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**What are the mental models of managers of the
resource-to-performance relationship?**

by

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2010

A Management project presented in part consideration for
the degree of Executive MBA

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Abstract

The resource-based view (RBV) has developed as a series of related propositions that seek to explain the relationship between a firm's resource endowment and its performance and growth (Lockett et al 2009). RBV has not however, generated clear unambiguous hypotheses in the manner of more narrowly conceived theories of firm behaviour or even transaction cost economics, an approach with which the RBV is frequently compared (Newbert 2007). Meta analyses still remains unclear as they have not managed to look at the internal environment of the firm, mostly it has been carried out externally at the macro level, the absence of the role of the manager due to this is concerning.

Building upon the RBV theory, there is a distinct need to consider the centric role that the manager has to play in shaping both firm behaviour and performance, as it is they who determine exactly how resources are managed and deployed within the organisation, by including managers we can begin to analyse the decision making process they go through.

This form of analysis requires a consideration that each manager makes decision based upon their own mental model of the environment in which they find themselves. Cognition theory emphasises that the mental models of managers drive ultimately the organisational performance, such it is important to be able to understand what these look like, not only for the current environment an organisation finds itself in, but it will also shape the decisions that are made in the future. Mental models are considered to be dynamic in nature, in that there is an evolutionary process evolving over time guided by the managers subjective and objective views of the organisation and their interaction with people within it, a process of enactment. Lockett et al define resource enactment as: 'the process by which the managers of a firm socially construct their own understanding of the internal environment (resource-base) of the firm'.

Cognition theory proffers the notion of a cognitive map, a graphical representation of how a person perceives a situation, and that this view will be their internal representation of reality. Extrapolating a cognitive map down to a specific level we can create a 'cause map', a map which is essentially a cognitive map where the relationships are restricted to causal relationships between an organisations internal resources or capabilities, i.e. each relationship between these resources in the map is restricted to a cause-and-effect type of relationship (Eden and Ackermann 1978). This would be akin to the day-to-day activities within a typical organisation where many a resource comes into contact with another.

Undertaking a process to elicit such cause maps, will provide valuable insight, at an individual level, into their decision-making, how they perceive the resources at their disposal and their view of the intertwined relationship they have with each other, which ultimately determines how they will be used, developed or discarded and new ones created, with the resultant performance these decisions produce. Maps at an individual level are valuable in that they can be aggregated into functional groups or hierarchical levels for comparison, or simply compared directly across two people.

Comparing maps in this way provides invaluable information to an organisation to see whether maps between (i) different functional groups, (ii) people with different experience in years of the company or (iii) people at differing levels of seniority, show convergence or divergence of thought. From this data an organisation can overlay performance results to the maps in each of these areas to produce 'preferred models' and look for ways to align those variant to the preferred model, by determining which factors lead to the best performances and instill these.

This dissertation will walk through the above stages, and express how these link together and how organisations can undertake their own meta analyses to observe the cause maps of their own managers in an attempt to explain "what are the mental models of managers of the resource to performance relationship?".

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1.0. Management Project Overview
1.1. Introduction

The field of strategy has largely been shaped around a framework first conceived by Kenneth Andrews in The Concept of Corporate Strategy (Irwin 1971). Andrews defined strategy as the match between what a company can do (organizational strengths and weaknesses) against what it might do (environmental opportunities and threats).

This dissertation focuses on the importance and usefulness of the RBV yet considers its inherent weaknesses and the need for considering the active role managers have to play in producing a sustained, competitive advantage. The way managers deploy resources are conceived by their view of the internal workings of the organisation and the mental models formed from it over time and at each time when making their decisions, in particular the resources and capabilities existent with the firm and how these are deployed. The mental models and cause maps of the managers within an organisation provide valuable clues as to whether the organisation operates functionally and complementary or dysfunctional and conflicting. It is important to elicit, measure and compare these maps in order to determine which of these situations are in place, and what steps an organisation can take to improve upon them.

1.2. Resource-based view

Sustainable competitive advantage remains one of the most important current concepts in strategy and is analysed in terms of discussions of the resource-based view (RBV) of the firm (Barney 1991). Barney states there is a relationship between the resources, or essentially the differences between those held across competing firms, and superior performance, where resources are heterogeneous and may not be perfectly mobile across these firms. The relationship between resources and performance are crucial to this area of research, and organisations that are able to encapsulate this fully understanding the cause and effect linkage will be able to well place themselves in their competitive spectrum.

RBV conveniently proposes a framework for organisations in regards to efficient utilisation of its resources and capabilities in order to satisfy the strategic resource test of value, rarity, inimitability and non-substitutability (Barney 1991). These tests individually and indeed collectively help organisations to realise the true value of their resources, and whether they are optimised in their utility.

The resource-based view suggests that human resource systems can contribute to sustained competitive advantage through facilitating the development of competencies that are firm specific, produce complex social relationships, are embedded in a firm's history and culture, and generate tacit organizational knowledge (Barney 1992). It is widely accepted that organisations with path dependent evolutionary development incorporating many causal relationships are very difficult to replicate or directly compete with, affording a longer period of competitive advantage to the holder.

Unfortunately though in RBV research, meta-analyses testing in this field remain inconclusive and continue to describe the 'what' and not the 'how', with empirical evidence still ambiguous as to whether these performances are indeed superior due to the external focus it maintains, and RBV has not wholly moved on from Penrose's (1959) resources approach concerned with efficiency, economic profit, competitive advantage, and profitable growth, Penrose also added one cannot even start to analyse the external environment of the organisation without a prior understanding of the nature of the organisation, which is its human and nonhuman resources and their interaction.

Although RBV obviously has its merits there remain two significant issues outstanding:
   Theoretically:
      1. Lack of empirical evidence between the resource and performance relationship.
      2. The role of the manager is hugely ignored and unrecognised.

   Practically:
      1. How do managers and decision-makers think about these resources and capabilities?
      2. How they think influences the actions they take?
      3. How do the actions managers take impact upon each other?

Coupled to this is the dimension of time, and how it further impacts upon the above, to produce a more complex and reiterative process, time is a huge determining factor. Therefore further research is required if a successful attempt to enter the 'black box' which is the firm, is to be made.

As stated above, within most of the RBV work the role of the manager or decision-maker remains absent or at best passive and is considered a given in that they are largely ineffective, yet surely it is their centricity to utilisation of their organisation's specific resources

or capabilities consistent with the organisations strategic goals that largely affects the resultant performance achieved.

Gavetti and Rivkin (2007) posed the question "where does a firm's strategy come from?". Firstly, strategy exists in managers' minds, in their theories about the world and their organisation's place in it (Huff and Jenkins 2002). Secondly, strategy is embodied, reified in a firm's activities (Porter 1985), rules (March et al. 2000), and routines (Nelson and Winter 1982). Gavetti and Rivkin go on to advise that the understanding of this requires a two-part search process. One part is in the world of cognition and comprises the mental processes that mould particular theories about the firm and its environment. The other unfolds in the world of action and consists of mechanisms that shape what a company actually does.

Considering the role of the manager and the direct impact of their decision making is an extension to RBV that must be conducted and leads research into the realms of cognition and what factors make up the decision making process about what resources are used in order to drive performance within the organisation.

1.3. Cognition Theory

If strategy exists in the managers' minds it is important therefore to know what this looks like and what shapes it. Why do different managers within the same organisation use the resources at their disposal in differing ways?

Managerial cognition underpins the decisions that are made within an organisation. Managers are deemed to make decisions by firstly making sense of their environments and applying 'best fit' techniques to resource usage. Managers' experience with their firm-level resources produces firm-specific knowledge about the productive opportunities that are unique for the firm (Gavetti and Rivkin 2007). This experience-based knowledge is proprietary due to its immobility, and it cannot be purchased in the market. Penrose (1959) notes that:

> 'experience produces increased knowledge about things and contributes to "objective" knowledge growth. A firm's capacity of proprietary firm-specific knowledge possessed by its managers' functions as an isolating mechanism and determines the speed at which a firm can take advantage of emerging opportunities in its domain of business'.

Re-focussing our attention to the internal firm rather than the external industry, we can produce mental models of the managers. These mental models control the decision-making process undertaken which ultimately drive the organisational performance, such it is important to be able to see what these look like and what can influence them, not only in the current environment an organisation finds itself, but it will also shape the decisions that are made in the future. In order to determine this we must study them individually and look to see how they compare across peer groups, within functional areas, and also across levels of hierarchy within an organisation.

1.4. Causal Maps and Cogniser[TM]

Viewing mental models can be achieved through the creation of cognitive maps, whose notion being that a cognitive map is a representation of how a person perceives a situation that is their internal representation of reality. The beliefs that compose these maps provide the individual with a coherent way of organising and making sense of an otherwise confusing array of signals, and a basis for subsequent action (Holsti 1976). The map depicts constructs or nodes, which represent the resources and capabilities available to a manager, and the causal (Axelrod 1976) and/or other relationships or linkages between them that a person believes exist between those constructs in a particular domain of interest at a point in time (Nair 2001). The purpose is to identify the influences can occur between resources within the organisation, i.e. each relationship in the map is restricted to a cause-effect type of relationship (Eden and Ackermann 1978) each resulting in a form of action.

Undertaking a process to elicit causal maps, will provide valuable insight into an organisation's decision-making members, how they perceive the resources at their disposal and their view of the intertwined relationship they have with each other, which ultimately determines how they will be used, developed or discarded and new ones created.

Currently, there are many different approaches to capturing individual cognitive maps however, few describe a method that produces collective cognitive maps, of these approaches, perhaps most significant is the work of Langfield-Smith and Wirth and Markóczy and Goldberg, who have all greatly contributed to the development of Cognizer™, a comprehensive computer package designed to meet the requirements of researchers looking to elicit and compare large numbers of maps on a longitudinal or cross-sectional basis.

Langfield-Smith and Wirth (1992) proposed a series of distance measures for the quantitative comparison of cause maps in terms of content similarities and differences, as distinct from structural measures. In general, content measures reflect the extent to which individuals vary

in terms of the concepts incorporated within their causal cognitive maps and how these are perceived to interrelate, whereas structural measures seek to capture differences and similarities in the complexity of such maps (Clarkson and Hodgkinson 2005).

Mental models are formed over a period of time and are governed by both intelligence of the individual but more on the individuals experience of using a resource in a given situation and the learning's from previous decisions they have made based on the resultant outcome. This interactive process is described as enactment, a process that can provide further depth into the mental models individuals possess.

1.5. Resource enactment

Lockett et al (2009) advise that their model of resource enactment comprises beliefs about resource functionality, resource (re)combinations and resource creation and decay. It gives a key role to managers' cognitions in the resource-performance relationship. It views resource enactment as a process, which has wide ranging implications for the development of a firm over time. The belief structures that managers develop in relation to their firm resources base will influence how the firm is internally managed.

Resource enactment is defined as a process whereby the input in to it, is the managers confused and potentially contradicting views of the internal environment, where no mental models of these resources is shared. The output of the resource enactment process is a shared understanding of the resource-base of the firm and more functional and aligned management team. In essence, organizational structure, routines and cultures are all rooted in the beliefs associated with resource enactment. Armed with elicited map data, comparisons can be carried out at individual and group level, groups can be aggregated in many ways through the Cogniser variables allowed for each map, accommodating personal data such as role, age, experience, geographic location etc… such meaningful sub groups can be formed and compared.

The closeness or 'overlap' of maps symbolises a level of shared mental models and sense making of the environment, which ultimately should provide an improved level of team performance. Where there are large distances or 'gaps' between the maps, this would suggest individualised mental models with little or no sharing and could lead to potentially dysfunctional teams being formed ultimately leading to under realised performance levels, or simply 'doing things differently' but the effectiveness of these choice differences would need to be explored.

1.6. Case Study

To help bring RBV, cognition theory, and resource enactment together, with meaningful data and future recommendations for practitioners, I will, through elicited cause maps, extend my research across senior and middle managers currently operating within the electronic Fire and Security industry. Participation will be from a wide range of managers operating in a complete mix of roles and responsibilities, across a wide geographical area, for the whole of the UK and Ireland, with the aim to produce as much data diversity as possible.

By producing data I will be analysing the resources and capabilities that were chosen and how these compare across functional groups, coupled to this the group adjacency matrices looking at resources with the largest areas of influence into performance areas currently being strived for within the organisation, and how these compare across the groups using variable data about each participant to form useful aggregate groupings. Finally, the resultant data will be used to review the distance between individuals and functional groups to evaluate the current levels of concurrence.

1.7. Conclusion

The primary reason for the case research is to determine and compare the mental models of the managers within ADT. By evaluating which resources they believe are best placed to contribute towards the performance goals critical to the company at this time, how they view the strength of these resources, and how these resources directly impact upon the delivery of the performance goals, I will be able to determine whether there is any similarity between their selections and views and whether this propose a level of similar or 'shared' mental models of their organisation.

Comparisons will be explored in a manner of ways by aggregating individuals into sub-groups across:
1. Functional departments;
2. Experience brackets of working years within the organisation;
3. Seniority of the role held within the organisation.

Collectively these will be used to observe whether the mental models of these groupings reflect any symmetry, if so where and between whom, to see if any patterns emerge. From these findings an organisation can explore performance differences and correlate if the mental models align to these differences, and if so, take steps towards improving them by drilling down to the group or individual level of these findings and understand why individuals feel they way they do, and what their motivations are for the decisions they make. This

invasive level of review will help an organisation to determine root causes of individual models in order to move these towards an aligned mental model for their managers and by doing so form a 'preferred' more cohesive shared model to provide a more consistent performance across its various business units, or at least identify individuals that can mentor others or who are of a concern requiring further development.

2.0. Resource-based View Theory

2.1. Introduction

A stream of strategy research has emerged that generally posits that organizational resources and capabilities that are rare, valuable, non-substitutable, and imperfectly imitable form the basis for a firm's sustained competitive advantage (Barney 1986). This RBV (Conner 1991) of organizational strategy and competitive advantage has recently engendered a great deal of theoretical and empirical efforts (Amit & Schoemaker 1993).

Over a period of time a series of papers have outlined that there is a relationship between the opportunity set facing the firm, the strategic behaviour to be implemented by managers and the outcome in terms of competitive advantage or performance (e.g. Barney 1991; Dierickx and Cool 1989).

The overarching proposition of the RBV suggests that a firm's possession of specialized resources may permit it to enjoy a competitive advantage over its rivals which, given suitable management, is converted into an observable performance advantage. Furthermore, where this resource bundle is imperfectly imitable the competitive advantage is sustainable in at least the medium term (Lockett et al 2009).

The question of how a firm's resources contribute to a firm's performance retains a focus position in the strategic management literature and is critical to many strategy practitioners. The RBV of the firm was developed to further our understanding of this question by theorising the link between a firm's resources and its performance (Crook et al. 2008).

It should not be overlooked that essentially RBV is an economic tool used to determine the strategic resources available to a firm, whose fundamental principle is that the basis for a competitive advantage of a firm lies primarily in the application of the bundle of valuable resources at the firm's disposal (Rumelt 1984).

In this section I will seek to examine the implications of these more recent assumptions and to analyse the sources of sustained competitive advantage by clarifying definitions, then consider the factor of heterogeneous resource immobility and its role in sustained competitive advantage creation, in order to comment on and support the paradigm of Barney's framework.

Determining and implementing sources of sustained competitive advantage has been a major area of research in strategic management (Porter 1985 and Rumelt 1984). Sources of

competitive advantage are borne from focussing on a firm's internal and external environments, and have lead to the formulation of frameworks such as SWOT or OTSW (Andrews 1971) whereby there are 2 main focus's for a firm: (1) internal analysis – a firm's strengths which require capitalising upon and weaknesses that require minimising or preferably elimination, and (2) external analysis – the environmental opportunities in which to apply your strengths and threats that need to be neutralised in order to not harm the firm.

This simple framework is a very effective method of enabling a firm to consider all four areas simultaneously when developing their strategies as it is its simplicity that makes it accessible to all and can include accommodate many inputs for consideration.

It must be emphasised though that the research efforts up until the late 1980's majored on the external analysis areas surrounding opportunities and threats (Lamb 1984) and also Five-Forces (Porter 1980), both areas of research depicting two assumptions that firms operating within a particular industry will be:

1. Identical by way of the strategically relevant resources they control and the strategies they pursue (Rumelt 1984);

2. Homogenous in their resource construct, and should any heterogeneity be created it will only be short lived, as other firms will acquire their own version of it and compete away any differentials, due to resources being highly mobile (are easily available in factor markets) (Hirshliefer 1980).

Considering these, there appears to be little by way of consideration at the <u>firm specific level</u>, looking inside the 'black box', as to how a firm's attributes (resources and capabilities) determine their competitive positioning within an industry, if indeed they do at all.

Building on more recent assumptions that strategic resources are heterogeneously distributed across firms and that these differences are stable over time (Barney 1991), it is important to consider how a firm's resources contribute to sustained competitive advantage. This has lead more recent research to look at the internal firm perspective – looking inside the black box – as opposed to the external competitor and industry perspective, to evidence whether these assumptions are correct.

Complementary research has also been carried out on firm's from an internal perspective (Grant 1991) discussing that the case for making the resources and capabilities of the firm the foundation for its long-term strategy rests upon two premises: first, internal resources and

capabilities provide the basic direction for a firm's strategy, second, resources and capabilities are the primary source of profit for the firm.

There is a burning question amongst these assumptions though, "what is the link between a firm's resources and sustained competitive advantage"?

The RBV explains a firm's ability to reach sustainable competitive advantage when different resources are employed and these resources can not be imitated by competitors which ultimately creates a competitive barrier (Mahoney and Pandian 1992). RBV further explains that a firm's sustainable competitive advantage is reached by unique resources having the characteristics of being valuable, rare, inimitable, non-substitutable as well as firm specific creating a meaningful framework for researchers and practitioners alike (Barney 1991), thus providing empirical indicators of the potential of firm resources to generate sustained competitive advantage.

The RBV also highlights the fact that all resources of a firm may not directly contribute to a firm's sustainable competitive advantage, and that varying performance between firms is a result of heterogeneity of assets (Helfat and Peteref 2003) and focuses on the factors that cause these differences to prevail (Grant 1991).

The RBV explores from within the firm, examining the link between a firm's internal workings and its performance and as such, this view cannot build on the externally viewed assumptions from Lamb and Porter. The RBV does however, make two very differing assumptions of it's own (Barney 1991b):

1. Firms within an industry may be heterogeneous with respect to the strategic resources they control;

2. Resources may not be perfectly mobile across firms, permitting heterogeneity to be long lasting.

If, as the RBV suggests, that firms may be heterogeneous with respect to the strategic resources they control and that these resources may not be perfectly mobile across firms, then these can lead a firm to sustained competitive advantage, an advantage that not only is value creating and not offered by any form of competition but, critically, also that any form of competition cannot emulate it in any other way. This is a defined sustained competitive advantage, and is a highly sought position.

Definitions can often be confusing, particularly across differing fields of research, in order to remove ambiguity it is important to detail these accordingly. With regards to RBV main concepts centre on (a) firm resources, (b) competitive advantage, and (c) sustained competitive advantage.

2.2. Firm resources

A firm's resources include all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc; controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness (Daft 1983).

Resources can be categorised into 3 sub-groups, (a) physical capital resources (Williamson 1975) although these are fairly obvious from an equipment point of view it also includes geographic location which can be significant, (b) human capital resources (Becker 1964) which also extends beyond the actual person into training, development, experience, relationships within / outside the firm and an insight to the management decision process, and (c) organisational capital resources (Tomer 1987) beyond its controlling and reporting systems to also include informal relationships internally and externally.

A subsequent distinction made by Amit & Schoemaker (1993) is that these resources can be further defined and split up into resources and capabilities. In this respect resources are tradable and non-specific to the firm, while capabilities are firm-specific and used to utilize the resources within the firm, such as implicit processes to transfer knowledge within the firm (Hoopes, Madsen and Walker, 2003, p890). This latter distinction has been widely adopted and looks wholly towards a firm's idiosyncrasy.

2.3. Competitive Advantage and Sustained Competitive Advantage

A firm is said to have competitive advantage when it is implementing a value creating strategy in that it acquires or develops an attribute or combination of attributes that allows it to outperform its current or potential competitors (Christensen and Fahey 1984), it is important to explain potential competitors in respect of those considering entry into a certain market in the future (Baumol et al 1982) this is a useful consideration as it goes beyond the current known and more static form of competition.

The study of such advantage has attracted profound research interest due to contemporary issues regarding superior performance levels of firms in the present competitive market conditions. Successfully implemented strategies will lift a firm to superior performance by facilitating the firm with competitive advantage to outperform current or potential competitors

(Passemard and Calantone 2000, p.18). To gain competitive advantage a business strategy of a firm manipulates the various resources over which it has direct control and these resources have the ability to generate competitive advantage (Reed and DeFillippi 1990). Superior performance outcomes and superiority in production resources reflects competitive advantage (Day and Wensley 1988).

This advantage can be appended with 'sustained' when indeed other firm's are unable to replicate the strategy too, even when they are aware or it. This is a most enviable place to be and can lead to extensive rewards. It is worth explaining what is meant by sustained in that it is supposed to be beyond measurement in time, in that it remains even after efforts to duplicate have failed and subsequently ceased (Rumelt 1984), but also that it is not expected to last forever it simply enjoys a current value that is unable to be competed away.

Stated by Ma (2003, p.73) winning is a habit not a one-time event. With the same view point Chaharbaghi and Lynch (1999, p.45) write sustainable competitive advantage is a journey not a destination, stressing the idea that once reached, all attempts should be made to sustain competitive advantage, and not simply bask in it and stand still, complacency is often the undoing of such an achievement.

Disruptive technologies are areas of concern and often determine any enjoyed cycle time, often called Schumpterian shocks (Barney 1986c), these redefine whether a resource continues to be an ongoing source of competitive advantage or whether its usefulness is destroyed as it can not be employed in a different form, i.e. a totally new technology altogether which has no path dependency in its creation.

2.4. Heterogeneous and Immobile resources
If we consider that in an industry all firm resources are actually homogeneous and highly mobile (Hirshliefer 1980, Rumelt 1984), as this helps to align and compare everyone, it is fair to assume there could never be at any time any one firm enjoying a sustained competitive advantage due to their sameness, as this would suggest a form of heterogeneity.

There are however, two concerns with this consideration (a) first mover advantage, as it is here a particular firm could steal a march over others by setting up preferred supplier and customer relationships that could hold fast, but how could this happen due to homogeneity, as it is assumed that all firms could act at the same time, a firm would indeed have to be heterogeneous (Lieberman et al 1988), and (b) entry barriers, for a firm not prepared to or able to enter an industry it is implied that they are unable to perform in equivalence to those

already operating there due to them possessing differing strategic resources (McGee & Thomas 1986).

