been dealing with a course that is two weeks away and we still don't have the support sorted out yet. [TEMP-Synch-Activity] [TEMP-Pressure-Deadline] [Out-Tension] [Dyn-Change-Salience]	Note that tension can arise from interactions that don't have a power content - i.e. Its a straight resource issue or miscommunication. It may result in an increased salience for the power dimension but it is not the cause of it.

A6 Example of Mindmapping

Following is a screen dump of mind mapping tool employed by this research, PersonalBrain5.5. One of the core categories, *objects*, is in the centre of the display with children below it, parents above it, lateral connections to the left and other children of its parents displayed on the top right. Clicking it any node of the mind map bring it to the centre of the display and automatically rearranges all other nodes in the display.
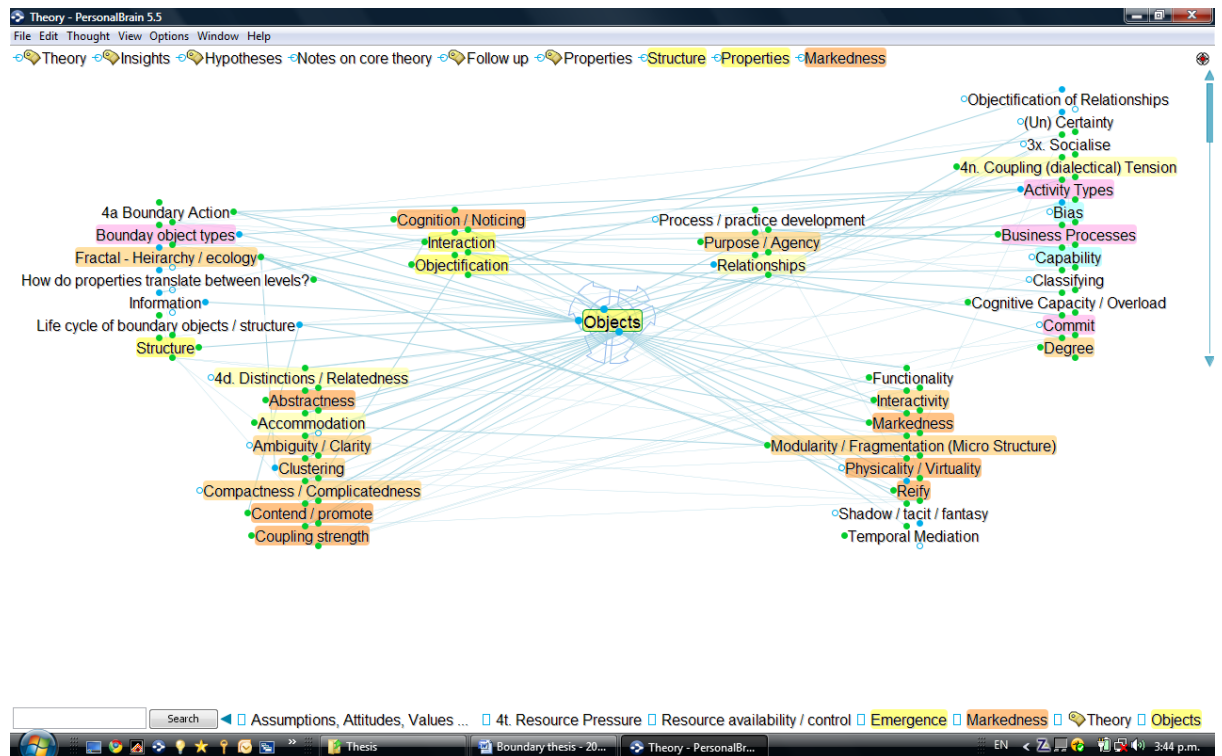
Following is another display with the notes field included. As the theory developed, a number of " node types" were developed to assist visualisation of the theory by colour coding. In the example given, the attribute of markedness is in the centre of the display and it is of the "core properties" type. Theoretical memoranda were written directly into the mindmap as can be seen in the notes field in the bottom left hand corner.