It must therefore be considered that most industries will, by nature, be characterised by heterogeneous and degrees of immobile resources (Hoskisson and Hitt 1989) else how could any firm ever gain a sustained competitive advantage over the other as all firms would be able to develop at a similar pace and be able to mimic each other along the way, leads research to focus on just how do firms differ in these respects.

2.5. Firm Resources and Sustained Competitive Advantage

In order to understand the sources that lead to sustained competitive advantage from a firm's resources that are said to be heterogeneous and immobile, we must introduce a framework (Barney 1991) that hangs it together, to determine those that contribute and those that do not.

Barney states that for a resource to contribute towards sustained competitive advantage it must have the following four attributes:
1. It must be valuable;
2. It must be rare;
3. It must be inimitable; and
4. It must be non-substitutable.

2.5.1. Valuable Resources

Resources are valuable when they enable a firm to conceive or implement value-creating strategies currently not enjoyed by competitors, leading to improved efficiency and effectiveness, particularly when exploiting opportunities and / or neutralising threats. If they do not achieve these then they are merely attributes. Once valuable resources are determined these can be improved upon further in ways leading to sustained competitive advantage.

2.5.2. Rare Resources

As explained above, value only exists where other firms are not currently creating it, but this is usually only a matter of time. This leads to the importance of the rarity dimension. For rarity to exist it must be that very few firms or only one firm can possess it. In this case it would be difficult for this value creation to be competed away. Rarity usually extends beyond a product due to non-exclusivity (or eventual non-exclusivity) and usually is confined to people, systems, and processes. Rarity and value is present where the numbers of firms

having it is less than the number of firms needed to generate perfect competition (Hirshliefer 1980). This can often be witnessed in first-mover advantage situations.

2.5.3. Inimitable Resources

For inimitability to be present Barney states that the resource has 3 constructs: (a) unique historical conditions – the ability to exploit resources depends upon a firm's place in time and space. Considering path-dependent models of economic performance, a firm's performance is determined by its route through history (Arthur 1983). Compounding further the observation above that these attributes are found in people, systems, and processes, which mature over time and produce individual practices and cultures, thus making it very difficult to replicate. (b) Causal ambiguity – is said to exist when the link between resources controlled by a firm and the resultant sustained competitive advantage is not fully understood (Demsetz 1972). This lack of understanding makes it difficult for it to be copied as competitors do not know which resources to copy or indeed for it to be taken away from the company should human resources exchange between firms. This is not uncommon due to the complex nature of a firm and how internal working relationships establish. (c) Social complexity – relationships amongst peer groups and the motivation that a particular manager or CEO exerts over their teams is very complex in nature (Klein & Leffler 1981). Reputations and brands that are built over long periods of time serve to confuse information further such a competitor cannot isolate the areas of strength.

2.5.4. Non-substitutable Resources

Non-substitutability is when no equivalent valuable resources that are rare and inimitable exist, capable of being employed to produce the same strategic outcome. Substitution can take two forms, direct or indirect. (a) Direct assumes that resources can be copied verbatim, but this is usually highly unlikely to occur due to all the reasons previous, or (b) Indirectly whereby a different combination of resources are used to achieve the same strategic outcome, this could be similar business plans between firms yet each goes about it a different way with the same aim.

2.6. Applications of the RBV

A major contribution of the RBV model is that it explains long-lived differences in firm profitability that cannot be attributed to differences in industry conditions (Peteraf 1993), arguing that a firm may gain expectational advantages by analyzing the assets it already owns, those which are satisfying of this framework.

The RBV has different implications for single business and corporate business strategies alike. At a single business level, it may help managers differentiate between resources that support a competitive advantage from those that do not, answering the debate whether to make or license new technologies dependent on the framework tests i.e. if perfectly mobile then license (Peteraf 1993).

The RBV aids a corporate firm in that firms with broader resources often seek diversification strategies (Montgomery and Hariharan 1991) helping a firm to determine whether their resources are quasi-fixed yet fungible i.e. they are transferrable across many products. A view supported by Montgomery & Wernerfelt (1989) whereby they characterize resources by their specificity and range of application.

2.7. Limitations of the RBV

There are views that the RBV is not actually a theory at all and that it is limited in its use in building strategic management (Priem and Butler 2001). Though fruitful, RBV research failed to discover a clear link between the objective characteristics of resources and performance (Crook et al. 2008) further analysis is required at the firm specific level to look at the relationship in more detail and extrinsic factors.

The underlying strength of the RBV attributes is in that they move a firm's focus away from products and technologies as these have limited life cycles on each of the four attributes, in favour of people, processes, systems, and culture i.e. into services. The best of these resources are often intangible, not physical, hence the emphasis in recent approaches has been on the softer aspects of corporate assets: the culture; the technology; and the transformational leader. These attributes capture how market forces determine the value of resources. They force managers to look inward and outward at the same time.

Although RBV helps to determine the requisite attributes as to whether resources and capabilities will deliver competitive advantage for the firm, and how these can be developed to ensure sustainability over time, there is still an overall consequence available empirical literature on the RBV and the range of variables it uses is that formal meta-analyses are precluded, and even summary statistics are difficult to compute. Also, it distinctly lacks explaining the role of the manager and the manager's influence upon what resources are used, how they are used, which of them are developed, which are eventually disposed of, and the importance of creating new ones.

Moreover, although early papers on the RBV views managers as playing a central role in the development and growth of the firm, through the decisions they make (Penrose 1959), developments on the RBV have largely neglected the role manager's behaviour. Accordingly, they did not theorise the processes whereby managers capture the potential strategic value of the firm's resources. Where resources contribute to firm performance, it is because managers combine and act upon the firm resources in such a way that they create this value (Collis and Montgomery 1995).

It is critical for all organisations to understand this process, and it is how a manager's cognition of a situation (Ginsberg 1992) determines how they use their resources, through what can be described as a process of enactment (Lado and Wilson 1994).

2.8. Summary

As described in the introduction section earlier and explored above, clearly RBV has its merits in linking the relationship between resources and performance and how these can achieve competitive advantage, yet there still remains a lack of empirical evidence to support the relationship and meta analyses still remains inconclusive. Insufficient credit is apportioned to the role a manager has to play within the organisation, and what biases the decisions they make about specific resource utilisation.

In the following section I will discuss the roles that cognition and the evolutionary process of competitive enactment play in enhancing RBV by bringing the manager into stronger focus, considering the decision-making process they go through in greater detail and what motivators influence these decisions, in order to make sense of the environment in which they operate in. How a manager's belief systems are formed impacts upon their conduct, and the competitive arena in which they occupy leads to behaviour patterns within industries formed from strategic groups to which they associate themselves.

3.0. Cognition and enactment

3.1. Introduction

In the previous section, I discussed how RBV helps to determine the requisite attributes resources and capabilities require to deliver competitive advantage for the firm, and how these can be developed to ensure sustainability over time. Here I will enhance these findings and discuss the area of cognition theory coupled to the competitive enactment process to integrate the role the manager plays in the resource-to-performance relationship whilst shifting from the external environment to the internal one.

This will provide an insight to understand that manager's need to make sense of their working environment forming a mental model from which they will base their decision-making. It is argued that managers deploy resources on the basis of their mental models of the internal environment of the firm, from these models or interpretations, resources contribute to performance through the mediating process of competitive enactment, a process that is evolutionary, forming a managers belief system.

As systems of shared meanings (Morgan 1986), organizations, through their managers, constantly act upon, cognitively interpret, and select their own environments (Weick 1979). Proponents of this view do not support an objective environment that exists independent of an organization, preferring the notion that organization and environment are enacted through the collective action of the management team, the collective interpretation and assignment of meaning to those actions, and the selection and retention of those actions that make sense to the organizational members (Morgan, 1986). Because the enactment process is idiosyncratic (i.e., it involves the generation and interpretation of firm-specific, symbolic knowledge); imaginative (i.e., it involves the search for strategic possibilities through intuition, experimentation, and improvisation); and evolutionary (i.e., it involves divergent and convergent processes of variation, selection, and retention of human actions and cognitions, linking past actions with future organizational realities), it may hold the potential of sustained competitive advantage.

Building on the cognitive literature on strategy we view managers as 'resource enactors' (Lado and Wilson 1994) and argue that they act upon their mental models of the firm's resource base (Ginsberg 1992). This means that the way managers use and combine resources ultimately rests upon their subjective perception of the resources potential functionality (Gavetti 2005). This theory shows that resources contribute to performance because managers combine and manage them in such a way that the strategic potential of the resources is enacted and captured. It specifies the process of resource enactment

whereby managers come to develop a shared understanding of their firm resource-base, and links this process to the resource-performance relationship.

3.2. Role of the manager

Many scholars (e.g. Adner and Helfat 2003; Eisenhardt 2002; Helfat et al. 2006) highlight the key role managers' play in their firm's ability to adapt to new circumstances. They suggest that senior managers are critical determinants in the deployment of different forms of dynamic capability. To quote Teece (2007) 'dynamic capabilities reside in large measure with the enterprise's top management team', Harreld et al. (2007) suggest that one of the core aspects of the managerial role is to develop the firm's capabilities. They argue that managers need to be able to accomplish two tasks: First, they must be able to accurately sense changes in their competitive environment, including potential shifts in technology, competition, customers, and regulation, and second, they must be able to act on these opportunities and threats; to be able to seize them by reconfiguring both tangible and intangible assets to meet new challenges. Their capability to do so depends on their motivation, skills and experiences (Zahra et al. 2006).

This emphasis on the role of managers also means that what managers perceive their environment to be like (Adner and Helfat 2003) are critical factors in understanding why and how dynamic capabilities are deployed. This cognition opens up a whole area of managerial decision-making and behaviour. Determining such mental models would provide invaluable insight into the managers beliefs around the resources at their disposal and what key considerations they make with regard to their utilisation. In order to analyse this in greater detail, I will be conducting an in depth level of research into a large UK based company operating within the Fire and Security industry. Mental models will be created by the use of specialist software programme, from which I will be able to analyse and compare the maps of senior manager's, this is covered fully in section 5.

Managers' experience with their firm-level resources produces firm-specific knowledge about the productive opportunities that are unique for the firm. This experience-based knowledge is proprietary because it cannot be transferred to new managers quickly, and it cannot be purchased in the open market. Penrose (1959) notes that 'experience produces increased knowledge about things and contributes to 'objective' knowledge growth. A firm's capacity of proprietary firm-specific knowledge possessed by its managers' functions as an isolating mechanism and determines the speed at which a firm can take advantage of emerging opportunities in its domain of business (Penrose 1959).

In Penrose's (1959) theory of efficient management of firms' resources, a key proactive role is assigned to managers in perceiving and pursuing productive opportunities. In a dynamic environment, managers can change both the productive services resources render and the demand conditions that affect its productive opportunities (Penrose 1959).

While some firms may have brilliant visionaries by luck, other firms have them because they developed the appropriate corporate culture, human resource practices, and reward systems to nurture the entrepreneurial faculties in their employees. It is the latter form of entrepreneurship that Penrose (1959) gives closer attention. Those firms with an entrepreneurial culture are likely to sustain superior returns - an idea that is revisited in Barney (1986).

Although it is conceded that although the manager is not completely absent from the breadth of all RBV literature, they are in the area of sustained competitive advantage, it is here where additional studies must ingrain the manager to the competitive advantage formation and its overall lifecycle.

3.3. Competitive enactment

Competitive Enactment (Porac & Thomas 1989) is the idea that a continual objective-subjective-objective reiterative process exists within an industry underpinning its competitive structure formed from the beliefs of practising individuals about their competitors, suppliers and customers, and that these beliefs through the objective-subjective-objective process become aligned into mutual enactment processes over time, forming strategic groups between organisations who hold similar beliefs about their competitive environment construct and composition.

Most research has been carried out considering financial performance of these groups yet this has been critiqued in that it does not help to define the competitive nature of the industry environment (Porac et al 1989) such why viewing the competitive strategy from a cognitive viewpoint is now gaining popularity (Hodgkinson 1997).

This growth of interest in the study of business competition from a cognitive perspective (Hodgkinson 1997), the notion of 'competitive enactment' and the associated 'cognitive life cycle' approach (Porac and Thomas 1990) represent a potentially major breakthrough in understanding the dynamics of competition in industries and markets. Porac and Thomas (1990) state that organisations compete with one another as they share similar form and that they require similar resources to survive. As critical resources are often scarce, similar

organisations therefore become competitively interdependent, and that their survival is a function of its resource capabilities compared to its rivals.

There is much literature on competitive strategy based on assumptions that the business environments are objective entities waiting to be discovered through formal analysis. Yet there is a growing recognition that more is contributed to the managers and a firm's decision-makers perception of their competitive positioning via their mental models, which forms strategy (Porac and Thomas 1990).

Strategy in business competitive terms has been dominated by refining techniques in analyzing competitive structures formed from the notion of strategic groups (Lewis & Thomas 1990). The notion of strategic groups was a concept formed by Hunt (1972) when studying differing firm performances in North America in the 1960's. Porter's (1980) definition for strategic groups is most widely accepted as:

> 'A strategic group is the group of firms in a given industry that follow the same or a similar strategy along the strategic dimensions. Often there are a small number of strategic groups that capture the essential strategic differences among firms in the industry'.

Economists have long classified firms into competing groups (Porac and Thomas 1990), with two classifications receiving the most attention this being, firstly, the 'industry' criterion in that firms compete with one another when the share the same technological attributes, and secondly, the 'market' criterion whereby firms compete with one another when their output attributes fulfill similar client functions and as such are substitutable.

These simple definitions however, remain unsatisfactory in that cognition accounts for how decision makers actually solve the comparison dilemma, which may vary to how a researcher interprets it, plus industry and market criteria continue to be ambiguous. McGhee and Thomas (1986) advise that the search for the cognitive basis of competitive strategy must deal with the cognitive models constructed by the actual decision-makers, which forms an internalized cognitive taxonomy.

The aim of the strategic group theory is to account for intra-industry variations in the competitive behaviour and performance of firms. Such firms often resemble each other

closely, are able to anticipate each others reaction to environmental jolts whilst recognising their mutual dependences and respond accordingly (Porter 1980).

Differences in strategy and profitability arise for two main reasons (Caves and Porter 1977):
1. Differential entry barriers – constituting the factors which prevent firms from entering any industry or market;

2. Presence of mobility barriers – is linked to those firms already existent within the industry or market, but which are unable to leverage from a current strategic group into another one.

It is interesting that differing groups co-exist, and that their construct, size, and activities often produce unique, relevant segmentation strategies and ultimately leads to a firms preferred positioning.

Although strategic groups are typically evaluated through internally provided quantitative accounting information (McGee and Thomas 1986) to determine bases of competition, more recent research seeks to explain how or why these competitive structures came to develop in the first place and how they were chosen and maintained. This leads to the requirement for looking beyond economics (even though it is accepted that this is the core reason for existence) to explain the types of strategic groups (Porac et al 1989).

A growing number of researchers have therefore begun investigating competitive strategy from a cognitive viewpoint (Walton 1986; Porac et al 1987), albeit of an exploratory nature.

Several theorists have advanced 'social constructionist' explanations for the emergence of competitive structures in industries and markets (Weick 1988; Porac et al 1995). Competitive structures both determine and are determined by strategists' perceptions of the business environment through an iterative process. This 'over-time' process leads to highly similar, or shared, mental models being created of their competitive arena. This social exchange develops the rules by which competitive engagement occurs.

This process of social construction has been termed by Porac as 'competitive enactment' through extending the early works of Weick (1979), who describes the term enactment as representing the notion that when people act they bring structures and events into existence and set them in action. Weick uses this term in the context of 'sense-making' by managers or employees. In addition he describes how they can enact 'limitations' upon the system to

avoid issues or experiences. To date enactment is usually related to firms, their environment and strategic management.

The notion depicts an objective-subjective-objective cycle (see figure 1 below).

Figure 1: A static model of competitive enactment

Enactment is not a one-off occurrence, and we must importantly consider the strength in the dimension of time, which together underpins the development and path of competitive structures to form a cycle (see figure 2 below). These structures consist firms whose beliefs about customers, suppliers, and the identity of competitors become highly unified through mutual, ongoing, enactment processes, these could also be added to by human resource 'movements' between competing firms within an industry through techniques of headhunting where previous competitive strategy aims have failed due to rarity, and can then be realised.
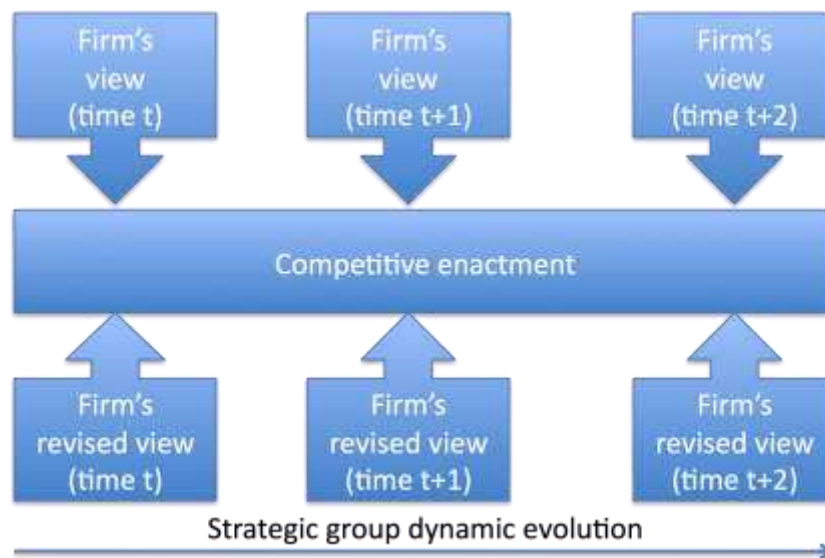
Figure 2: A dynamic model of competitive enactment

This process of unification over time creates 'group-level' beliefs about the marketplace due to the tendency of firm imitation. This was evident from the research by Porac and Thomas in their 'The Case of Scottish Knitwear Manufacturers' (1989) in that these small Scottish firms considered themselves as competitors due to the mental model held by each of the firm's managers, which directed them towards firms they believed highly resembled their own. This can lead to a group-level model comprising firms with a narrow range of strategic options which in turn can have severe consequences not only at an individual firm level, but the strategic group as a whole or industry.

Imitation can occur both directly and indirectly (Aldrich et al 1984). Indirectly: where strategists face similar technical / material problems with a finite number of solutions. The belief similarity is formed from interpreting the same cues and solving the same problems; Directly: from formal and informal communications between a competitive set, leading to idea exchange and externalizing their mental models.

It should be noted that in this dissertation I have not considered the needs of the customer and their centricity from a demand (pull) to influence the competitive environment Daniels et al (1993), such it is accepted that the entire environment is not wholly a push strategy from the supply. It is often a collaborative process as a customer can experience first hand competing firms and often take the best of these firms to encourage and develop a superior-performance firm delivery or best practise, usually leading to the competing firms to alter their strategic positions, whilst converging even further their beliefs. Nor does it analyse whether there is a 'connect or disconnect' between the mental models from the supply and demand sides, this is a very important research area too.

If we accept that a manager is aware of the strategic group in which their firm exists, it is of particular interest to research how they perform within it, and how they best use the resources that are available to them. Considering the previous section about RBV and Barney's VRIO framework, which determine the extant factors that a firm's internal resources must align to in order to produce a sustained competitive advantage, there is a hole in the literature that defines how these resources are deployed in such ways.

Porac and Thomas (1989) argue that the important link between group-level (strategic) and firm-level competitive phenomena is the mental-models used by key decision-makers to interpret the competitive environment of their firms. Whereby actual resource exchanges occurs at the 'material' level, i.e. what goods or services to provide, which raw materials to use, and which customers to target, this has dominated research. These decisions are considered to be reflective of the intuition and cognitive constructs of the decision-makers.

In the field of strategic management, the majority of studies analyse competitive environments from an economic standpoint, based on the implicit notion that business environments are formal and objective. As such, the human element is 'assumed' and the role that managers play in creating and changing competitive environments is neglected. However, given that people take business decisions and drive organisations, to ignore such an important dimension of the competitive environment is a considerable limitation to developing a more holistic understanding about them (Panagiotou 2006).

Today there remains little appreciation about how managers perceive their competitive environment and the impact of managerial cognitions on industry dynamics. Given that managerial cognitions influence decision-making and therefore competitive strategies (Bukszar 1999), the cognitive aspect of management is integral to understanding how competitive structures develop. Through their competitive activities, managers create and alter the dynamics of an industry.

Strategic groups provide an intermediate frame of analysis between the individual firm and its industry (Thomas and Venkatraman 1988). Therefore, by investigating the perceptions of managers as decision-makers within their firm's management structure, a broader framework that includes the individual, the firm and the industry can be developed. Scholars have used strategic groups to analyse the contestability of competitive market structures, industry dynamics, structural evolution and strategic change (Porter 1980; Porac et al 1989). Others have used the concept to examine intra-industry variations in a firm's performance (McGee and Thomas 1986), competitive behaviour (Smith et al 1997), mobility barriers (Sudharshan et al 1991) and competitive positioning (Fiegenbaum et al 1990).

This external analysis dominates most of the research in this field, and it is only through more specific internal firm research in analyzing the mental models of an organisation's management team, will the research be able to move on further and begin to consider how the structure of the various managers models have on the resource-to-performance relationship within an organisation. This internal focus requires the need to interview individual managers and determine how the envisage their working environment, this will be discussed in greater detail in section 4.0. Causal maps and Cogniser^{TM}.

3.4. Implications for managers and decision-making

Cognitive theory helps in understanding how decision-makers both make sense of firm diversity and define competitors. This permits what Porac and Thomas (1990) describe as the simplification by the decision-maker of the inter-firm environment into category types, a view supported by Panagiotou (2006). From a socio-economic perspective, the fact that managers simplify their competitive environment in a subjective manner suggests that individuals are bounded by their cognitive frames and consequently redefine their world into smaller and more manageable chunks in order to contextualise it and operate effectively within this space. Weick (1979b) stated that the most important competitive groups are those that are formed from the managerial definitions of firm forms, and that boundaries among firms retain importance when they exist in the minds of the competing managers. This was particularly evident from the study of Scottish Knitwear when competition once defined,

accounted for only 3% of the worldwide knitwear production, this myopia can lead to further reaching ramifications about a firm's longer term survival as clearly they had not truly defined the scope of their competitive rivals. This was mainly due to their classifications of competitors not stretching geographically further from their 'localised' geography, a severe under-estimation.

The mutual awareness that characterises competitive enactment is a key feature in oligopolistic environments exhibiting strategic inter-dependence (Pennings et al 1984), however this is challenged by the cognitive approach in that decision-makers form a subjective reality of cognitive oligopolies to rationalise the local competitive environment. Managers and firms operate in smaller mental segments rather than on one big frontline, where all companies operate and compete. While this frontline notion reinforces the oligopolistic characteristic of markets, a cognitive standpoint introduces the notion of a 'mental oligopoly' or a 'mental segmentation', since firms appear to operate within such cognitive boundaries.

From the perspective of an individual firm, the fact that managers from the same strategic group have perceptions that are relatively similar with each other, and that these differ from those of managers in firms from another strategic group suggests that over time, managers from the same strategic group become more like-minded as a consequence of interaction and cross-influencing.

Understanding the impact of managerial perceptions on how competitive environments are negotiated is crucial to understanding competitive landscapes, individuals certainly perceive things differently and make judgments in quite different ways. Therefore the ways in which managers analyse, make sense of their environment and take decisions about competitive strategies have considerable implications for the field of strategic management (Weick 1995).

Managers form a 'school of thought' that subsequently reinforces this frame of mind. The potential of this like-mindedness has serious repercussions because managers may become locked into a similar way of thinking and practising. As a result, it may become harder for these managers to see outside the parameters of these mental boundaries.
This leads to imitation becoming the industry norm. Therefore, differentiation and creative thinking, tailored-made to the specific needs of a particular firm, may fall by the wayside. In such settings, a failure to recognise relevant threats and opportunities in the wider competitive landscape can jeopardise the alertness and competitive performance of the firm.

Managers need to be alert to shifting environments and new forms of competition, successful adaptation will only be possible by avoiding cognitive inertia that is often prevalent in a well-formed cognitive taxonomy, allowing the decision-makers to continually re-define their competitive groups.

One way for firms to counteract the undesirable effect of stagnant thinking is to promote and maintain diverse management teams. The cross-fertilising of management teams with recruits from other groupings or industries can help ensure that creative problem solving can become part of the firm's approach. This is a dominant theme of much firm behaviour text.

3.5. Summary

The above sections discusses cognition and how this links to competitive enactment to shape the overall mental model of the manager, through the forming and subscription to strategic groups that enable firms to continuously compare themselves within their chosen group. This helps explain why similarities exist across organisations that work with similar size and technicality of resources, and how that overtime these become more entwined.

Although this external focus offers some insight into my research the unit of analysis is not an internal one, affording difficulties in its appropriateness, measurability, and transferability, and as such is limited. In order to fully address the research question of "what are the mental models of managers of the resource to performance relationship?" I require the actual maps of managers operating in the working environment.

It is therefore important to be able to produce and analyse these mental models. This can be achieved by using procedures for the systematic elicitation and comparison of cause maps, allowing for the mass application of causal mapping techniques using a software tool that allows these maps to be elicited. One such well developed software package is Cogniser™, a comprehensive computer package designed to meet the requirements of researchers looking to elicit and compare large numbers of maps on a longitudinal or cross-sectional basis. The following section will explain what types of maps can be produced, how they can be created and their research usefulness.

4.0. Causal Maps and Cogniser^{TM}

4.1. Introduction

In order to fully address my research question I need to consider the employment of cause maps, as these will provide an internal view of the manager's mental models in a given situation. These will allow individual maps to be reviewed and compared in a multitude of ways in order to seek insight into what influences these models and what leads them to make the decisions they do.

The notion of a cognitive map is essentially a representation of how a person perceives a situation that is their internal representation of reality. The beliefs that compose these maps provide the individual with a coherent way of organising and making sense of an otherwise confusing array of signals, and a basis for subsequent action (Holsti 1976). I will reference the term 'cognitive map' to represent the essence of a person's beliefs regarding a particular situation represented in a network based format (Jonassen, Beissner, & Yacci 1993). The map depicts constructs and the causal (e.g., Axelrod, 1976; Langfield-Smith & Wirth 1992) and/or other relationships that a person believes exist between those constructs in a particular domain of interest at a point in time (Nair 2001).

Known variously as cognitive models, scripts, belief structures, knowledge structures and mental models amongst other terms (Walsh 1995), cognitive mapping has grown out of a need to capture and articulate these 'information structures' because of their influence on decision-making, reasoning, predictions about future events, affect and behaviour (Fiske and Taylor 1991). Mapping has been used extensively and to great advantage in many areas of firm research, for example stress and emotional experience at work (HSE 2002), learning (Carley and Palmquist 1992), human resource management (Budhwar and Sparrow 2002), technological innovation (Swan 1995) and marketing (Crittenden & Woodside, 2006), a broad field of research.

Cognitive maps can be analyzed along two principal dimensions: content, which captures what constructs (variously referred to as concepts, nodes, elements or variables) an individual perceives relevant to a given domain, and structure, which reflects the global organization of those constructs within the map. The content of a map can provide rich insights into the meaning of specific concepts but map comparisons are often difficult because of unique circumstances.

Due to the many changes that are taking place in society and industry, there has been much interest in the so-called 'learning organization' (Klimecki and Lassleben 1998) one that has

the ability to quickly adapt to its ever-changing environment. Based on this, there has been much interest in extending the notion of individual cognition to an organizational level (Meindl, Stubbart and Porac 1996). Specifically, organisation science researchers have been interested in applying cognitive approaches to understanding firms. Cognitive mapping is an approach that has been used to study individual and firm cognition that was first used to understand individual cognition (Axelrod 1976, Eden and Ackermann 1978).

As described in the previous section, Cognitive theory provides a useful framework for identifying the importance of how decision-makers both make sense of firm diversity and define competitors. It also helps us to understand that manager's need to make sense of their surroundings, which allows a manager to categorize the resources at their disposal and select from them based on a particular resource's utility match to the situation they find themselves in. Being able to understand an individual's beliefs which we have established controls their decision making process, we will be able to 'step inside' the manager's mind. In order to do this we can use a process to be able to view their cognitive mapping to produce causal maps.

4.2. Cognitive mapping

The earliest work on cognitive maps is generally credited to Tolman (1948). A cognitive map is a graph composed of nodes (resources / capabilities) and links (which essentially are relationships) between the nodes. A cause map is essentially a cognitive map where the relationships are restricted to causal relationships where influences can occur between nodes, i.e. each relationship in the map is restricted to a may-lead-to or cause-effect type of relationship (Eden and Ackermann 1978).

As pointed out by Nelson, Nelson and Armstrong (2000), in the context of the capture of information systems expertise, it is not possible to literally 'open the expert's head' and extract domain knowledge as represented directly in the human brain. It follows that methods are required that can represent knowledge in ways that capture the essence of peoples' thoughts and belief systems. Cognitive mapping is a technique that captures an individual's view, at any moment in time, of a particular issue in a useful graphical representation. Cognitive mapping usually begins by asking participants a question to elicit their perceptions. An analysis of various cognitive mapping techniques shows that most of the techniques maybe viewed as consisting of three major parts: one, eliciting concepts, two, refining concepts, and three, identifying relationships between concepts (Sheetz and Tegarden 2001).

A common characteristic of these approaches is a focus on obtaining the views of people in their working environment. These views are often obtained using broad questions with the intention that the participants will provide the details they believe are most important.

Cognitive maps have been used to represent managerial cognition at both the individual and group levels (Axelrod 1976). Even though cognitive maps have been used to represent group-level cognition, most cognitive mapping approaches have focussed on individual cognitive maps. This has lead to the difficult problem of merging individual maps to create a collective cognitive map that represented the aggregation of the individual maps, which is useful for a firm to determine its company wide alignment across its decision-makers. To successfully merge the individual maps, sufficient congregating labels or common semantic nodes, must be identified (Tegarden and Sheetz 2000). This can be a very difficult and time-consuming process.

Currently, there are many different approaches to capturing individual cognitive maps however, only four of the approaches describe a method that produces collective cognitive maps. These are congregate maps (Bougon 1992), shared maps (Langfield-Smith 1992), group maps (Eden and Ackermann 1978), and oval maps (Eden and Ackermann 1978). These are described below.

Out of these approaches, perhaps most significant is the work of Langfield-Smith who created a shared map through the use of a group workshop where the participants identify similar ideas within the individual cognitive maps. Once an agreed upon set of 'elements' are identified, then the participants describe a set of relationships that they agree exists between the elements.

Once this is accomplished, the individual maps are merged to create a shared map. The shared map is used to identify both shared and idiosyncratic beliefs. This is more important to understand firm behaviour and make sense of decision-making as it represents a higher representation of the management team, and simply the more participants the stronger the result confirmation.

4.3. Cogniser

The work in the shared map arena Langfield-Smith has helped lead in the development of procedures for the systematic elicitation and comparison of cause maps, allowing for the mass application of causal mapping techniques. However, due to a dearth of suitable supporting computer software, very few researchers to date have responded to this (Clarkson and Hodgkinson 2005).

Furthermore Langfield-Smith and Wirth and Markóczy and Goldberg, have all greatly contributed to the development of Cognizer™, a comprehensive computer package designed to meet the requirements of researchers looking to elicit and compare large numbers of maps on a longitudinal or cross-sectional basis.

Langfield-Smith and Wirth (1992) proposed a series of distance measures for the quantitative comparison of cause maps in terms of content similarities and differences, as distinct from structural measures. In general, content measures reflect the extent to which individuals vary in terms of the concepts (depicted as nodes) incorporated within their causal cognitive maps and how these are perceived to interrelate, whereas the latter measures seek to capture differences and similarities in the complexity of such maps (Clarkson and Hodgkinson 2005). More recently, Markóczy and Goldberg (1995) have devised a systematic approach to the elicitation and comparison of cause maps, potentially suitable for use in large-scale applications. Building on Langfield-Smith and Wirth's (1992) contribution, they advocate the following five-step procedure:

1. Develop a pool of constructs by conducting and analyzing interviews with managers and a review of relevant literature. This is done prior to the study so that each participant selects constructs from the same pool.
2. Have each participant select a fixed number of constructs by identifying items from a constant pool of constructs.
3. Construct the causal map of each individual participant by having them assess the influence of each of their selected constructs on the other selected constructs.
4. Calculate distance ratios between causal maps using a generalized version of Langfield-Smith and Wirth's (1992) formula.
5. Perform a variety of statistical tests on the distance ratios to identify what characteristics account for similarities in thinking.

4.4. Defining Terms

Within the Cognizer system, the term <u>construct</u> is used to define the node type within maps. The term <u>variable</u> is used to define participant data (usually of interest to the researcher), such as age, gender, experience, role. Although variables are not featured within any participants' maps, they can be used to form meaningful subgroups of participants whose maps are to be compared. The term <u>links</u> is used to depict the relationships between constructs in the cause maps, their direction of influence and its strength.

4.5. Cause Map Elicitation and Construction

Within the past decade hybrid techniques have become more popularized, seeking to combine the strengths of idiographic and nomothetic approaches while dispensing with their associated weaknesses (Clarkson and Kelly 2008), the most comprehensive of such hybrid procedures to date is that devised by Markóczy and Goldberg. Within their system the researcher, prior to the elicitation of the cause maps, develops a common pool of constructs. By creating a finite pool of constructs we avoid the 'coding' issue prior to elicitation rather than after, the benefits being that there is only one list and every participant is presented with the same stimuli and allows comparison of maps to be conducted from the same construct set, the disadvantage though is that it does not cater for novel constructs.

Individuals are required to select a personalised list of constructs to be mapped from this common pool, and they construct their maps by formally assessing the perceived influence of each construct thus selected on every other construct within the entire subset. Crucially, this procedure totally obviates the need for subjective researcher judgment in making cause map comparisons, albeit within the boundaries of a researcher-designed framework (Clarkson and Hodgkinson 2005).

Construct lists vary considerably in their form, content, and method of development (see, Markóczy & Goldberg, 1995). These should be relevant to the organisation and also contain relevant theoretical and empirical contributions from the MOC literature, and represent a cross section of all of the firms activities with a balance of the number represented across from its functional areas, i.e. Operations, Marketing, HR, IT etc... Although there is no recommended number the study should aim to be between 40 – 60 constructs, so as not to be too limiting nor to be too complex to conduct. Constructs should be presented in terminology familiar to the firm to ensure correct interpretation.

From the pool participants should select the ten most relevant constructs, which will produce a list of 90 (10*(10-1)) influence relations to be considered. It should be noted that it does not

follow that participants have a non-belief for the constructs not selected; it simply means there are ten more significant. Starting from a pool of only ten is far too limiting for a study, therefore this is an unfortunate dichotomy.

Cause maps are elicited in a three-stage process, first by asking the participant to consider whether a particular construct exerts a causal influence on another construct belonging to the subset selected. In cases in which no causal influences are perceived, participants are instructed to simply move on to the next pair of selected constructs. In those cases in which participants perceive that the construct in question exerts a causal influence on another construct, they are next requested to consider how it does this, is it a positive effect so as to produce an increase in the dependent variable or is it negatively producing a relative decrease. Finally, they are asked to consider whether it does so slightly (+-1), moderately (+-2), or strongly (+-3). Throughout the process the screen features a progress bar, for reference. Data is captured at each 'next' instruction which assists with pauses in the interview, or if the need to review previous sections occurs.

Systematically considering all pair-wise effects should significantly diminish the possibility that potentially important effects are omitted (Hodgkinson, Maule, & Bown 2004). Here the researcher must maintain the relationship direction being sought.

For example, map 1 below diagrammatically shows a simple five-construct model, with a link between constructs depicting direction of influence and the degree of influence.
The elements of which have two properties, one, relevance, and two, influence, influence that could be either positive or negative, and to what degree or strength of influence: high; moderate; or low. There is also the chance that there is no link due to irrelevance between the subject matters.

Here you can see that each link has a number associated to it, between constructs 1 – Visionary Leadership and 4 – Customer Relationship Management the number is +3. The sign associated to the number determines the polarity of the link, whereby a + sign is a positive influence, i.e. an increase in 1 leads to a positive increase in 4, and a – sign is a negative influence, i.e. an increase in 5 – IT investment leads to a negative increase in 4 – Customer Relationship Management, and a decrease in 5 leads to a positive increase in 4.

There are two ways of displaying a causal map, diagrammatic form as below or in an association matrix also below in table 1.
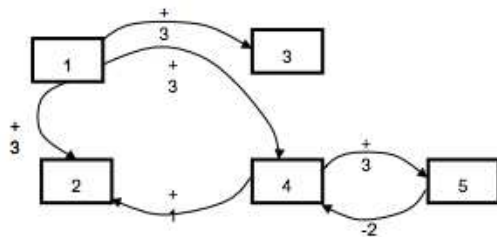
		Visionary Leadership Team	Effective Customer Service	Improve Employee Engagement	CRM Tool	Investment in IT
1	Visionary Leadership Team		+3	+3	+3	0
2	Effective Customer Service	0		0	0	0
3	Improve Employee Engagement	0	0		0	0
4	CRM Tool	0	+1	0		+3
5	Investment in IT	0	0	0	-2	

Map 1: Diagrammatical representation of a Causal Map

Table 1: Matrix representation of a Causal Map

The constructs are shown in the matrix column header and row leader, the direction of influence is from the row to the column or x axis to y axis. A number corresponds to the presence of a link, and the value determines the degree of influence either positive or negative or in some systems black for positive or red for negative. Usually this type of matrix only includes the nodes of selection for the particular participant.

In addition to the association matrix there is an expanded association matrix, this includes all available nodes not just the selected ones by a particular study, these are useful for aggregate maps whereby we can see wider data for map comparison or distances between participants or groups. It also permits discussion on the node choice variances as well as the relationship between the choice ones. However these can become very complex considering the number of node choices the study may take. And serve to add confusion, even more so can be said for the diagrammatic form.

Axelrod (1976) expressed clearly that causal maps are not a panacea for management teams, they simply present information about an individual's or group's belief systems. Consideration should also be given in the method in which the map was constructed and elicited, as this has a huge bearing on the responses provided by the participant, and researcher bias can have a damaging effect.

Maps elicited by means of pair-wise comparisons are available for immediate viewing. Although 'good practice guidelines' of some researchers state that participants should be presented with the opportunity to validate their completed maps, there remains mixed opinion here, however where such participant validation is to be permitted, major problems can arise unless it is undertaken more or less concurrently, as changes in actors' mental representations can and do often occur soon after data collection (Hodgkinson & Clarkson

2005). The immediate view mechanism has been incorporated within the Cognizer™ system to enable participant validation of cause maps in real time, thereby minimizing this type of problem. Dependent upon whether the map contains all constructs or just their selected ones, these will still remain a complex diagram being difficult to read in diagrammatic (digraph) form. It is my experience that adjacency matrices are easier for more complex maps as association from or to a particular construct can quickly be identified.

4.6. Cause Map Analysis and Comparison

Cause maps can be analysed by focusing on two dimensions: the <u>content</u> and the <u>structure</u> of each map. Content measures reflect the constructs that an individual perceives as being relevant to a particular domain of interest and how these constructs are thought to be related to one another (Langfield-Smith & Wirth, 1992). Structural measures reflect varying degrees of complexity among maps, providing a useful basis on which to test the validity of hypotheses concerning cross-sectional differences between groups of decision-makers and developmental changes in their belief systems over time (Eden et al., 1992).

In terms of their content, a cause map can be analyzed to calculate a number of statistics and parameter values. The in-degree (Id) value reveals the extent to which a construct is influenced by another construct. The out-degree (Od) value reveals the extent to which a construct exerts influence on another construct.

Although Cognizer was not designed specifically for the analysis of maps derived from documentary sources, they can be encoded in the form of an adjacency matrix. Once the coded causal views have been entered into the computer, Cognizer™ can be used to calculate second-order matrices as well as to produce visual representations of cause maps in the form of influence diagrams/weighted digraphs (Hodgkinson & Clarkson 2005), for the purpose of my research in the next section, all adjacency maps were of a first order type, but that is not to say the elicited responses were of a first order.

When used for comparative analysis, structural measures can be used to determine the different overall map configuration and how simply or complexly a person makes sense of the environment they operate in (Eden and Ackermann 1998). Scholars have largely suggested that a simply structured map, with few interconnections between the various constructs, will have negative consequences suggesting narrowness of vision (Weick 1979). Contrary to this, some have questioned whether excessive complexity might serve a form of 'paralysis by analysis' (Hodgkinson & Maule 2002) and Nair's (2001) study covering a range of managers, led him to conclude that more research is required to ascertain whether very

elaborate or highly dense cognitive maps are, in fact, dysfunctional. Calori et al. (1994) suggested that cognitive complexity levels should match the level of the environment of the given individual or group.

Measuring maps can take place in many ways, dependent upon the ultimate aim of the research, yet the Cognizer™ system can accommodate the following:

1. The number of constructs selected by each participant;
2. The number of links;
3. The total, mean, and standard deviation (SD) link strength;
4. The total, mean, and SD absolute (ABS) link strength;
5. The link-to-node ratio (i.e., the proportion of links to nodes/constructs in a map);
6. The map density (i.e., the number of observed links divided by the total number of links theoretically possible, given the subset of variables selected for incorporation in the participant's map);
7. The link strength density and link strength density for selected constructs (the total link strength divided by the number of constructs gives an indication of the strength of relationships within the map); and
8. The ABS link strength density and ABS link strength density for selected constructs.

Aggregated maps do not necessarily reflect the views of any one individual and cited as being a controversial and problematic procedure (Langfield-Smith, 1992) however, there are occasions when aggregation procedures can prove insightful, as they enable the detection of overall group tendencies and allow senior executives to look at the consensus view (Walsh 1995). In consequence, there is considerable potential value in analyzing aggregated cognition, in an attempt to identify theoretically meaningful, systematic variations among groups of actors, my study includes this and compares aggregated maps from three specific management groups based on the functional area of responsibility.

Within Cognizer™, each participant is automatically assigned a unique six-digit participant identification number, and participant variables for each can be defined and recorded. This enables the researcher to systematically link cause maps to a variety of exogenous variables reflecting individual and a firms characteristics. This paves the way for supplementary work or extension of the study beyond this project.

4.7. Summary

As referred earlier, a number of scholars have called for managerial and organizational cognition research to advance beyond the small-scale, inductive studies that have characterized the field so far, typically due to the lack of available software systems to support this.

Although causal mapping techniques have been used in management research for gaining insight into the belief systems of managers, they have yet to be used for studies directly linking managerial cognition either to other characteristics of the manager (age/experience) or to their actions (decisions made/performance) due to the inherent time and access to a firm required, Barr et al (1992) have tried to link causal maps to behaviour.

Markóczy and Goldberg (1995) have made an important advance for work with causal maps by describing a method for obtaining a single distance measure between causal maps using all of the information available within each map. Yet there appears to be three things needing to be added if the research is to be fully useable by management science researchers.

1. Map meaning is dependent upon how they were created, such technique is important.
2. Distance ratio should be able to be customised (not exact to LSW method) and also with ability to rethink the interpretation of missing information.
3. Analysis of the distance data remains limited and requires expansion.

There is clearly a need to advance causal and other cognitive mapping techniques in a manner that will enable the systematic elicitation and comparison of decision-makers belief systems across multiple levels of analysis (i.e. individual, group, firm, and country levels) with larger sampling numbers if the body of theory that has emerged in the MOC field over recent years is to be tested with an acceptable degree of statistical rigor and control (Hodgkinson & Clarkson 2005).

Walsh (1995) questioned whether additional responsibility might push people to think in a complex manner. Clarke & Mackaness' (2001) exploratory study revealed the cognitive maps of senior managers to be no more complex and coherent than their less senior counterparts, this is encouraging for my own study as it involves managers with widely differing degrees of responsibility, in fact they go on to state that senior executives attempt to simplify rather than making more complex their situation, this could be visible in the number of links and their density once the maps are elicited.

This now leads to my research area in section 5.0.,considering the techniques described above I will undertake from scratch a project that will firstly evaluate the performance goals considered to be the priority of the senior management team, and produce a selective list of resources that are extant and available to these managers and their line managers. By uploading this data into the Cogniser^{TM} software package, I will produce data sets based on the manager's resource selections compared across the individuals and the groupings which can be formed from them, also data based on the manager's cause maps, and how these compare across similar groups.

5.0. Case Study: ADT Fire and Security

5.1. Introduction

As discussed earlier RBV helps to realise the importance of resource heterogeneity and immobility in order for them to contain value, rarity, inimitability and non-substitutability, to provide sustained competitive advantage to the firm.

However, it fails to explain the role of the manager, and how through resource enactment managers over time utilise their resources at their disposal in a more consistent and cohesive mental model, also helps to reveal the manager's influence upon what resources are used, how they are used, which of them are developed, which are eventually disposed of, and the importance of creating new ones.

Cognition theory helps us to understand that manager's need to make sense of their surroundings in order to produce a mental model from which they will base their decision making, therefore to understand what these mental models look like we need to be able to 'step inside' the thought process of the manager. Cogniser^{TM} helps us to do this by individually allowing the mental models of managers to be elicited by way of cognitive cause maps, permitting reviewing for comparison to determine the level of similarity or dissimilarity across groups or sub-groups. To understand these cognitions is important, as they are direct precursors to managers' conduct, behaviour and practice.

This study aims to bring together the previous sections to provide a detailed study of senior and middle managers within ADT UK&I. I will produce two data sets focusing on (i) what resource selections are believed to best drive performance as viewed by the managers, and (ii) the cause maps of the managers considering the resource to resource effect. These data sets will be compared across varying group construction formed by (i) functional role, (ii) seniority within the firm, and (iii) working experience at the firm, to determine to what level these managers share the same mental models in order to achieve the company wide areas of targeted performance. Finally I will conclude my findings and their usefulness.

5.2. Company background

ADT UK & Ireland are a wholly owned subsidiary of Tyco Fire and Security (see Appendix 1 for full company history and operational activities), providing products and services across the whole of the UK and Ireland, for the electronic Fire and Security industry.

Their current turnover is c £500M per annum, and they have typically 11% - 13% market share across their focus products.

ADT have a senior leadership team (SLT) that head up all functional areas and areas with profit and loss responsibility (see Appendix 2 for UK & I SLT organogram). ADT are organised in two profit and loss clusters, one for the North region and one for the South region, each headed up by a Regional Managing Director, whom each has responsibility for six regional profit and loss, full accounting business centres. These twelve centres are geographically dispersed across the UK (see Appendix 3 for branch locations) in order to completely reach all consumer and commercial markets.

Each business centre has a General Manager responsible for budgeted performance delivery, with a localised management team (see Appendix 4 for typical branch organogram).

5.3. Methodology

In the previous section I referred to several areas of application within the field of managerial organisation cognition that demand mass application of cognitive mapping procedures. My area of research requires a similar application in order to produce cause maps representing the senior and middle managers in respect of their understanding of the resource-to-performance relationship.

Implementing the Cognizer™ system, in total I approached 36 people to take part in the research, from the completed responses I was able to produce 29 sets of constructs with construct strength ratings, and through individual interviews was able to elicit 29 cause maps. From these participants I was able to form three distinct groupings for analysis. These group types were:

1. By functional role – this will allow measures and comparisons across the organisation whose work responsibility significantly differs by type, this consists of installation and service personnel who form an 'Operations group', sales and administrative personnel who form a 'Sales group', and the General Management team who form a 'GM' group.

2. By seniority – this will allow measures and comparisons across the organisation whose level of responsibility significantly vary by the spans and scope of control, this consists of a department level group who form a 'Department group', and the area managers with profit and loss responsibility who form a 'General group'.

3. By working experience with the company – this will allow measures and comparisons across the organisation for personnel who have worked there for distinctly differing brackets of years irrespective of function or seniority, this consists of a 'Upto 10 years group', a '10 – 20 years group', and a 'greater than 20 years group'.

Note: Some individuals, due to specialty in the nature of their roles were clustered to best-fit groups when producing the functional grouping. These were national roles that were outside of the typical branch structure.

The study was conducted in four stages:
1. Determining five performance metrics which the resource / capability would aim to serve.
2. Determining the most relevant forty resources / capabilities which the managers would be able select from, across all of the firm's resource / capabilities currently existing across all its functional areas. With an equal number of resources representing each of the eight functional areas.
3. An individual's choice of ten resources / capabilities to service the performance metrics, coupled to their current view of how effective these are.
4. Determining how these resources / capabilities and the performance goals impact upon each other in a cause-effect relationship, through a 1:1 interview process.

The objective was to provide ADT an insight into why their employee's select specific resources and their influence on the company's performance in certain goals through the utilization of these resources, and by what factors these choices are governed. Also, when these employee's are clustered into grouping sets whether the data from these sets produce noteworthy results.

In addition to the construct choices, I was also interested in producing individual cause maps which would be compared at individual and the above described grouping levels, to determine if there was any similarity between them or emergent patterns.

For each participant I collected demographic data regarding their gender, age, job role, geographical location, their experience working with ADT and their experience working within the industry. These data sets would support the formation of the above grouping sets.

5.3.1. Determining the five key performance metrics

I approached by email the regional management team across the UK&I for ADT, this included representatives from General Managers, Heads of Sales, Heads of Operations, the Head of the Customer Service Centre, and the Head of the Six Sigma team, these are the profit and loss holders for the company and have senior responsibility, totalling 17 people, and posing the following question and what the response criteria was:

"What 5 performance metrics do you believe are of most importance to you and ADT at this time?

For example this could be Organic Orders Growth, Improve Service Margin, Improve Cash collection, etc… Can you please list your 5 and send these back to me as soon as possible, they do not have to be in any priority order, but please no more than 5."

Although I provided examples, this was not to produce any researcher leading or bias, but it was meant to guide the thinking to company wide performance measures and prevent any localized, non-strategic goals. From each individual's feedback I produced a list of every response (some responses were essentially variants of the same metric, such were consolidated in order to simplify the list) and I recorded who had selected which in a simple spreadsheet.

For any responses outstanding more than one week and for each subsequent week up to a maximum of three weeks, I sent out a chase email for them to respond. After three weeks it would be decided not to include them further in the research due to the need to move to the next research stage.

This feedback would enable me to be able to rank from all of their selected performance areas those performance metrics by which were most popular and from this ranking determine the collective highest five. These five were to be the performance areas in which the future selection of resource / capabilities would serve.

In addition to their performance selections, I also requested that they each provide the name and details of one or two of their direct reports who could also be included in the further research stages, such to expand the number of participants and also diversify from people who had purely P&L responsibility to managers with a specific functional area of responsibility.

5.3.2. Determining the resources (constructs) pool from across the functional areas

In a similar approach method to the performance selection, which was quite successful, I approached by email, the senior leadership team (directorate level) across the UK&I of ADT, this included Functional Directors, and the highest level P&L owners Regional Managing Directors (note: it did not include the Managing Director) totalling eight people, and advised them of the study's purpose and that I required their insight from their areas of responsibility and could they each provide up to five specific resource or capability types aligned to their functional area of expertise. For those with P&L responsibility and not a pure functional area

of responsibility, that they should choose from across all groups as best they feel.

The aim was to produce approx 32-40 resource or capability types, with an equal number represented from each of the functional areas of which eight were identified. From this defined list, I would be able to present this to the regional managers and their direct reports from which they could select the ten they believe would be most instrumental in realising the five performance areas previously discussed.

In order to control and standardise the format and type of response I required, I produced a sample for consideration to act as a guide, this was presented as per table 3, below:

Functional Area	Resource / Capability type
HR	Ability to recruit talented people
HR	Retain talented people
HR	Motivated workforce
Finance	Funding to support investments
Finance	Funding to pay market rates for talented people
Finance	Acquisitions
Finance	Control & Governance
Sales	Ability to offer Multi-Discipline solutions
Sales	Ability to Tailor Make a solution
Marketing	Ability to serve wide Customer Segments
Operations	Standardised processes across UK
Operations	Quality Assurance Accreditation
Operations	Multi-product managers
Operations	Multi-product engineers
Operations	Op Ex
Organisational Culture	Consistent Formalised Communication method
Organisational Culture	Change agility
Organisational Culture	Accountability
SLT	One ADT culture
SLT	Strategic Discipline
SLT	Vision
IT	Single platform for all business processes
IT	Comprehensive CRM tool

Table 3: Sample resource / capabilities grouped by functions which they are owned by.

The idea of these samples was to encourage them to think in small denominations of resources / capabilities allowing them to be evaluated by their slighting differences and not a capture all rendering choices to be difficult or too wider ranging.

For any responses outstanding more than one week and for each subsequent week up to a maximum of three weeks, I sent out a chase email for them to respond. After three weeks it would be decided not to include them any further in the research – and that the resource / capabilities for their area of responsibility would have to be chosen by myself.

5.3.3. Determining from the forty resources / capabilities the ten most relevant

The responses I received from the SLT, which was five out of the eight approached, were useful as they represented five key focus areas of the business today from the Director responsible for that specific area, however it did pose a slight problem in that this left three sets of five, i.e. fifteen resources / capabilities undefined.

I considered these gaps and made a list of as many resources I felt aligned to these functional areas, and in my own judgment as a profit and loss owner, selected the five I felt were most appropriate. This presented an element of researcher bias unfortunately, but was unavoidable due to the lack of responses received and the time frame remaining in order to carry out the balance of the research. The final construct pool is shown in table 4, below.

Resource / Capabilities type	Category of resource
Control & Governance of processes	Finance
Funding to pay market rates for talented people	Finance
Invest in acquisitions bulk contract / share deals	Finance
Production of management information to aid decision making	Finance
Replenishment / upgrade of IT equipment	Finance
Ability to attract, select & recruit talented people	HR
Ability to support managers in legal areas of HR management	HR
Consistent industry leading remuneration linked to role and responsibility	HR
Continuous improvement of HR processes and technologies	HR
Create and maintain company policies and procedures	HR
Comprehensive CRM tool	IT
Integrated management information systems to aid managerial decision making	IT
On line IT guidance to assist new starters	IT
Shared ERP tool	IT
Single platform order processing & operations software	IT
Ability to generate leads for all targeted segments	Marketing
Ability to identify and focus on a specific market, with solutions	Marketing
Improved Web information and communication customers/prospects	Marketing
Responsiveness to market trends	Marketing
Responsiveness to product development / technology changes	Marketing
Improved RESOLVE capability, multi-products	Operations
Increase level of RRI's	Operations
Quality and effectiveness of customer service	Operations
Quality assurance accreditation NSI/BAFE/LPS/BSIA	Operations
Standardised processes across UK	Operations
Ability to embed a learning culture	People Development
Consistent formalised employee communication methods	People Development
Develop managers to improve leadership capability	People Development
Improve levels of employee engagement	People Development
Lead on culture change initiatives	People Development
Ability to offer customer value propositions	Sales
Ability to offer multi-discipline solutions	Sales
Effective sales promotion and execution	Sales
Effective seller activity plan	Sales
Efficiency and speed of remote order processing	Sales
A strong, visionary, and capable leadership team	SLT
Fast pace decision making	SLT
Increase Health & Safety investment and awareness	SLT
Making sense of the future	SLT
One ADT culture	SLT

Table 4: Final list of forty resources / capabilities.

The eight categories of resource can be evaluated as follows:

1. Finance: All matters controlled by the Finance Director's central team relating to working capital management, process control, tax, asset management and capital expenditure.
2. HR (Human resources): All matters associated to recruitment, compensation and benefits, HR specific processes, and legal HR.
3. IT (Information Technology): All matters associated to management information systems, capital expenditure for technology related items, and all processing systems.
4. Marketing: All matters to do with business intelligence and market data, web activity, and sales lead generation.
5. Operations: All matters associated to efficiency and effectiveness of customer service delivery and industry regulations.
6. People Development: Although controlled by the HR director it does have a specific responsibility to employee communication, culture bias, training and development.
7. Sales: All matters associated to front end customer delivery, particularly product and service reach.
8. SLT (Senior Leadership Team): All matters associated to the company strategy, vision, culture, and responsiveness to industry and market change.

5.3.4. Selection of the resource sets to service the performance metrics

When the preferred list of representative resource / capability types were received back from the senior leadership team (SLT), I produced a questionnaire styled form in Microsoft Excel format, please refer to form 1 below, which was sent out by email requesting the respondents at stage one and also to those direct reports that they had kindly nominated to additionally take part in the next stage of the research, this amounted to 36 participants. The email read:

"The performance areas (below) were voted for by your GMs and Heads of, therefore can you please consider from the 40 listed capabilities / resources on the attached form, which **10** do you believe are the most important in order to deliver the following performance metrics:

Performance Metric
Organic orders growth
AMR growth
Service margin improvement
Cash collection improvement
SG&A cost reduction

Make your choice by selecting these with a 1 in the respective D column, also (in your opinion) score these between 1-10 in the respective E column as to how you would rate the effectiveness of this based upon your experience of it or belief currently. There are no right or wrong answers, this is research to determine how **you** rate the resources that you have chosen are best placed to achieve these performance areas."

	Participant Resource selection.xls					
	New Open Save Print Import Copy Paste Format Clear Conte... Clear Form... Undo Redo AutoSum Sort A-Z Sort Z-A Gallery Toolbox					
	Sheets Charts SmartArt Graphics WordArt					

	A	B	C	D	E	F H I
1	Name:	Please click here and select your name from the drop down list				
2	Role:	0				
3	Branch:	0				
4	Region:	0				
5	Manager:	0				
6	Age:					
7	ADT experience (years):					
8	Industry experience (years):					
9						
10	Resources	Please select 10 resources from the list below by placing a corresponding 1 in column 'D', then score its strength in column E between 1 (poor) and 10 (excellent)		0		
11	**Resource / Capabilities type**		**Category of resource**	Selection	Strength	
12	Control & Governance of processes		Finance			
13	Funding to pay market rates for talented people		Finance			
14	Invest in acquisitions bulk contract / share deals		Finance			
15	Production of management information to aid decision making		Finance			
16	Replenishment / upgrade of IT equipment		Finance			
17	Ability to attract, select & recruit talented people		HR			
18	Ability to support managers in legal areas of HR management		HR			
19	Consistent industry leading remuneration linked to role and responsibility		HR			
20	Continuous improvement of HR processes and technologies		HR			
21	Create and maintain company policies and procedures		HR			
22	Comprehensive CRM tool		IT			
23	Integrated management information systems to aid managerial decision making		IT			
24	On line IT guidance to assist new starters		IT			
25	Shared ERP tool		IT			
26	Single platform order processing & operations software		IT			
27	Ability to generate leads for all targeted segments		Marketing			
28	Ability to identify and focus on a specific market, with solutions		Marketing			
29	Improved Web information and communication customers/prospects		Marketing			
30	Responsiveness to market trends		Marketing			
31	Responsiveness to product development / technology changes		Marketing			
32	Improved RESOLVE capability, multi-products		Operations			
33	Increase level of RRI's		Operations			
34	Quality and effectiveness of customer service		Operations			
35	Quality assurance accreditation NSI/BAFE/LPS/BSIA		Operations			
36	Standardised processes across UK		Operations			
37	Ability to embed a learning culture		People Development			
38	Consistent formalised employee communication methods		People Development			
39	Develop managers to improve leadership capability		People Development			
40	Improve levels of employee engagement		People Development			
41	Lead on culture change initiatives		People Development			
42	Ability to offer customer value propositions		Sales			
43	Ability to offer multi-discipline solutions		Sales			
44	Effective sales promotion and execution		Sales			
45	Effective seller activity plan		Sales			
46	Efficiency and speed of remote order processing		Sales			
47	A strong, visionary, and capable leadership team		SLT			
48	Fast pace decision making		SLT			
49	Increase Health & Safety investment and awareness		SLT			
50	Making sense of the future		SLT			
51	One ADT culture		SLT			
52						

Selections

Ready   Sum=0

Form 1: Participant personal details, resource / capability selection and strength rating form.

This method is very similar to that described by Hodgkinson & Clarkson in their article 'Introducing Cogniser[TM]' (2005), and the Markóczy and Goldberg article 'A method for eliciting and comparing causal maps' (1995), in which the choice was limited to 10 for practical reasons in order to control the level of complexity in the process. By forming the

construct pool contents ahead of the individuals selection prevented any coding errors that could occur between terminology of resource types which amount to producing the same effect, plus enables comparisons between choices to be made more accurately too.

Although not strictly required to populate Cogniser^{TM} for cause map elicitation, I believed it was important to gain an individual's valuation of how the resource / capability that they chose was currently performing towards delivering the performance goals, based upon their personal experience of it. This hopefully would be useful for the future recommendations once I had aggregated these through all responses when determining the most influential resources / capabilities and how they had been rated overall.

In addition to the selected constructs from within the predefined pool, I would also be including within the construct pool the five performance metrics (above), making fifteen constructs per map for each participant. Although adding a degree of complexity to the interview process and resultant maps i.e. from 90 questions to 210 questions, this would allow a two-pronged approach to the study, firstly, what resources / capabilities are the chief influencers of performance, and secondly, what are the subsequent resource influencers of the first performance influencers, as a these would contribute a second degree affect to performance.

Although Markóczy and Goldberg do not differentiate their construct pools to this degree of separation in their article (1995), that is not to say their constructs do not represent a blend of goals and resources.

5.3.5. Eliciting the cause maps

In order to manage the responses from the number of participants involved in the study, I decided that I would produce a tracking log, see table 7 below, which would enable me to identify the following:

1. Who had responded.
2. Whether their Cogniser^{TM} personal data had been updated.
3. Whether their chosen resource / capabilities had been added to their cause maps by way of 'constructs'.
4. Whether their cause maps had yet been elicited through an interview.

As each response was received back by email, I updated the tracking report and the Cogniser^{TM} application data simultaneously. It is important to note that each participant was provided with a unique ID number, which is how any form of analysis was referred to, and at

no time would their name appear on any report.

Paticipant ID	Gender	Age	ADT Experience	Industry Experience	Responded	Cogniser updated	Constructs added	Cause map elicited
P1001	Male							
P1002	Male							
P1003	Male							
P1004	Female							
P1005	Male							
P1006	Male							
P1007	Male							
P1008	Male							
P1009	Male							
P1010	Male							
P1011	Male							
P1012	Male							
P1013	Female							
P1014	Male							
P1015	Male							
P1016	Male							
P1017	Male							
P1018	Male							
P1019	Male							
P1020	Male							
P1021	Male							
P1022	Male							
P1023	Male							
P1024	Male							
P1025	Male							
P1026	Male							
P1027	Male							
P1028	Male							
P1029	Male							
P1030	Male							
P1031	Male							
P1032	Male							
P1033	Male							
P1034	Male							
P1035	Male							
P1036	Male							

Table 7: Participant response tracking log

For any responses outstanding more than one week and for each subsequent week up to a maximum of three weeks, I sent out a chase email for them to respond. After three weeks it would be decided not to include them any further in the research. For those who had responded I contacted them by telephone to thank them initially and to schedule into our diaries a time and date that they would be available for at least 1 hour to elicit their personal cause maps.

Any that I was unable to reach directly I decided I would leave a voice mail message for them to call me back with their availabilities. Again, for any voicemail messages outstanding more than two weeks it would be decided not to include them any further in the research.

Due to the physical location of the participants some of the elicitation sessions would have to be done by telephone and not face to face with the Cogniser™ application visible to them.

For these sessions I decided I would produce in Microsoft Excel an 'adjacency matrix' from their personal construct selections, this would be identical to that produced by Cogniser™ (refer to table 8 below) such the remote person would had some indication as to what form the questioning session would essentially take, and how they would be sequenced.

This would enable remote participants to read across each row in turn in order to reference and keep focus on the 'lead' question being asked as to its influence upon each of the other resource, capability or performance areas, this is important due to the bias direction from

which each question is asked, and not to consider it from the opposite way around, as the adjacency matrix had been formed from the Cogniser™ ordering this would directly correlate to the Cogniser™ screen questioning that I was using.

Item	Resource / Capabilities type	Organic orders growth	AMR growth	Service margin	Cash collection	SG&A cost reduction	Invest in acquisitions bulk contract / share deals	Ability to attract, select & recruit talented people	Consistent industry leading remuneration linked to role and responsibility	Comprehensive CRM tool	Improved RESOLVE capability, multi-products	Quality and effectiveness of customer service	Improve levels of employee engagement	A strong, visionary, and capable leadership team	Effective seller activity plan	Ability to generate leads for all targeted segments	Sub-total
1	Organic orders growth																0
2	AMR growth																0
3	Service margin																0
4	Cash collection																0
5	SG&A cost reduction																0
6	Invest in acquisitions bulk contract / share deals																0
7	Ability to attract, select & recruit talented people																0
8	Consistent industry leading remuneration linked to role and responsibility																0
9	Comprehensive CRM tool																0
10	Improved RESOLVE capability, multi-products																0
11	Quality and effectiveness of customer service																0
12	Improve levels of employee engagement																0
13	A strong, visionary, and capable leadership team																0
14	Effective seller activity plan																0
15	Ability to generate leads for all targeted segments																0
Sub-total	Sub-total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Table 8: Performance selection adjacency matrix

I carried out the first session face to face with a participant well known to me in order to how best set up further sessions, as this would provide a useful guide for the interview duration and how they initially respond to the line of questioning, such I could assist but being careful not to guide them. From this I was able to judge and express to the participant that each further questioning session would take approximately 45 minutes but should take no longer than 60 minutes to complete.

I explained that the construct set was made up of their personal 10 choices, and that these had been added to by the 5 performance goals and that each question set would be based around each construct in turn, and that the participant should consider how this directly affects each of the other constructs in turn, all of which had been randomized and would be presented in no particular order, Cogniser™ has a facility to randomize the order. I also explained that the response I required for each question would be in the same form, i.e. the 'affect' that the leading or subject construct has on each other construct would either be of a positive nature, negative nature, or it may have no affect at all. If the affect was positive or

negative, to what degree of strength would this affect be, and that strong, moderate or weak should be chosen, as discussed in the previous Cogniser^{TM} section.

Many participants struggled with the causal direction of influence, but not as much with the strength of influence. Often when asked how does 'a' affect 'b', they would proceed to work the relationship out in a way they have experienced it directly, yet they would proceed to view the influence from both sides and often confuse the direction of influence in the specific question being asked, this lead to my making clear that what the question was indeed proposing in order to not confuse the response, this was also warned by similar research conducted by Roberts (1976).

Many also found links as though they felt they needed to because they were there in the system, justifying and rationalizing until a link was formed, this lead to many complex digraph maps, (see weighted digraph 1 in appendix 5), being created due to in essence each construct emitting and receiving as many as 14 links, however there were others that managed to cut through this and simplify their graphs (see weighted digraph 2 in appendix 5), even though this too looks busy it distinctly does not have the line density of the complex digraph and can be read somewhat more easily. From my own experience, I would suggest that not every construct on a first-degree basis would link to every other construct, however I was careful not to lead the interviewee in this area.

In retrospect I believe that for future, similar analysis, a longer period of time should be taken for the eliciting process and that the researcher should make explicit the importance of link presence, whereby the link relevance can be extracted further yet omitted where the link is not a real direct affect. It was my experience that participants would make several links forming a chain and would answer on this basis as they felt this was their reality, but often the link was not strictly a direct one.

5.4. Analysis

5.4.1 Analysis of the selected Performance metrics

From the replies a list was produced comprising every unique goal type, if some responses were essentially seeking to achieve the same as a previous response or a paraphrase of it, I grouped the response type in order to simplify them, it was important for me to not provide a selecting list for this stage of the research as I really wanted to understand from a blank canvas which performance area each manager was striving for.

I received 21 variants of response from 15 respondents out of the 17 people who were initially approached, such the response rate was over 88%. This was very encouraging for me as this provided a significant amount of senior management input into formulating the 5 performance goals. This in turn enabled the rest of the research to be focused on the true, shared, global performance sought from the senior management team, and would serve as effective targets for good resource / capability choice matches.

Table 2 (below) shows the complete list of all performance areas suggested, and displayed in a ranked list of preference. These being:
1. Organic orders growth.
2. AMR growth.
3. Service margin
4. Cash collection
5. S, G & A cost reduction.

Performance Metric	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P Total	% of total	Ranking
Organic orders growth	1	2				1	1	1	1		1	1	1		1	11	14.7%	1
AMR growth	1	1				1	1	1				1	1	2	1	10	13.3%	2
Service margin			1		1	1	1	1	1	1		1	1	1		10	13.3%	2
Cash collection				1					1	1	1				1	6	8.0%	4
SG&A cost reduction			1			1						1	1	1	1	6	8.0%	4
Install Margin				1			1	1		1	1					5	6.7%	6
Operating income		1	1						1		1				1	5	6.7%	6
CIP day reduction				1		1		1						1		4	5.3%	8
Customer satisfaction			1		1				1							3	4.0%	9
Sales activity	1	1											1			3	4.0%	9
Quote levels	1	1														2	2.7%	11
>90 day debt						1										1	1.3%	12
Attendance and adherence to schedule					1											1	1.3%	12
Design success rates/turnaround				1												1	1.3%	12
Disputes – Reduction									1							1	1.3%	12
Engineers Calls per Day - Service									1							1	1.3%	12
Kaizen events achieved			1													1	1.3%	12
Orders to target	1															1	1.3%	12
Percentage of calls answered within 20 seconds					1											1	1.3%	12
Percentage of presented alarms actioned within 20 seconds					1											1	1.3%	12
Sales headcount											1					1	1.3%	12

Table 2: Performance selection responses, sorted by ranked order of preference

Where (at a UK&I level):

Organic orders growth – is a measure of installation based orders in £'s booked and compared to the previous accounting periods, not including acquisitions.

AMR growth – (Annual Maintained Revenue) is a measure of the combined maintenance and monitoring charges in £'s that are recurrent year on year for live customers, not including acquisitions.

Service margin – is a measure of the AMR (above) as a % of profit when the revenue in absolute £'s is compared to the associated costs to provide this service in absolute £'s.

Cash collection – is a measure in % terms of the amount of accounts received in £'s against a target of accounts deemed collectable in £'s, when compared to previous accounting periods.

S, G & A cost reduction – is the cost in £'s of the sales force (S), general costs associated to buildings and utilities (G), and the cost of the administration teams (A), expressed as a % of total orders booked (above).

What is interesting here is the significant alignment of these goals to that of the areas of company strategy (communicated by the group Managing Director some 12 months earlier).

strategy is outlined below:

1. Unit growth from our core products (Fire and Intruder systems) – this helps to deliver organic orders growth, AMR growth, an improved service margin, and reduction in S, G & A costs.

2. Improved sold margin from the non-core products – this helps to deliver organic orders growth, AMR growth, an improved service margin, and reduction in S, G & A costs.

3. Growing the volume of AMR from product and non-product sales – this helps to deliver AMR growth, improved service margin, and reduction in S, G & A costs.

Although absent in strategy definition, it is assumed that if the above is delivered, improvement in cash collection to aid working capital would be a natural occurrence.

It would appear from this evidence that the UK&I level strategy previously communicated has

been wholly adopted by the senior management team in order to arrive at these five performance goals. Of the 21 variants received, every participant selected at least one of the overall top five, and in some instances all five, this would suggest not only a majority alignment to operational strategy but also a reach across each member of the management team.

5.4.2. Analysis of the resource content selection

From the managers requested to take part in the Performance goals, each nominated one or two departmental managers from their direct reports to further assist with this section of the research. This incremented the research study numbers to thirty-six in total, of which I received twenty-nine replies, a response rate of over 80%, which I felt would serve to be a sufficient data result set of resource / capability selections. From these I formed three varieties of sub-groups designed to produce variety in the analysis types. These were created from (i) the **functional** role of the individual, (ii) the **seniority** level of the individual, and finally the **tenure** the individual has worked within the organisation. Table 3 below, shows the participants from their functional role type with respective group sizing.

Role or Title	# Number	%		Group	# Number	%
General Manager	9	31.0%		General Manager (GM)	9	31.03%
Service Manager	5	17.2%		Operations (Ops)	11	37.93%
Install Manager	3	10.3%				
Ops Manager	1	3.4%				
Head of Operations	1	3.4%				
Design Manager	1	3.4%				
Head of Sales	3	10.3%		Sales (Sales)	9	31.03%
Admin Manager	2	6.9%				
Sales Manager	4	13.8%				
	29	100.0%		Total	29	100.00%

Table 3: Participant grouping by functional role, with age and experience averages.

The data set by seniority levels, these being departmental manager (a specific function) or general manager (full P&L ownership), is depicted in table 4 below, again with group sizing.

Role or Title	# Number	%		Group	# Number	%
General Manager	9	31.0%		General	13	55%
Service Manager	5	17.2%		Department	16	45%
Install Manager	3	10.3%		Total	29	100%
Ops Manager	1	3.4%				
Head of Operations	1	3.4%				
Design Manager	1	3.4%				
Head of Sales	3	10.3%				
Admin Manager	2	6.9%				
Sales Manager	4	13.8%				
	29	100.0%				

Table 4: Participant grouping by seniority.

The final grouping set was by formed by ADT tenure, producing a data set by working experience in up-to 10 years, 10-20 years, and over 20 years, this is depicted in table 5 below, again with sizing.

Group	# Number	%
0-10 Years	11	38%
10-20 Years	9	31%
Over 20 Years	9	31%
Total	29	100%

Table 5: Participant grouping by ADT tenure.

The group sets were strived to produce similar numbers of representation for each type per sub-group in order to balance the data sampling as equally as possible.

My early observation is that many participants struggled to reduce the selection pool to only ten as they had difficulty to differentiate the nuances between them and began to see them as direct complements of each other and that all were important to performance, which is not strictly false, because if they were not useful they would never have formed part of the pool.

In order to overcome this I 'advised' that the participant initially select as many as they have a strong affiliation with in order to eliminate as many as possible. Then by an iterative process continue to do this until there was only ten left, this proved to be a positive method and overcame the initial task complexity, a method described by Markóczy and Goldberg (1995) with their selection cards, albeit the order in which these were chosen did not suggest priority scoring or preference.

These responses coupled with the five performance areas would latterly be used as the constructs forming the individual cause map per participant. Of the choice constructs each participant provided, I tracked their responses in Microsoft Excel and aggregated them through to produce an overall preference system of selection with the associated performing strength. This is shown in table 6, below.

Although this table does not depict any stronger functional area than the other as those over 50% picked are made up of constructs in Operations, People Development, HR and the SLT. They do however, provide clues as to what has happened within the organisation over the last 18 months, their re-focus on customer service and putting the customer first is evident through the many initiatives associated to owning the current issue, coupled with major re-structuring leading to managers with a larger span of control requiring stronger leadership

qualities and better decision-making knowledge. Having the ability to recruit talented people will form part of fulfilling the growth aspiration ADT holds in its recovery from the recession, and increase its mix of staff.

Resource / Capabilities type	Category of resource	Selection	Score	% Choice
Quality and effectiveness of customer service	Operations	25	5.40	87%
Develop managers to improve leadership capability	People Development	21	4.76	73%
Ability to attract, select & recruit talented people	HR	16	5.19	56%
A strong, visionary, and capable leadership team	SLT	16	6.13	56%
Integrated management information systems to aid managerial decision making	IT	14	4.36	49%
Ability to offer customer value propositions	Sales	14	5.07	49%
Improved RESOLVE capability, multi-products	Operations	11	5.64	38%
Comprehensive CRM tool	IT	10	2.70	35%
Single platform order processing & operations software	IT	10	3.10	35%
Consistent industry leading remuneration linked to role and responsibility	HR	9	5.56	31%
Ability to generate leads for all targeted segments	Marketing	9	4.67	31%
Improve levels of employee engagement	People Development	9	5.56	31%
Effective sales promotion and execution	Sales	9	5.67	31%
Responsiveness to product development / technology changes	Marketing	8	3.63	28%
Standardised processes across UK	Operations	8	5.38	28%
Ability to offer multi-discipline solutions	Sales	8	6.00	28%
Effective seller activity plan	Sales	8	6.13	28%
One ADT culture	SLT	8	4.75	28%
Responsiveness to market trends	Marketing	7	3.86	24%
Production of management information to aid decision making	Finance	6	5.33	21%
Increase level of RRI's	Operations	6	5.50	21%
Fast pace decision making	SLT	6	5.50	21%
Invest in acquisitions bulk contract / share deals	Finance	5	5.00	17%
Replenishment / upgrade of IT equipment	Finance	5	3.80	17%
Increase Health & Safety investment and awareness	SLT	5	8.20	17%
Control & Governance of processes	Finance	4	7.75	14%
Ability to support managers in legal areas of HR management	HR	4	5.25	14%
Efficiency and speed of remote order processing	Sales	4	5.50	14%
Funding to pay market rates for talented people	Finance	3	5.00	10%
Ability to identify and focus on a specific market, with solutions	Marketing	3	5.00	10%
Improved Web information and communication customers/prospects	Marketing	3	4.00	10%
Consistent formalised employee communication methods	People Development	3	5.67	10%
Quality assurance accreditation NSI/BAFE/LPS/BSIA	Operations	2	8.00	7%
Making sense of the future	SLT	2	5.00	7%
Continuous improvement of HR processes and technologies	HR	1	4.00	3%
Create and maintain company policies and procedures	HR	1	7.00	3%
On line IT guidance to assist new starters	IT	1	8.00	3%
Ability to embed a learning culture	People Development	1	5.00	3%
Lead on culture change initiatives	People Development	1	8.00	3%
Shared ERP tool	IT	0	0.00	0%

Table 6: Resource popularity of selection by total participants.

In addition to the popularity of constructs chosen I also asked each manager to express how well they felt this resource performs in order to deliver their results and how it would measure up to the competition, these scores are a little concerning, for instance the averaged overall rating of our quality and effectiveness of customer service was only 5.40, followed by developing managers at 4.76, ability to recruit talented people at 5.19, and the strength of the leadership team in its vision and capability is only considered to be 6.13. These I believe need further investigation towards why these are considered to be so poor, and what efforts

need to be made in order to remedy this, else the ultimate performance of the company will be lacking and the potential never realised. I would suspect that the recent restructuring has had an impact on morale though, which may taint these views.

Considering constructs by functional groups, these are made up of managers with specific departmental responsibility often in a customer facing environment, whose purpose is to be involved at differing customer stages and different types of touch-points. Table 7 below highlights the variance between operational, sales, and general management teams.

Resource / Capabilities type	Category of resource	Function					
		Ops	% choice	Sales	% choice	GM	% Choice
Control & Governance of processes	Finance	2	20%	1.00	14%	1.00	8%
Funding to pay market rates for talented people	Finance	0	0%	0.00	0%	3.00	25%
Invest in acquisitions bulk contract / share deals	Finance	2	20%	0.00	0%	3.00	25%
Production of management information to aid decision making	Finance	2	20%	2.00	29%	2.00	17%
Replenishment / upgrade of IT equipment	Finance	4	40%	1.00	14%	0.00	0%
Ability to attract, select & recruit talented people	HR	3	30%	4.00	57%	9.00	75%
Ability to support managers in legal areas of HR management	HR	3	30%	0.00	0%	1.00	8%
Consistent industry leading remuneration linked to role and responsibility	HR	3	30%	2.00	29%	4.00	33%
Continuous improvement of HR processes and technologies	HR	0	0%	0.00	0%	1.00	8%
Create and maintain company policies and procedures	HR	1	10%	0.00	0%	0.00	0%
Comprehensive CRM tool	IT	0	0%	4.00	57%	6.00	50%
Integrated management information systems to aid managerial decision making	IT	8	80%	2.00	29%	4.00	33%
On line IT guidance to assist new starters	IT	0	0%	0.00	0%	1.00	8%
Shared ERP tool	IT	0	0%	0.00	0%	0.00	0%
Single platform order processing & operations software	IT	3	30%	3.00	43%	4.00	33%
Ability to generate leads for all targeted segments	Marketing	3	30%	3.00	43%	3.00	25%
Ability to identify and focus on a specific market, with solutions	Marketing	1	10%	0.00	0%	2.00	17%
Improved Web information and communication customers/prospects	Marketing	2	20%	1.00	14%	0.00	0%
Responsiveness to market trends	Marketing	2	20%	2.00	29%	3.00	25%
Responsiveness to product development /technology changes	Marketing	2	20%	2.00	29%	4.00	33%
Improved RESOLVE capability, multi-products	Operations	4	40%	1.00	14%	6.00	50%
Increase level of RRI's	Operations	2	20%	1.00	14%	3.00	25%
Quality and effectiveness of customer service	Operations	9	90%	6.00	86%	10.00	83%
Quality assurance accreditation NSI/BAFE/LPS/BSIA	Operations	0	0%	0.00	0%	2.00	17%
Standardised processes across UK	Operations	5	50%	0.00	0%	3.00	25%
Ability to embed a learning culture	People Development	1	10%	0.00	0%	0.00	0%
Consistent formalised employee communication methods	People Development	1	10%	1.00	14%	1.00	8%
Develop managers to improve leadership capability	People Development	8	80%	5.00	71%	8.00	67%
Improve levels of employee engagement	People Development	4	40%	1.00	14%	4.00	33%
Lead on culture change initiatives	People Development	0	0%	0.00	0%	1.00	8%
Ability to offer customer value propositions	Sales	2	20%	5.00	71%	7.00	58%
Ability to offer multi-discipline solutions	Sales	4	40%	3.00	43%	1.00	8%
Effective sales promotion and execution	Sales	3	30%	2.00	29%	4.00	33%
Effective seller activity plan	Sales	1	10%	4.00	57%	3.00	25%
Efficiency and speed of remote order processing	Sales	1	10%	3.00	43%	0.00	0%
A strong, visionary, and capable leadership team	SLT	6	60%	2.00	29%	8.00	67%
Fast pace decision making	SLT	2	20%	2.00	29%	2.00	17%
Increase Health & Safety investment and awareness	SLT	3	30%	1.00	14%	1.00	8%
Making sense of the future	SLT	1	10%	0.00	0%	1.00	8%
One ADT culture	SLT	2	20%	2.00	29%	4.00	33%

Table 7: Resource popularity of selection by department groups.

The operational group showed a strong propensity for quality & effective customer service, this is consistent with all groups as a whole but at 90% selection this is particularly strong. Integrated management information systems at 80% choice is probably because operational people rely on systems and its data to manage their business and the timing of their decision making, also at 80% was development of managers to improve the leadership capability, this aligns to the need for raising the all round ability of the management team now that every

one of them has an increased span of responsibility and number of direct reports post restructuring. These are very dominant construct selections and would suggest similar thought across the operational team. Sales personnel also selected quality & effective customer service at 86% the realization that the future of the organisation heavily depends on protection of its existing customers and gaining a reputation that enables referral business is critical to future growth and success. They also selected development of managers to improve the leadership capability at 71%, mirroring the operational colleagues for the same reasons. The third most popular also at 71% was to be able to offer customer value propositions, the need to be able to differentiate themselves from the competition whilst ensuring the needs of the customer are always met.

The general managers also opted for quality & effective customer service at 83% as they too believe this is at the centre of the organisations ability to compete and grow. Their choice of ability to recruit talented people is stimulated by the consolidation of the management teams with increased responsibility and spans of control drive the requirement to have all round better staff at every level of the organisation, and to be able to find talent outside of the industry holds many rewards as long as these can be inducted seamlessly and quickly they pose little risk to the business today whilst affording more benefits in the future.

Reviewing the construct selections by seniority levels held within the organisation, as shown in table 8 below, only serves to endorse the customer service even more strongly at a departmental level as 94% choose this, although this is also the highest ranked amongst the general managers the mental alignment is not as strong at only 77%. Development of managers in leadership is also the second most popular for each group with 81% and 62% respectively, further endorsing the alignment both within the departmental group and also general managers.

At the third level of choice we have a gap in that department managers 63% prefer management information whereby general managers was less than half of this number, and conversely the general manager selection of recruiting talented people at 77%, was mirrored with less than half of this amount was preferred by the department managers. Possibly explained by department managers being involved in the day-to-day activities and requiring systems and data to perform them, whereby general managers are seeking to improve the overall workforce talent pool in readiness for growing the business.

Resource / Capabilities type	Category of resource	Seniority			
		Dept	% choice	General	% choice
Control & Governance of processes	Finance	2	13%	2	15%
Funding to pay market rates for talented people	Finance	0	0%	3	23%
Invest in acquisitions bulk contract / share deals	Finance	2	13%	3	23%
Production of management information to aid decision making	Finance	4	25%	2	15%
Replenishment / upgrade of IT equipment	Finance	5	31%	0	0%
Ability to attract, select & recruit talented people	HR	6	38%	10	77%
Ability to support managers in legal areas of HR management	HR	3	19%	1	8%
Consistent industry leading remuneration linked to role and responsibility	HR	5	31%	4	31%
Continuous improvement of HR processes and technologies	HR	0	0%	1	8%
Create and maintain company policies and procedures	HR	1	6%	0	0%
Comprehensive CRM tool	IT	3	19%	7	54%
Integrated management information systems to aid managerial decision making	IT	10	63%	4	31%
On line IT guidance to assist new starters	IT	0	0%	1	8%
Shared ERP tool	IT	0	0%	0	0%
Single platform order processing & operations software	IT	5	31%	5	38%
Ability to generate leads for all targeted segments	Marketing	5	31%	4	31%
Ability to identify and focus on a specific market, with solutions	Marketing	1	6%	2	15%
Improved Web information and communication customers/prospects	Marketing	3	19%	0	0%
Responsiveness to market trends	Marketing	4	25%	3	23%
Responsiveness to product development / technology changes	Marketing	4	25%	4	31%
Improved RESOLVE capability, multi-products	Operations	4	25%	7	54%
Increase level of RRI's	Operations	2	13%	4	31%
Quality and effectiveness of customer service	Operations	15	94%	10	77%
Quality assurance accreditation NSI/BAFE/LPS/BSIA	Operations	0	0%	2	15%
Standardised processes across UK	Operations	5	31%	3	23%
Ability to embed a learning culture	People Development	1	6%	0	0%
Consistent formalised employee communication methods	People Development	2	13%	1	8%
Develop managers to improve leadership capability	People Development	13	81%	8	62%
Improve levels of employee engagement	People Development	5	31%	4	31%
Lead on culture change initiatives	People Development	0	0%	1	8%
Ability to offer customer value propositions	Sales	6	38%	8	62%
Ability to offer multi-discipline solutions	Sales	6	38%	2	15%
Effective sales promotion and execution	Sales	5	31%	4	31%
Effective seller activity plan	Sales	4	25%	4	31%
Efficiency and speed of remote order processing	Sales	4	25%	0	0%
A strong, visionary, and capable leadership team	SLT	8	50%	8	62%
Fast pace decision making	SLT	4	25%	2	15%
Increase Health & Safety investment and awareness	SLT	4	25%	1	8%
Making sense of the future	SLT	1	6%	1	8%
One ADT culture	SLT	4	25%	4	31%

Table 8: Resource popularity of selection by seniority.

As an alternative view, please see bar-chart 1 below, which reflects an all construct difference in choice comparison (the difference between the average selection for each construct between the two groups) by seniority, where negative values reflect where general manager level choices were significantly higher for those constructs than the department managers and positive values where the department manager choices were higher. Values close to nil either were not selected by either group or were proportionally selected by both groups, either way cancelling each other out and suggesting a common preference of choice. There appears to be the largest choice difference for general managers in ability to select and recruit talented people at 33%, funding to pay market rates for talented people 29%, and a comprehensive CRM tool 28% higher than the department managers. Department managers were in favour of offering multi-discipline solutions 46%, replenishment of IT equipment 38%, and improved web information 31% higher than the general managers. These findings are similar to the above in that the general managers are differentially

focused on future recruitment and hiring of key personnel, and department managers remain focussed on client service offerings.
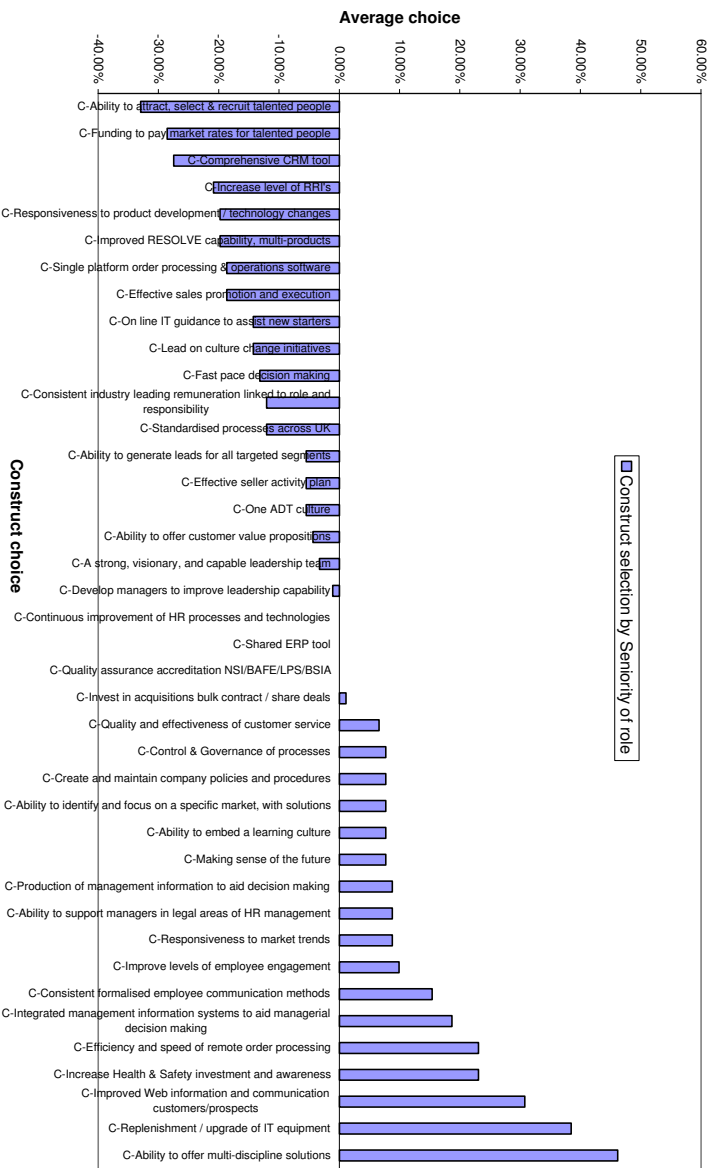
Bar chart 1: Resource popularity of selection by seniority.

Further analysis of the construct selections was carried out by ADT tenure serves to further endorse previous findings, as shown in table 9 below. The largest selection across all experience ranges being quality & effective customer service with 91% in 0-10 years service, 89% in 20+ years service, and 78% in the 10-20 year service. There is also consensus of opinion in the development of managers in their leadership with 0-10 years (73%) and 20+ years at 89%, somewhat a drop in 10-20 years at just over 50%. I am not wholly sure that tenure is the key denominator here, and would comment that the 20+ years is dominated by operational staff and 10-20 years dominated by general managers, and therefore conclude that these choices are very much aligned to the functional groups and reasons for choice being the same.

With the four highest resource / capabilities being selected by over 50% of the participants there appears to be a high degree of homogeneity within each group type and across the whole participant set, as ADT is essentially a service company, and having undertaken significant staff and premise restructuring throughout the past 12 months, the quality and effectiveness of its customer service is of no surprise to be the most popular choice, staff have all realised that the experience of their customers is critical to their future survival.

Resource / Capabilities type	Category of resource	0-10 Years	% choice	10-20 Years	% choice	Over 20 Years	% choice
Control & Governance of processes	Finance	3	27%	1	11%	0	0%
Funding to pay market rates for talented people	Finance	0	0%	3	33%	0	0%
Invest in acquisitions bulk contract / share deals	Finance	2	18%	1	11%	2	22%
Production of management information to aid decision making	Finance	3	27%	1	11%	2	22%
Replenishment / upgrade of IT equipment	Finance	2	18%	1	11%	2	22%
Ability to attract, select & recruit talented people	HR	7	64%	5	56%	4	44%
Ability to support managers in legal areas of HR management	HR	1	9%	1	11%	2	22%
Consistent industry leading remuneration linked to role and responsibility	HR	2	18%	4	44%	3	33%
Continuous improvement of HR processes and technologies	HR	0	0%	1	11%	0	0%
Create and maintain company policies and procedures	HR	0	0%	1	11%	0	0%
Comprehensive CRM tool	IT	3	27%	4	44%	3	33%
Integrated management information systems to aid managerial decision making	IT	6	55%	2	22%	6	67%
On line IT guidance to assist new starters	IT	0	0%	1	11%	0	0%
Shared ERP tool	IT	0	0%	0	0%	0	0%
Single platform order processing & operations software	IT	4	36%	4	44%	2	22%
Ability to generate leads for all targeted segments	Marketing	2	18%	4	44%	3	33%
Ability to identify and focus on a specific market, with solutions	Marketing	1	9%	1	11%	1	11%
Improved Web information and communication customers/prospects	Marketing	0	0%	1	11%	2	22%
Responsiveness to market trends	Marketing	3	27%	3	33%	1	11%
Responsiveness to product development / technology changes	Marketing	2	18%	2	22%	4	44%
Improved RESOLVE capability, multi-products	Operations	6	55%	2	22%	3	33%
Increase level of RRI's	Operations	4	36%	1	11%	1	11%
Quality and effectiveness of customer service	Operations	10	91%	7	78%	8	89%
Quality assurance accreditation NSI/BAFE/LPS/BSIA	Operations	1	9%	1	11%	0	0%
Standardised processes across UK	Operations	4	36%	1	11%	3	33%
Ability to embed a learning culture	People Development	0	0%	0	0%	1	11%
Consistent formalised employee communication methods	People Development	3	27%	0	0%	0	0%
Develop managers to improve leadership capability	People Development	8	73%	5	56%	8	89%
Improve levels of employee engagement	People Development	4	36%	3	33%	2	22%
Lead on culture change initiatives	People Development	0	0%	1	11%	0	0%
Ability to offer customer value propositions	Sales	5	45%	4	44%	5	56%
Ability to offer multi-discipline solutions	Sales	2	18%	2	22%	4	44%
Effective sales promotion and execution	Sales	2	18%	3	33%	4	44%
Effective seller activity plan	Sales	3	27%	3	33%	2	22%
Efficiency and speed of remote order processing	Sales	1	9%	2	22%	1	11%
A strong, visionary, and capable leadership team	SLT	7	64%	5	56%	4	44%
Fast pace decision making	SLT	2	18%	2	22%	2	22%
Increase Health & Safety investment and awareness	SLT	1	9%	2	22%	2	22%
Making sense of the future	SLT	1	9%	1	11%	0	0%
One ADT culture	SLT	1	9%	4	44%	3	33%

Table 9: Resource popularity of selection by ADT tenure.

Couple to this the development of the managers in the area of leadership will best position them to work with increased spans of control and increased areas of responsibility post restructuring. The ability to attract talented people will be a must if they are to raise the bar in performance terms across all staffing once the company begin to recruit for growth. The role of the directorate team remains strong in the minds of the regional management team and they still look heavily towards them for their vision and capability to help guide them in their decision-making. Whilst management information systems will provide the checks and balances of quantitative data to reaffirm previous decisions made or lead to specific focus areas. The future of organisational growth can only come from providing the customer with value propositions that will help ADT differentiate itself from its competitive surroundings.

There was no dominant resource category, however IT was the strongest overall reflected, and marketing the weakest, yet this is not too surprising as Marketing as a function was not

represented by any participants and being a head office function are often absent from the day to day business manager's environments.

What is concerning is that of all resource selections, the average rated performance across them was only 51% in their ability. The strongest 5 also aligned to similar valuations, such currently ADT do not appear to be best placed to deliver their performance aims from their current resource sets or indeed strongest preferred resources, this is an area that requires strategic review from within the company.

When reviewing the table at a disaggregate level i.e. purely from the functional groups, there still remains a large consistency in choice of the specific highest five selections. What it does not express though, is a preference order or weighting of the resource, it simply expresses it was one of the ten selections, and may need to form part of the research development in this field such to include a priority system, as noted by Markóczy and Goldberg (1995). Nevertheless, there was still a good level of shared agreement between the participants. There was only one resource that no participant selected, 'A shared ERP tool', which would suggest that the breadth and balance of the construct pool i.e. across all eight functional areas was suitably relevant for the research group.

5.4.3. Constructs of influence

It is not surprising that the most selected constructs from the above section are also rated as the 5 most influential by virtue of having the highest 'out-density' to deliver performance, see table 10 below. In order to discuss these in simplistic terms I have taken the out-density from the whole participant group for this section of analysis.

Clearly ADT as an organisation is very aligned in their shared beliefs of what inputs are required into the enactment process from a resource perspective. The fact that they do not consider these to be highly performing areas at this time is an underlying concern to the functionality of the UK&I as a whole, and should not be underestimated in the impact under investment in these areas going forward would have on the overall results achieved. I believe that the biggest impact will be on morale and employee engagement if these areas are constantly overlooked, they can only lead to frustration amongst these decision-makers as they may feel that their locus of control is inhibited if these resources cannot be satisfied at a local level, they must be developed as a countrywide whole if standardization can be achieved, this is key to a corporate enterprise.

Functional areas of IT usually form a large capital investment and it is too easy for the cash controllers to procrastinate and wait for the 'next big thing' in the technology world, but unfortunately detachment can occur within the customer facing teams, whereby many non-value added transactions still have to be carried whereby business process re-engineering could resolve many of these by automation.

HR and People Development are often a hot topic for labour intensive organisations, and in order to control levels of conflict to a functional rather than dysfunctional level, roles and reward systems must be deemed to be consistent to merit, effort and potential whilst also aligned to the industry (or an industry receptive to these transferrable skills) compensation and benefits plans, else the organisation may see members of their team pursuing their careers elsewhere outside of ADT.

Function	Capability / Resource	Improved Service Margin	Organic orders Growth	AMR Growth	Reduce SG & A Costs	Improve Cash Collection	Od
People Development	Develop managers to improve leadership	47	47	45	26	41	38
SLT	A strong, visionary, and capable leadership team	27	23	29	28	20	37
IT	Integrated management information systems to aid managerial decision making	21	17	15	22	22	37
Operations	Quality and effectiveness of customer service	30	52	50	0	48	35
HR	Ability to attract, select & recruit talented people	26	27	24	12	16	33
Sales	Ability to offer customer value propositions	15	23	23	4	12	33
Operations	Standardised processes across UK	11	10	9	12	15	32
HR	Consistent industry leading remuneration linked to role and responsibility	15	17	15	6	16	30
Marketing	Responsiveness to product development / technology changes	11	17	14	5	6	30
IT	Single platform order processing & operations software	11	6	6	21	15	30

Table 10: Constructs with the highest Od influence

The same focus must also be placed upon succession planning, if middle and senior managers do not see a 'place-to-go' nor are they groomed or developed to go there they may too become disillusioned about what their future is. The average experience across the operational teams is twice that of the general managers and sales managers, this could be speculated that the industry is dominated by engineering bias and that this also represents the highest populous of people employed within the company, but are these people being cross trained for development into other areas or potentially stagnating, this is a whole subject of its own, it will be of interest when I review the cause map distances between and across these groups in the next section.

The growth areas ADT aspire to though have their immediacy in the fields of Marketing, Sales and Operations. Responding to product and technology developments both within the industry and in diversifying reachable products will facilitate ADT to provide the highly sought customer value propositions, which will through investment in management leadership and technical training throughout the organisation should place them well to deliver the quality and effectiveness of the customer service to sustain a competitive advantage.

As a follow up study, it would be interesting to determine from table 10 how the individual managers feel about each of these areas, and what they would like the directorate team to do in order to improve upon them, also if these were improved upon what else could be delivered by way of future growth for the organisation, and how this may look.

5.4.4 Reduce S, G & A costs – negatively affected

The reduction of SG and A costs interestingly was the only performance goal that that had both positive and negative influences by a similar number of constructs. I would like to address the negative influences in isolation to the positive ones previously discussed.

Function	Capability / Resource	Reduce SG & A Costs	Od
Finance	Funding to pay market rates for talented people	-4	17
Finance	Invest in acquisitions bulk contract / share deals	-4	20
Marketing	Ability to generate leads for all targeted segments	-2	21
People Development	Lead on culture change initiatives	-1	11
Sales	Effective sales promotion and execution	-8	29
SLT	Increase Health & Safety investment and awareness	-4	22

Table 11: Constructs with negative SG&A affect

Although on the surface these could be considered to be in opposition to the SG&A reductions, it must also be expressed that often investment needs to occur before the return from it does, table 11 (adjacent) would support this view and if the clock could be wound forward would ultimately lead to a reduced level of SG&A costs by way of improving the level of orders produced by the company, and therefore should not be discarded on that basis.

Summarizing the results of the tables above the selected constructs amongst all employees are in line with the delivery of the performances and strategic direction the company pursues, save that the directorate team should investigate the poor scoring average of the constructs today, solicit feedback from a wide staff audience (not just from this participant base) as I am convinced that the scoring would be similar from across most management teams not just those in the survey. It may be that the scores reflect scarcity as opposed to true performance, and from this form a contingency plan as to how these views / actual performances can be improved.

5.4.5. Cause map distance measures

Cause maps provide a greater depth of information regarding an individual, these extend beyond construct choices into how these constructs impact upon each other, they also add the degree of impact too, thus defining strength of influence in the first degree relationship and beyond. These maps confer the complexity of the mental model the individual holds of their environment and can provide, when analysed between and across sub-groups, data patterns for aggregate comparison, to help contrast the substantive and the structural differences, e.g., the cognitive complexity dimension, in the knowledge structures of managers or groups, who perform at different modes or levels.

Maps can be analysed in a number of differing ways (Markóczy and Goldberg 1995), and with all distance-based data the concepts are quite common. Cogniser^{TM} has many methods for exporting data for analysis and comparison. In this section I will be looking at statistical analysis by the above sub-groups discussed for construct selection, but this time for distance maps both between and across these groups, using Cogniser^{TM}.

In order to retrieve this data a 'cause map group' must first be created from each of the individual maps, this is simple to do by selecting the 'Cause Maps Group' menu, and selecting 'New Cause Map Group'. Once the group is formed, there are three specific actions that can be undertaken within it:

1. Analyse the group.
2. Compare the group.
3. Aggregate the group.

Select option 2 such data can be produced for exporting in a simple matrix using the Markóczy and Goldberg method. The software that was used throughout the mapping exercise generated a distance measure which compares one participant's map with another participant's map. Scores range between zero and one with larger numbers reflecting greater dissimilarity. This means the lower the distance measure the closer the cognitions are amongst the individuals or groups and in turn the greater the level of consensus amongst them within the company.

As maps are determined by the size of the gaps between them, it is noted that the gaps between participant i and j, will be the same as the gap between j and i and from this we can conclude two important factors i.e. they satisfy both the 'symmetry condition' in that the value of the gap is the same both ways, and the 'minimality condition' in that the relationship is always between 0 and 1 and not a negative value, such with both conditions met are deemed to be metrical (Everitt 1990).

Perhaps most usefully, Klimoski and Mohammed (1994) offered three ways to think about the form collective cognition may take: homogeneity, overlap, and distributed. When collective cognition is talked about as homogeneity, individuals who are part of a collective share the same representations of information which the collective engages with. Alternatively, collective cognition may exist in the form of overlapping representations within a collective where there is direct parity in some cognitive representations but not all. Finally, collective cognition may exist in a distributed form where information is not collectively represented but rather is distributed throughout the collective and becomes shared when individual members of the collective interact with one another.

5.4.6. Total group descriptive statistics

From the 29 maps created this produced 407 possible pair-wise combinations (i.e. P1001 - P1002:P1029; P1002 - P1003:1029 etc...). Table 12 below displays basic statistical data, from which I would comment that an overall distance gap mean of 0,528 would suggest that the entire participant pool had neither strong similarity nor dissimilarity, with a lowest gap (similarity) of 0.158 being between P1024 and P1034 who were part of the same 'functional' and 'seniority' sub-groups, and with the highest gap (dissimilarity) of 0.787 between P1003 and P1025 who were not in any of the same sub-groups, would appear consistent to expectation.

| Total Group	Number	Minimum	Maximum	Mean	Std, Dev
MG Distance	407	0.158	0.787	0.528	0.103

Table 12: Whole group descriptive statistics

Using the ANOVA one-way statistical tool analysing by all 3-group i.e. seniority, function, and tenure, this proposed 2*3*3 = 18 unique group configurations (seniority has 2 types, functional group has 3 types, and tenure has 3 types), with the number of participants at 29, this meant that representation per unique combination only had a potential of 1.61 members per group (assuming we had complete participant diversity mix) thus rendering the mean averages per group not conducive for regression analysis as really I would prefer 5 or more per group to have a 95% or stronger confidence in the mean.

The actual representations are shown below in table 13, with the highest group of 5 being department level managers, in operations with 20 years or more experience, and no members of (i) general seniority-ops-0-10 years; (ii) general seniority-ops-20+ years; (iii) general seniority-sales-20+ years, and many groups with only 1 or 2 members.

```
All 3-Grouping Level        N     Mean      StDev
DepartmentOps0-10           4    0.54050   0.03641
DepartmentOps10-20          1    0.51900         *
DepartmentOps20+            5    0.53380   0.04825
DepartmentSales0-10         2    0.48100   0.01131
DepartmentSales10-20        2    0.54200   0.05233
DepartmentSales20+          2    0.51250   0.02192
GeneralGM0-10               4    0.50975   0.04489
GeneralGM10-20              3    0.51367   0.01795
GeneralGM20+                2    0.50950   0.05869
GeneralOps10-20             1    0.53200         *
GeneralSales0-10            1    0.55700         *
GeneralSales10-20           2    0.58650   0.06010
```

Table 13: 3-group analysis for mean and standard deviation

When reviewing the data in an individual plot graph my observations were that the statistically lowest mean gaps (shared mental models) were from department managers in sales with up-to 10 years tenure. The highest mean gaps (dissimilarity to other groups) were general managers in sales with 10-20 years tenure, but due to group sizes of 2 and 1 respectively, this data is not reliable enough for extrapolation.
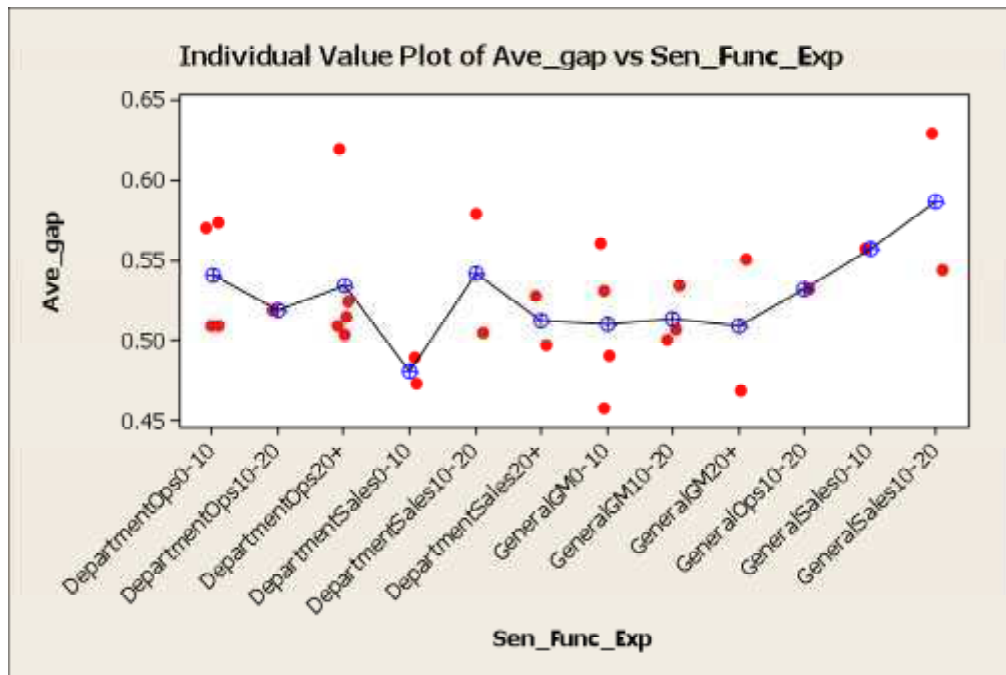
Individual value plot 1: 2-group analysis by seniority and function

In order to be more confident regarding the predictability of the mean and significance of the driver of the distances, the data was re-analysed by 2-group types. The next analysis will look at distances when comparing any 2 different group types, these will be compared in the following combinations:

1. Seniority of role : Department function;
2. Department function : ADT Tenure; and
3. Seniority of role : ADT Tenure

Data is presented below in two parts:

1. Proposes a P-value, the probability of obtaining a test statistic at least as extreme as the one that was actually observed, assuming that the null hypothesis is true where P is the probability of significant statistical difference if the value is below 0.05, or potential significance if below 0.1. The lower the p-value, the less likely the result, assuming the null hypothesis, the more "significant" the result, in the sense of statistical significance. One often rejects a null hypothesis if the p-value is less than 0.05 or 0.01, corresponding to a 5% or 1% chance respectively of an outcome at least that extreme, given the null hypothesis.

2. Displays each group with representative members (any group with nil members is not reported), advising the number in the group (N), the mean average (Mean), the standard deviation (StdDev), and a scale identifying the mean (*) and the extent of the mean upper ( ))and lower (( ) limit with a confidence level of 95% or more. Coupled to this data are individual value pots and box plots. Please refer to appendix 6 for explanation of box plot data.

5.4.7. Cause map compared by Seniority and Department function groups

The 'seniority and function group' has a potential of 6 combinations, but as the function of general manager can never exist at a department level, there will only be 5 practical groups.

This data was of significant interest to me as here we have a group 'General-Sales' as shown in table 14 below (highlighted in blue) whose mean and 95% confidence range had a statistical difference to the others. The only group it had any commonality with was General-Ops, which only had one member. With a probability P-value (highlighted red) of 0.112 there was potential of interest here. Due to General-Ops only having one member I removed this from the data set and ran the analysis again.

```
Source        P
Sen-Dept    0.112

                                    Individual 95% CIs For Mean Based on
                                    Pooled StDev
Level            N     Mean    StDev  --+---------+---------+---------+-------
DepartmentOps   10  0.53500  0.03898              (-----*-----)
DepartmentSales  6  0.51183  0.03760       (-------*-------)
GeneralGM        9  0.51100  0.03565        (------*-----)
GeneralOps       1  0.55100        *  (-------------------*------------------)
GeneralSales     3  0.57667  0.04579                 (----------*-----------)
                                    --+---------+---------+---------+-------
                                    0.480     0.520     0.560     0.600
```

Table 14: 2-group analysis by seniority and function

This new analysis had a reduced P-value of 0.07, indicating a stronger likelihood of group difference, as shown in table 15 below. General-Sales I could conclude had the largest gap,

or mental mode dissimilarity, from any other group by comparison. I would add caution in the group membership of only 3, and would increase the data sample size for more of this group type in order to have a higher confidence in this observation. In addition to this, to what degree of mental-model significance does a mean gap comparison of 0,57667 have to a group average of 0,51133, this would require further analysis or widening of the data set size.

```
Source        P
Sen-Dept    0.070


Level             N     Mean    StDev
DepartmentOps    10  0.53500  0.03898
DepartmentSales   6  0.51183  0.03760
GeneralGM         9  0.51100  0.03565
GeneralSales      3  0.57667  0.04579


                  Individual 95% Confidence Indices For Mean Based on Pooled StDev
Level             +---------+---------+---------+---------
DepartmentOps             (-----*-----)
DepartmentSales   (-------*-------)
GeneralGM          (------*-----)
GeneralSales                    (----------*-----------)
                  +---------+---------+---------+---------
                0.480     0.520     0.560     0.600
```
Table 15: 2-group analysis by seniority and function, adjusted
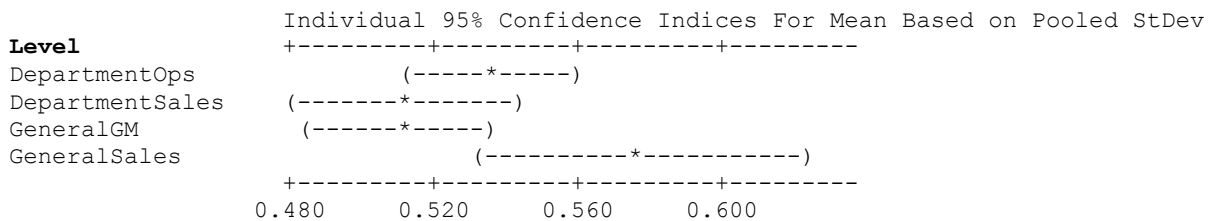
The individual value plot 2 and box plot 1, below, help to depict these relationships more graphically. There is closeness in the average gap sizes between Department-Sales and General-GM, with a larger gap size in General-Sales.
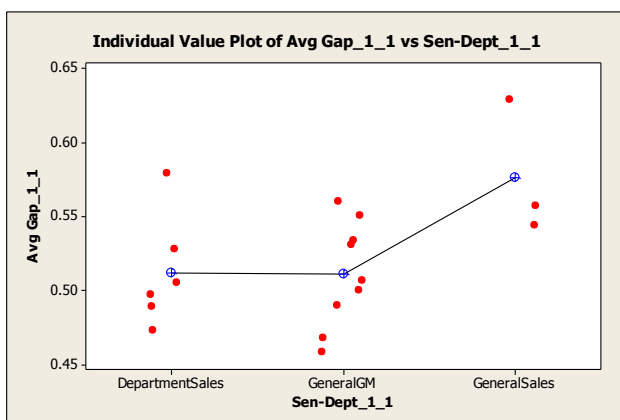
Individual value plot 2: 2-group analysis by seniority and function
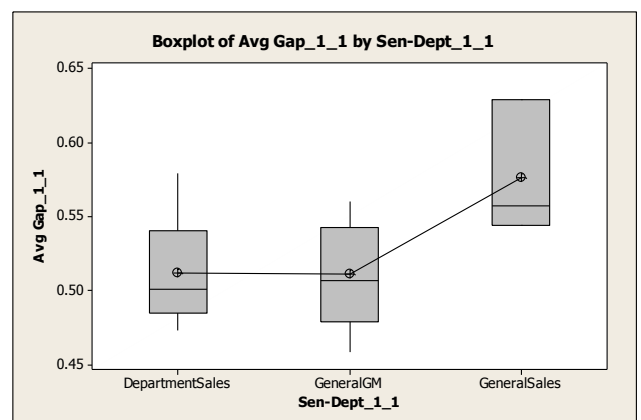
Box plot 1: 2-group analysis by seniority and function

5.4.8. Cause map compared by Department and Tenure groups

The 'function and tenure group' has a potential of 9 combinations, each of which was represented below in the data set, as shown in table 16 below. With a probability P-value (highlighted red) of 0.667 there was very little statistical significance between these groups as their means and 95% confidence indices were very similar, indicating a consistent gap between all mental-models, and with a comparison gap mean of 0,528, were neither similar nor dissimilar.

```
Source         P
Dept-Tenure    0.667
                                 Individual 95% CIs For Mean Based on
                                 Pooled StDev
Level      N    Mean    StDev   -+---------+---------+---------+--------
GM0-10     4  0.50975  0.04489        (--------*--------)
GM10-20    3  0.51367  0.01795       (----------*---------)
GM20+      2  0.50950  0.05869    (------------*------------)
Ops0-10    4  0.54050  0.03641             (--------*-------)
Ops10-20   2  0.53500  0.02263        (------------*------------)
Ops20+     5  0.53380  0.04825          (------*------)
Sales0-10  3  0.50633  0.04460    (---------*----------)
Sales10-20 4  0.56425  0.05270              (--------*-------)
Sales20+   2  0.51250  0.02192    (-----------*------------)
                                 -+---------+---------+---------+--------
                                 0.450     0.500     0.550     0.600
```
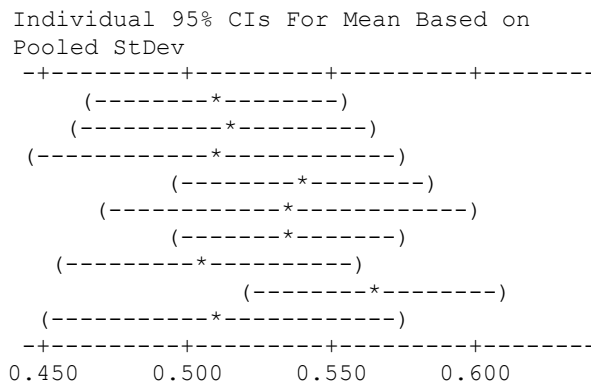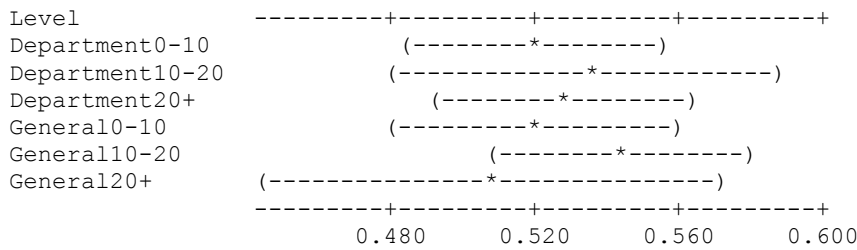
Table 16: 2-group analysis by department and tenure

Adding to the comments above, these plots, individual plot 3 and box plot 2 below, show 'near horizontal' mean link lines across each grouping, confirming a similarity in mean gap sizes.
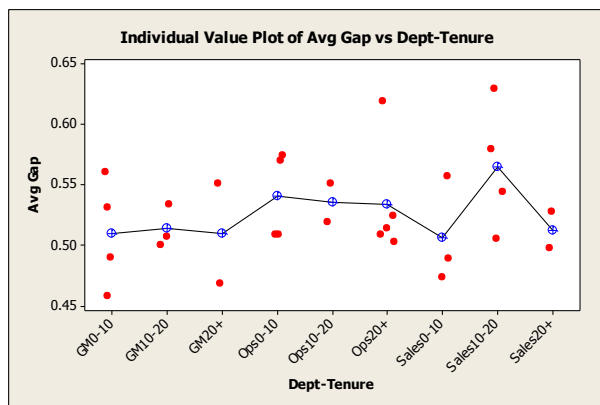
Individual value plot 3: 2-group analysis by function and tenure
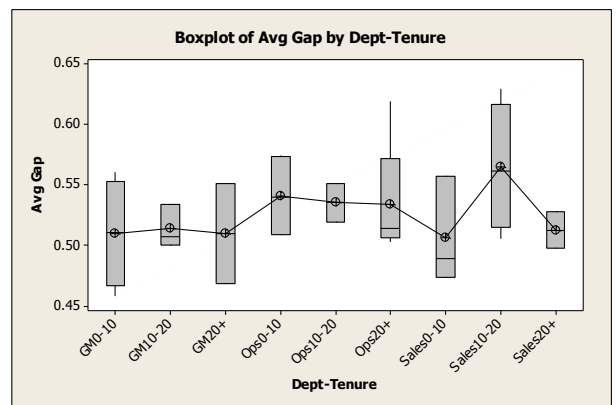
Box plot 2: 2-group analysis by function and tenure

5.4.9. Cause map compared by Seniority and Tenure groups

The 'seniority and tenure group' has a potential of 6 combinations, each of which was represented in the data set, as shown in table 17 below. With a probability P-value (highlighted red) of 0.896 this displayed the highest levels of inter-group similarities with very similar sized mean gap comparisons, thus there was very little statistical significance between these groups. With a total comparison gap mean of 0,528, were neither similar nor dissimilar.

```
Source        P
Sen-Tenure    0.896

Level             N    Mean     StDev
Department0-10    6    0.52067  0.04201
Department10-20   3    0.53433  0.03931
Department20+     7    0.52771  0.04171
General0-10       5    0.51920  0.04425
General10-20      6    0.54417  0.04621
General20+        2    0.50950  0.05869

                  Individual 95% CIs For Mean Based on Pooled StDev

Level             ---------+---------+---------+---------+
Department0-10          (--------*--------)
Department10-20        (-------------*------------)
Department20+           (--------*--------)
General0-10            (---------*---------)
General10-20               (-------*-------)
General20+       (---------------*---------------)
                  ---------+---------+---------+---------+
                      0.480     0.520     0.560     0.600
```

Table 17: 2-group analysis by seniority and tenure

Supporting further the comments above, these plots, individual plot 4 and box plot 3 below, show the flattest 'near horizontal' mean link lines across each grouping out of all group tests conducted, confirming a similarity in mean gap sizes.
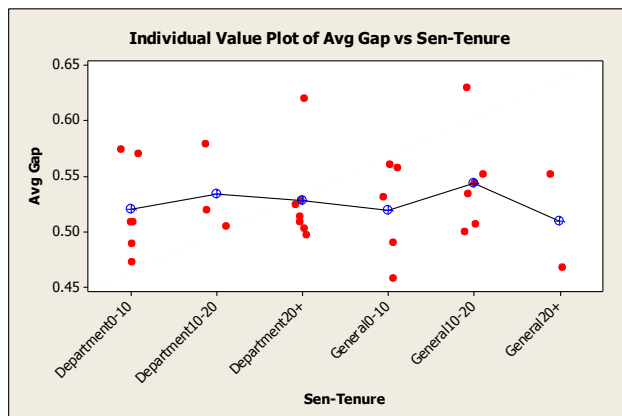
Individual value plot 4: 2-group analysis by seniority and tenure
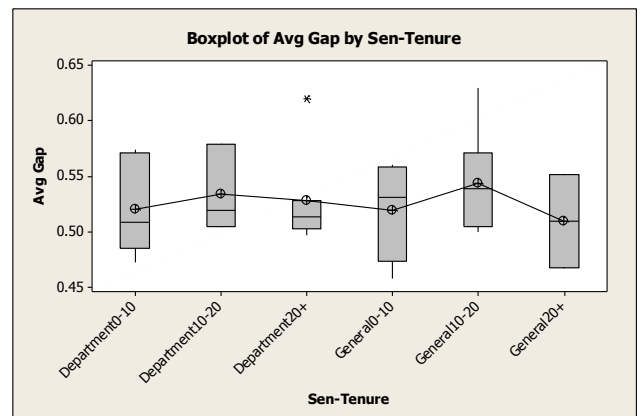
Box plot 3: 2-group analysis by seniority and tenure

From this data I would conclude that it really makes no difference as to the functional group the participants work in the map comparison gap sizes are very similar.

In conclusion to this analysis type, the most significantly differing group by way of comparison gap mean averages to any other group set was found to be General level of seniority with a Sales function, but due to sample sizes and group representation sizes, I would be uncomfortable with my confidence levels without extending the data set further and repeating this analysis. Tenure analysis appeared to have little bearing, and I would suggest that tenure for 'new starters' in a 0 – 2 years bracket should be reviewed as after this period of time there are many aligning influences into the organisation which strip away previous industry or company conditioning.

5.5. Cause map compared by Map Density

In addition to the MG method of map comparisons by gap sizes in the mental models, due to the many data export formats available to Cogniser^{TM}, I will briefly look at map density across similar groups to the above. Map Density refers to the number of links (actual observed links) divided by the theoretical number of maximum links between constructs (number of constructs * number of constructs –1) (note this is undefined if there are no links or there is less than two constructs, a value of 0 is assigned) .

This helps to describe the degree of complexity (or simplicity) in which a manager arranges the mental-model of their environment. A high map density suggests that there are a large number of links selected during the cause map elicitation, leading to a high-density web complexity between the constructs where 'everything affects everything' to some degree or another.

Using ANOVA one-way statistical analysis again, the high P-value of 0.458 in table 18 below suggests a large degree of similarity across the groups with regards to the map densities between them.

The group of General seniority and General Manager function with over 20 years tenure has the highest density average at 0.11 suggesting that these mental modes are more complex and intertwined resource-utility wise than any other group, this group is made up from the most senior people with the highest level of responsibility with the longest tenure of all the participants in the data set, which is an interesting analysis. The group with the lowest density, most simpler maps, was General seniority Operational function with 10-20 years tenure.

```
Source              P
Sen_Func_Tenure     0.458


Level               N      Mean      StDev
Dept_Ops_10 - 20    2    0.07500    0.00707
Dept_Ops_Over 20    4    0.09250    0.01258
Dept_Ops_Upto 10    3    0.09000    0.01732
Dept_Sales_10 -     3    0.08000    0.01732
Dept_Sales_Upto     1    0.09000          *
Gen_Gen Man_10 -    3    0.07667    0.02082
Gen_Gen Man_Over    2    0.10500    0.00707
Gen_Gen Man_Upto    1    0.10000          *
Gen_Ops_10 - 20     1    0.07000          *

                    Individual 95% CIs For Mean Based on Pooled StDev
Level               ------+---------+--------+---------+---
Dept_Ops_10 - 20          (---------*---------)
Dept_Ops_Over 20               (------*------)
Dept_Ops_Upto 10             (-------*-------)
Dept_Sales_10 -         (-------*-------)
Dept_Sales_Upto       (-------------*-------------)
Gen_Gen Man_10 -        (-------*-------)
Gen_Gen Man_Over               (--------*---------)
Gen_Gen Man_Upto           (-------------*-------------)
Gen_Ops_10 - 20     (-------------*-------------)
                    ------+---------+--------+---------+---
                      0.050     0.075     0.100     0.125
```
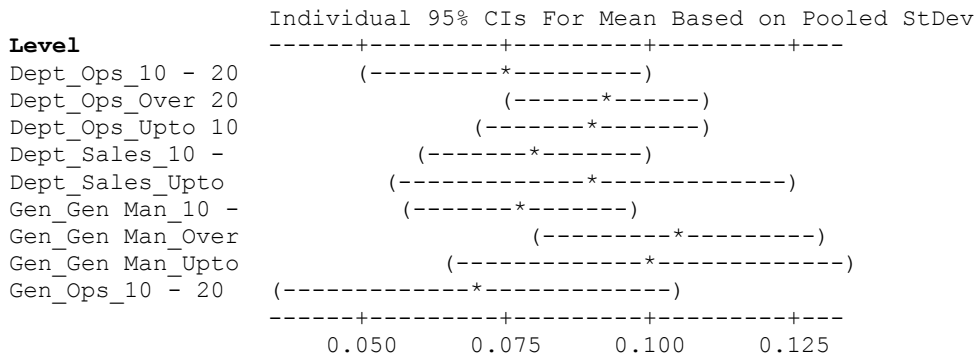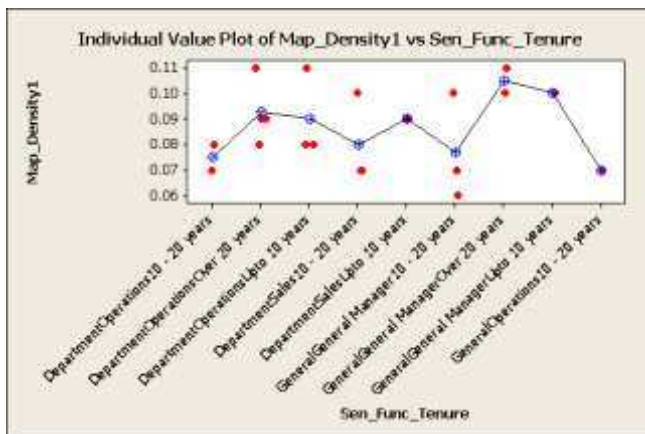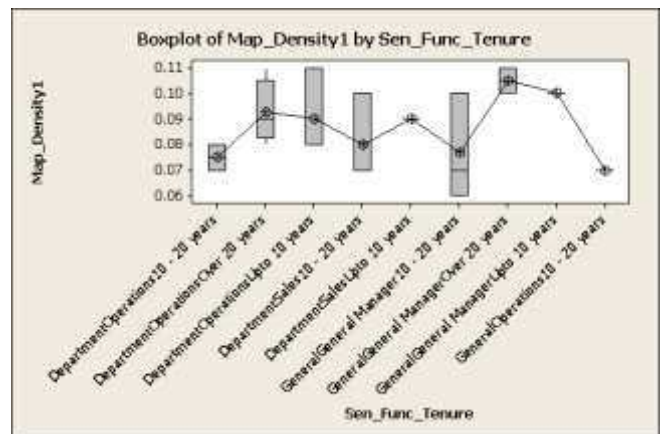
Table 18: 3-group analysis by map density

The only additional comment I would make here is regarding the sample sizes and that the above groups consisted of only 2 people and 1 person respectively, such my confidence in these results reliability wise is limited, and I would prefer to widen the data set.

The above data is mapped below in individual value plot 5 and box plot 4.

Individual value plot 5: 3-group analysis Map density

Box plot 4: 3-group analysis Map density

5.6. Difficulties encountered and limitations of the research

Even when conducting research within an environment that is well known to a person undertaking research as ADT is to me, gaining participant commitment to take part and for them to respond timely is always challenging. As this was not a project being lead from the directorate, I felt that constant chasing for responses became the norm which led to much frustration on my part chiefly by no urgency from the participants.

Perhaps most disappointing was the lack of support from the directorate senior leadership team (SLT), as ultimately I believe these findings will be of future importance to them, or paves the way for increasing the breadth and depth of the study. The lack of response and quality of the actual responses, I believe have left the study potentially wanting.

Although the study began with 36 participants receiving 29 responses has limited the breadth of the functional roles, this should have been raised to perhaps nearer fifty, with a more even balance across functional groups to extend beyond the P&L environment into HR, IT and finance.

Many participants, particularly at the departmental level, struggled with the in and out degrees of influence in the causal relationships, and looked to second, third and even fourth degree cause and effects rather than answer on a first degree basis, which I believe lead to more complex map forms. It is surprising though that the most simple form of maps belonged to operational managers with 10-20 years tenure rather than any from the general manager level of participants as there is much literature to support that the higher level of seniority held within an organisation often leads to a more simpler mental-model held.

What is the life-cycle of these maps? Obviously any study of this nature is a snap shot in time and circumstance, and I believe that responses could vary in a short period of time for many participants if the study was repeated, but due to the analysis earlier I feel there will always be a strong alignment in the construct choices but there may be differences in the comparison map gaps in the cause and effect relationships, and map densities.

6.0. Conclusion

At the outset, the study goal was to understand the common substance in everyday managerial thinking: why and how do managers in an established company within an established industry come to think in a shared way.

Any shared cognitions in organizations should be observable as overlapping or incongruent elements in the map systems originating with people of different hierarchical or functional positions (Laukkanen 1994). Another area can be based on the observation that cognitive studies are often concerned with performance in organizations (Laukkanen 1994). This study sought to encounter with both areas.

This dissertation has reviewed how RBV, management cognition, and the process of enactment shape organisations today and help them to achieve and maintain sustained competitive advantage. Discussing how the gaps in manager's cognitive maps can offer insight into the levels of similarity or dissimilarity between their mental models within the organisations help identify areas of variation, and what the contributing factors may be. I have discussed tools that allow this cognition to be measured in the form of cause maps, which can help determine, when relationships are restricted and focussed upon a specific situation or problem area, the rationale behind the beliefs of their managers.

Why are causal maps important and are they useful? Causal maps can be a powerful tool to help managers to focus attention on the root causes of a problem, find critical control points, guide risk management and risk mitigation efforts, formulate and communicate strategy, and teach the fundamental causal relationships in a complex system (Scavarda et al 2006).

Managers can apply causal maps in at least five ways. First, causal maps can be used as a diagnostic tool to focus attention on the root causes of a problem (Evans et al 2008). Second, they can be used to identify the critical control points for a system (Kaplan & Norton 2004). Third, they can be used to guide risk management and risk mitigation efforts (Card 1998). Fourth, they can assist managers in both formulating and communicating strategy (Kaplan & Norton, 2004). Fifth, they can be a powerful tool to help managers teach the fundamental causal relationships in a complex system.

Any organisation that has managers with high degrees of shared mental models will have a significant foundation from which they are well placed to compete. Shared models make communication and implementation of strategic decisions easier to implement, there becomes an intuitive way of synergising efforts leading to a collaborative method of working

both across functional areas and through the hierarchy of command. An organisation undergoing restructuring in the face of economic pressure or innovation strategies due to loss of market share will be able to undertake change programmes more swiftly and efficiently as their managers will efficiently go about the process with complementary degrees of determination.

Considering cause maps as part of this research to measure within my own organisation what the 'mental climate' is like revealed interesting comparisons between three specific management sub-groups, although it is accepted that the number of participants involved in the study only comprised of 29 managers, it still provided a rich amount of data.

The cause map gaps when compared across sub-group levels displayed similar gap means and standard deviations, concluding that the overall study across the groups were neither similar nor dissimilar. This is not to be considered as a negative, we only have to refer to the Surowiecki's (2005) book, The Wisdom of Crowds, where it is argued wise crowds need to have (i) diversity of opinion, (ii) independence of members from one another, (iii) decentralization, and (iv) a good method for aggregating opinions. He contends that, if these four conditions are met, the collective intelligence of the group will produce better outcomes than a small group of experts. Perhaps these gaps will hold the company in good stead.

The group with the most significant gap from any other however was found to be in the role of Sales with senior levels of responsibility, yet due to there being only a small number of members in this group makes my analysis difficult to comment on with any large degree of confidence as to why this may be. It does provide an extension opportunity to the study to explore this finding further, which would also enable my desire to amend the tenure groups to include a 'new starters' consideration in an effort to determine whether this is significant and whether they can influence mental models of the others or whether the new starters eventually just blend in to the pack.

The study area that offered the highest levels of cohesion across the participants was in the adjacency matrix from the aggregation of all of the groups, clearly supporting that the managers shared a strong similarity in the belief of which constructs would provide the strongest performance of their strategic goals. Here I was able to determine that the strongest six were selected by at least 50% of the participants, suggesting a strong shared-model of understanding for which resources were centric to company performance and strategy realisation. This is a significant driver of managerial conduct, behaviour and beliefs.

When analysing map density, I was very surprised that the more simpler maps and cognitive processes were found to reside within the departmental level of managers not the senior level of general managers, this is contra to what I was expecting to find, as much literature states that the higher the position held in office, more often the more simpler the mindset of the individual in their sense making of the company and its expectation of them. However one comment would be this grouping held the longest tenure from all participants and may just have simplified their processes over time.

The current absence of actual business unit financial performance within this research, leaves also leaves an opportunity to develop this study further to determine whether the gaps in the mental models correlate to the organisation's performance at a UK&I level or by specific P&L owners, and whether this occurs within a particular function, location or at a particular level of seniority.

Markets and firms are interacting institutions, each being necessary to the existence of each other Penrose (1959, p197). The function of both is 'resource allocation', and how managers use their resources will determine the ultimate performance of their organisation.

Section 7.0. References

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Section 8.0. Appendices

Appendix 1 – ADT Fire and Security overview

Appendix 2 – ADT Fire and Security senior management organisation chart

Appendix 3 – ADT Fire and Security profit centre locations

Appendix 4 – ADT Fire and Security typical profit centre structure

Appendix 5 – Cause Map comparison

Appendix 6 – Box Plots

Appendix 1 – ADT Fire and Security overview

About ADT

ADT is the leading provider of electronic fire and security solutions. With a 6,000 strong team, we can combine nationwide resources with local presence. We provide the solutions you need to protect your buildings and business; from the smallest shop to the largest retail centre; from workshops to car plants; from underground car parks to the tallest office blocks. We protect hotels, factories, banks and airports. The experience and specialist knowledge we have gained is now ready to work for you. Our experts will help you assess your security risks and work with you to develop a solution tailored to meet your needs, no matter how straightforward or complex, no matter how small or large your project. You also need the highest standards of support for all your security systems. Our National Service Bureau gives you instant access to our team of over 1,200 trained service engineers, 365 days a year, and our dedicated Alarm Receiving Centres can provide 24 hour remote monitoring.

History

In the United States in the 19th century, there were many small telegram delivery companies; in 1874, 57 district telegraph delivery companies affiliated and became "American District Telegraph". With the increase in telephone usage in the late 1800s, ADT's messenger business slowly declined in popularity. ADT tried branching out and developing their signalling business while still maintaining their telegraph business as primary income source. ADT incorporated into Western Union in 1901. ADT separated its messenger business from its main signalling business at this time. In 1909, Western Union and ADT came under the control of AT&T. ADT began to expand into new areas like fire alarms and burglar alarms between 1910 and 1930, but was kept separate from AT&T's Holmes alarm business. ADT became a publicly owned company in the 1960s.

In 1964, ADT was found to be a monopoly in restraint of trade. It was shown to provide almost 80% of the central station alarm service in the United States. In some cities, such New York City and Memphis, Tennessee, they were the sole provider. They were also found to have forced out of business competitors by lowering prices below cost. They would charge national accounts very low prices in cities with competitors and much higher prices where no competition was available. ADT was forced to adopt a national price list, which could not be varied, to help establish Central Station Competitors in cities without competition, and to pay fines and triple damages to the federal government, customers, and local competitors.

In 1977, the UK's Lord Ashcroft had bought under performing outdoor equipment maker Hawley Goodall, and transformed it through acquisition into business services group, registered in Bermuda. In the early part 1987, Hawley bought Crime Control Inc. based in

Indianapolis for $50 million, placing the company fourth place spot in the U.S. security market. Later in the year it bought ADT. This purchase transformed Hawley into the leading security services business in the United States, and resulted in the majority of its revenues coming from the North American market. As a result of the acquisition, Hawley changed its name to ADT Inc. and decided to refocus its business around security services. At the end of 1987, the company sold its North American-based facility services business to Denmark's ISS A/S.

By the mid 1990s, ADT surpassed the 1 million customer milestone. In 1997, ADT was purchased by Tyco but means of a reverse takeover, thus allowing Tyco a Bermudan tax status. Lord Ashcroft joined the board of Tyco, although he had quickly disposed of a large amount of his Tyco stock taken in payment for the purchase of ADT.[1]

ADT in the UK

ADT first entered the United Kingdom in the late 1950s with the establishment of Electric Protection Services Limited based in London and introduced central monitoring in the mid-60s at the request of several leading banks, despite not opening a central monitoring station of their own. The 1970s and 80s brought steady growth. In the mid 1990s, ADT Inc was acquired by Tyco International at the same time Tyco also bought up the UK firm Thorn Security. In 1997, ADT Fire and Security plc was formed from the merger of three of the UK's largest security firms: ADT, Thorn Security and Modern Security Systems.

Operations today

ADT provides monitored burglar, fire and video surveillance systems. ADT has branches in 50 different countries, with over 62,000 employees. ADT had gross revenue of $8 billion in 2008. ADT has branches covering the United States, Canada and Latin America, as well as 21 countries in Europe. ADT UK and Ireland has 23 branches employing around 5,500 people. ADT Europe has annual gross revenues of at least $2.6 Billion. ADT has branches in seven Asian countries, one branch in South Africa, and branches in Australia and New Zealand. ADT is the largest security company in the United States, serving over five million customers. As of 2004 ADT holds 35% market share of the North American market and has six monitoring stations, four in the United States and two in Canada.

ADT is the UK's leading security company, helping to protect over 250,000 UK family homes and 160,000 businesses across the country. ADT UK has also a specialist vehicle division tasked to create and maintain CCTV and riot control vehicles for police forces around the country.

In 1989 ADT Fire and Security was granted a 45 year contract to maintain the security of the British and American Governments. This is why employee vetting is so in depth and conducted by external sources.

ADT systems

ADT's main service is the installation and monitoring of alarm systems, whereby one of their Customer Monitoring Centres (CMC) receives electronic signals from an alarm system when an alarm event is triggered, such as in the case of an intrusion, fire, carbon monoxide presence or manual depression of a holdup/duress button. A monitoring specialist examines the data received from the alarm system and determines the type of response the alarm signal warrants. Depending on the type of alarm, the monitoring specialist will attempt to contact the location via telephone to investigate further and determine if the signal is a false alarm. If necessary, the monitoring specialist can notify the local police, fire, EMS, or other emergency services department and/or an authorized security response service of the alarm status and the event address. ADT maintains six Customer Monitoring Centres in North America.

ADT had a manufacturing plant in Clifton, New Jersey. After the Hawley Holdings buyout in the early 1990s they outsourced R&D and manufacturing. ADT security systems are now manufactured by Ademco (a product of Honeywell International), GE ITI (both products of GE Security), DSC (a product of Tyco International), or Bosch.

ADT dealers

ADT Security also has an authorized dealer group. Besides ADT Corporate, sub-contractors or home security dealers offer installation, which is monitored and serviced by ADT Corporate. Some ADT Dealers use Honeywell/Ademco products which is also used by ADT corporate and some ADT dealer use GE products.

With ADT Corporate or any other dealers, there is a 36-month contract for monitoring. As far as the services are concerned, there is no difference between ADT Direct or an ADT Dealer, you just get a better price on the equipment and save lot of money on the initial cost going through ADT Dealers.
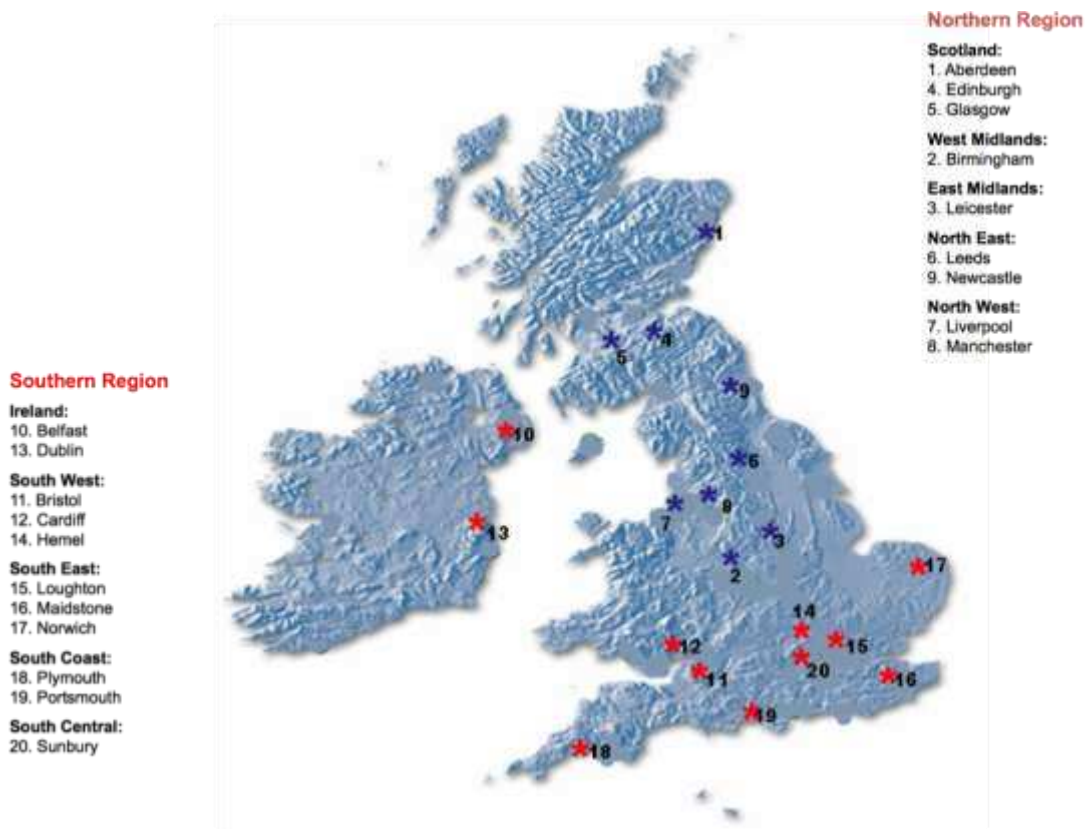
Products and services

- Home Security Systems (including Fire and Life Safety)
- Custom Home Security Systems (including Fire and Life Safety)
- Home Health and Companion Systems
- Home Video Surveillance
- Small Business Intrusion Detection
- Small Business Video Surveillance
- Small Business Electronic Access Control
- Medium & Large Business Intrusion Detection
- Medium & Large Business Fire & Life Safety
- Medium & Large Business Video Surveillance
- Medium & Large Business Radio Frequency Identification (RFID)
- Medium & Large Business Electronic Access Control
- Medium & Large Business Electronic Article Surveillance and Smart Electronic Article Surveillance
- Medium & Large Business Preferred Services
- Medium & Large Business Security Monitoring Services
- Medium & Large Business ADT Select Solutions
- Medium & Large Business ADT Advanced Integration
- Medium & Large Business Store Business Intelligence
- Medium & Large Business ADT Anti-Skim ATM Security Solutions
- Government Access Control
- Government Fire & Life Safety
- Government Intrusion Detection and Control
- Government CCTV & Surveillance
- Government Executive Protection
- Government Security System Integration and Design
- Government Public Warning/ Mass Notification Systems

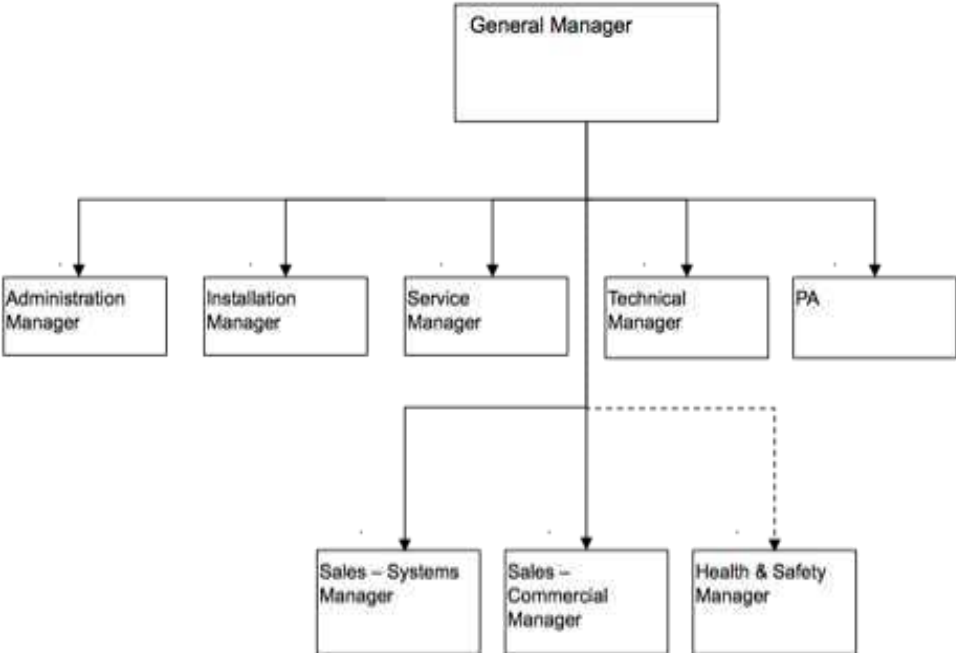**Appendix 2 – ADT Fire and Security senior management organisation chart**
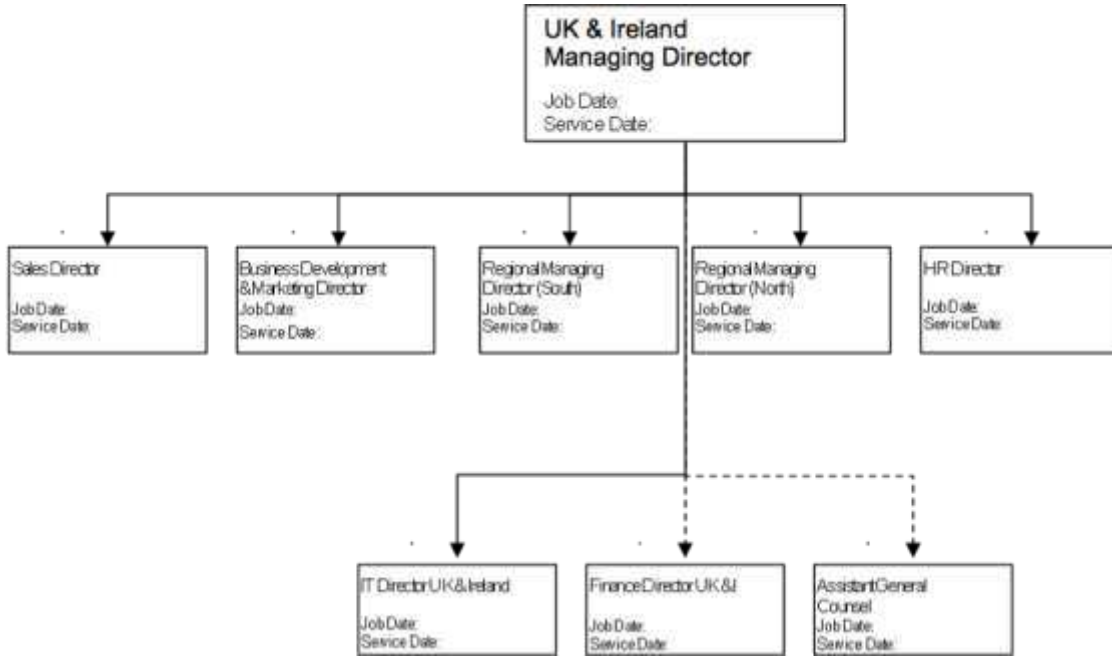
Appendix 3 – ADT Fire and Security profit centre locations

ADT UK & I is composed from 2 regional areas, each with 5 independent profit and loss accounting business, forming a total of 10 business units

Northern Region

Scotland:
1. Aberdeen
4. Edinburgh
5. Glasgow

West Midlands:
2. Birmingham

East Midlands:
3. Leicester

North East:
6. Leeds
9. Newcastle

North West:
7. Liverpool
8. Manchester

Southern Region

Ireland:
10. Belfast
13. Dublin

South West:
11. Bristol
12. Cardiff
14. Hemel

South East:
15. Loughton
16. Maidstone
17. Norwich

South Coast:
18. Plymouth
19. Portsmouth

South Central:
20. Sunbury

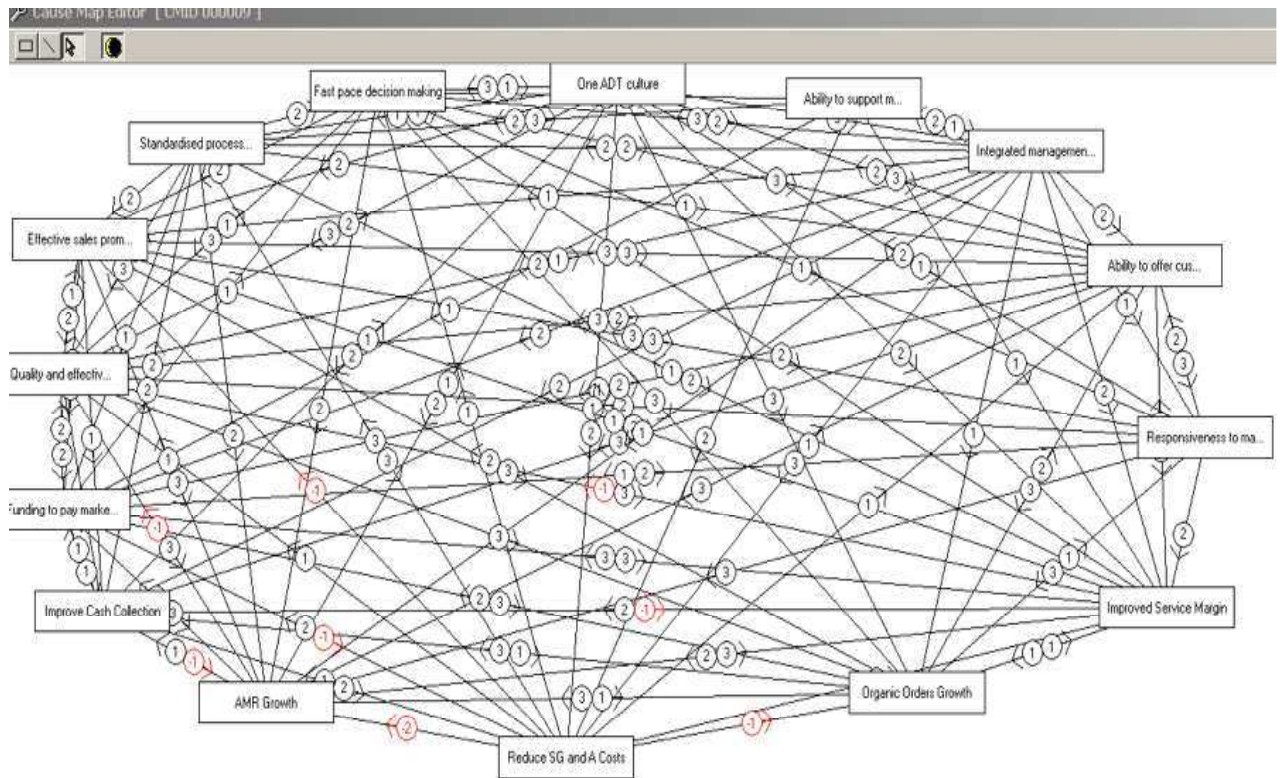**Appendix 4 – ADT Fire and Security typical profit centre structure**

Area Leadership Team

Appendix 5 – Cause Map comparisons
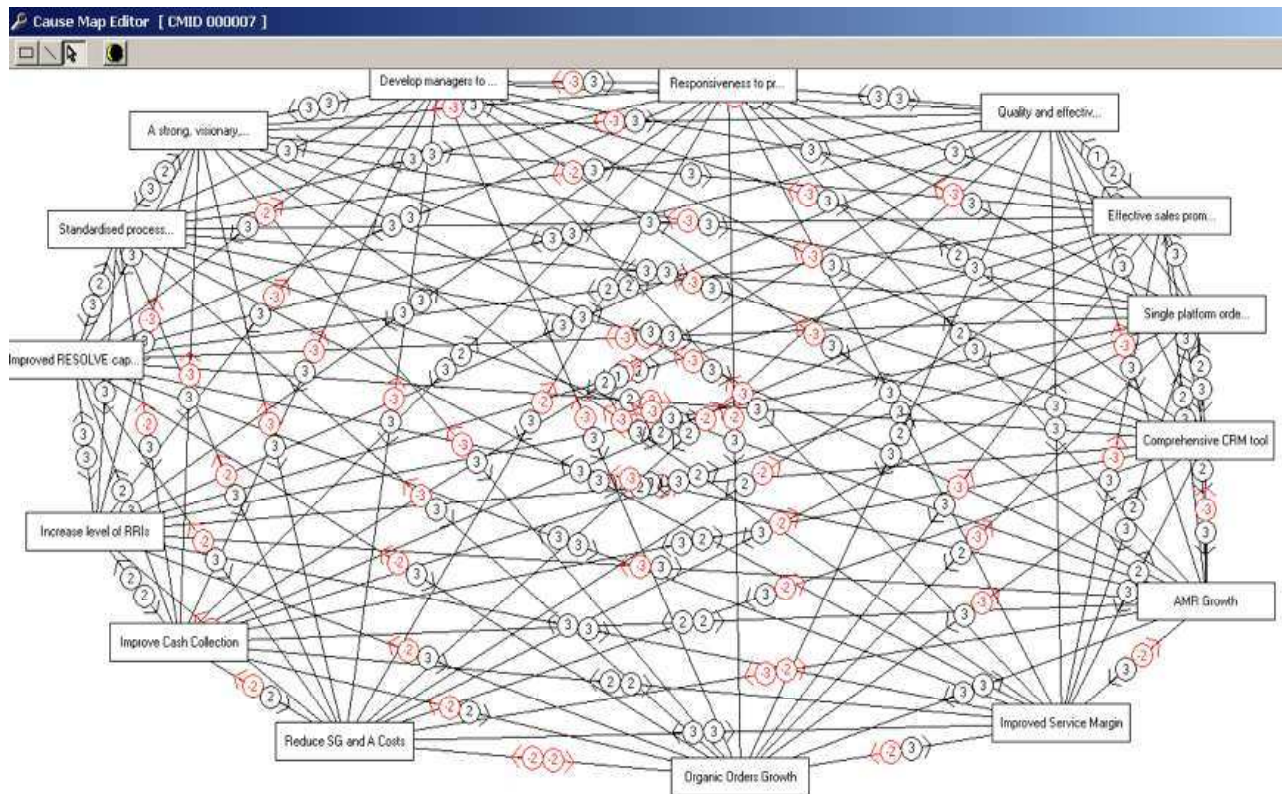

Weighted digraph 1: complex

Weighted digraph 2: simple

Appendix 6 – Box Plots

In 1977, John Tukey published an efficient method for displaying a five-number data summary (ww.netMBA.com). The graph is called a **boxplot** (also known as a box and whisker plot) and summarizes the following statistical measures:

- median
- upper and lower quartiles
- minimum and maximum data values

The following is an example of a boxplot.
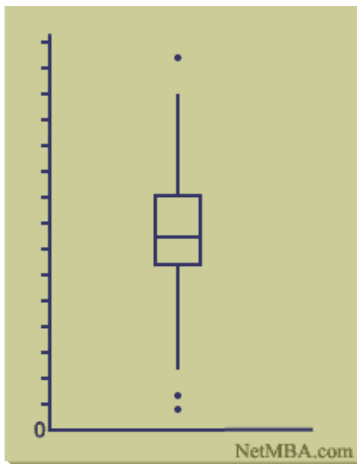
Box Plot

The boxplot is interpreted as follows:

- The box itself contains the middle 50% of the data. The upper edge (hinge) of the box indicates the 75th percentile of the data set, and the lower hinge indicates the 25th percentile. The range of the middle two quartiles is known as the inter-quartile range.
- The line in the box indicates the median value of the data.
- If the median line within the box is not equidistant from the hinges, then the data is skewed.
- The ends of the vertical lines or "whiskers" indicate the minimum and maximum data values, unless outliers are present in which case the whiskers extend to a maximum of 1.5 times the inter-quartile range.
- The points outside the ends of the whiskers are outliers or suspected outliers.

Advantages of Boxplots

Boxplots have the following strengths:

- Graphically display a variable's location and spread at a glance.
- Provide some indication of the data's symmetry and skewness.
- Unlike many other methods of data display, boxplots show outliers.
- By using a boxplot for each categorical variable side-by-side on the same graph, one quickly can compare data sets.

One drawback of boxplots is that they tend to emphasize the tails of a distribution, which are the least certain points in the data set. They also hide many of the details of the distribution.