



# Leaders' sensemaking under crises: Emerging cognitive consensus over time within management teams

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## ABSTRACT

When facing a crisis, leaders' sensemaking can take a considerable amount of time due to the need to develop consensus in how to deal with it so that vision formation and sensegiving can take place. However, research into emerging cognitive consensus when leaders deal with a crisis over time is lacking. This is limiting a detailed understanding of how organizations respond to crises. The findings, based on a longitudinal analysis of cognitive maps within three management teams at a single organization, highlight considerable individual differences in cognitive content when starting to make sense of a crisis. Evidence for an emerging viable prescriptive mental model for the future was found, but not so much in the management as a whole. Instead, the findings highlight increasing cognitive consensus based on similarities in objectives and cause-effect beliefs within well-defined management teams over time.

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## Introduction

Due to its importance to the viability of organizations, the link between perceptions and interpretations of external change and organizational adaptation to achieve performance outcomes has received considerable research attention (Barr, 1998; Barr, Stimpert, & Huff, 1992; Daft & Weick, 1984; Eden & Ackermann, 2010; Isabella, 1990; Lant, Milliken, & Batra, 1992; Sutcliffe & Huber, 1998; Thomas, Clark, & Gioia, 1993). A major reason given for organizational adaptation in the face of a disruptive external change and subsequent crisis is that leaders alter their beliefs to accommodate the changes in the environment, or alternatively, the leaders themselves are changed (Barr, 1998; Daft & Weick, 1984; Janis, 1989).

Leaders are clearly important when organizations face a crisis and are key when searching for answers to make sense of what is happening (Weick, Sutcliffe, & Obstfeld, 2005). Sensemaking under crises is inherently complex because leaders have to think and problem solve in the context of a novel ambiguous situation involving time pressure and stress while interacting with others in management teams (Mumford, Friedrich, Caughron, & Byrne, 2007). The key task for leaders in such situations is to develop a mental model, based on their schemas,<sup>1</sup> consisting of causal beliefs for understanding and responding to the crisis (Weick, 1995).

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<sup>1</sup> Alternative terms are found in the management literatures and seem to be sometimes used synonymously. For example, the term 'mental models' is popular (e.g. Hodgkinson & Johnson, 1994; Porac et al., 1989; Senge, 1990) as are the terms 'cognitive models' (e.g. Hodgkinson, 1997) and 'schemas' (e.g. Dutton & Jackson, 1987; Fiske & Taylor, 1991; Ireland et al., 1987; Kiesler & Sproull, 1982; Lord & Foti, 1986) and 'mental representations' (Stubart, 1989). All these terms are used to describe the cognitive underpinning of information-processing and sensemaking and other management processes and activities. The terms 'belief structures' (Mohammed, Klimoski, & Rentsch, 2000) and 'knowledge structures' (e.g. Lyles & Schwenk, 1992; Walsh, 1995) are also found in the literatures but these terms are sometimes used at a group level of analysis to mean the mental models of either a group of individuals or an organization. The term 'cognitive map' (e.g. Axelrod, 1976; Calori, Johnson, & Sarnin, 1994; Daft & Weick, 1984; Fahey & Narayanan, 1989) is also used but this term is often more closely associated with a visual representation of cognition, such as a representation on paper or on a computer screen. This term is also used in this representational form in this article. Debates on the problems raised by the multiple terms used highlight that some differences exist between some of the terms and they should not be used synonymously. For example, mental models can be thought of as temporary dynamic models in working memory whereas schemas are enduring knowledge structures in long term memory (Hodgkinson & Healey, 2008; Rouse & Morris, 1986).

The most significant recent advance in understanding leaders' cognition driving sensemaking under crises has been theoretical. Mumford et al. (2007) present a detailed theoretically grounded conceptual model, which includes two particularly important facets, both central to their conceptual model of leader cognition. One, is the activation of descriptive mental models which are used to interpret any externally led change. It is external change that invariably starts a crisis and individual managers adopting leadership roles, even within the same firm, can interpret the change differently (Jackson & Dutton, 1988). Two, is the development of a prescriptive mental model or "...a mental model describing the causes and consequences of performance with respect to the crisis situation at hand" (Mumford et al., 2007, p. 528). In other words, leaders develop a mental template for the future, but as Mumford et al. (2007) point out, this development is complex and occurs over time. The development of a new prescriptive mental model is critical because the stability of leaders' cognition in the face of a changing external environment has been found to be a contributor to inertia and organizational failure (Barr et al., 1992; Hodgkinson, 1997).

As an understanding of descriptive mental models and the development of a prescriptive mental model for the future are both cited as key to fully understand leaders' sensemaking under crises, a longitudinal research perspective is required. Sensemaking under crises involves cycles of information processing, communication and problem solving, which are likely to be interspersed with action, to make sense and give meaning to events (Smircich & Morgan, 1982; Weick et al., 2005). In most settings such a complex longitudinal process invariably involves collective leadership drawing on different experiences and expertise within management teams (Friedrich, Vessey, Schuelke, Ruark, & Mumford, 2009). While individuals within management teams will likely interpret change differently, ultimately, consensus needs to be built around an envisioned future (Strange & Mumford, 2002).

The development of a viable prescriptive mental model provides a basis for vision formation in a crisis (Mumford & Strange, 2002; Strange & Mumford, 2005). However, we know little of how the content, or the assumptions and beliefs, contained within leaders' mental models develop and change during the course of a crisis. With the exception of an empirical study by Markóczy (2001) there is little direct cognitive empirical evidence to help understand how consensus is developed over time within the mental models of individual managers within the same firm as they grapple with the same change events. To help understand how leaders develop a prescriptive mental model for the future when responding to a crisis, we map cognitive diversity and consensus in individuals adopting leadership roles within management teams in the same firm over time.

### *Sensemaking*

As part of a growing stream of research into management cognition (see Hodgkinson & Healey, 2008; Hodgkinson & Sparrow, 2002; Narayanan, Zane, & Kemmerer, 2011; Walsh, 1995 for reviews) scholars have long considered the importance of sensemaking based on interpretive work conducted by the leaders of organizations, such as the CEO or top management team, to make sense of change when it is encountered (Gioia & Chittipeddi, 1991). Weick (1995, p. 57) points out that the sensemaking perspective is associated with understanding the cognitive filters that people use and what these filters include and exclude. Thus, a hallmark of sensemaking is the simplification of complexity through individuals' mental models so as not to be overwhelmed by data (Daft & Weick, 1984; Walsh, 1988).

Leaders enact or produce part of the environment they face (Daft & Weick, 1984; Weick, 1995) such as the enactment of a strategic group within their mental models signifying a very limited perception of competition (Porac, Thomas, & Baden-Fuller, 1989). Consequently, the sensemaking perspective highlights that the environments that leaders deal with are, at least in part, socially constructed (Weick, 1995). This social construction of environments distinguishes the sensemaking perspective from much of the work on behavioral economics, such as the work which focuses on the cognitive limitations of humans in general operating in objective environments (Hodgkinson & Healey, 2008; Weick, 1995). While the social aspects of sensemaking is a theme running through the literature, some researchers put more emphasis on sensemaking as an individual cognitive process (Maitlis & Christianson, 2014).

Another theme debated within the literature on sensemaking is in connection with its temporal dimension. Weick (1995) initially highlighted the retrospective nature of sensemaking, while more recent work raises the possibility of prospective future oriented sensemaking that may be linked to resolving a crisis (Weick et al., 2005). Leaders can make presumptions about the future (Weick et al., 2005) and give meaning to others (Smircich & Morgan, 1982) such as through categorizing and labeling a disruptive change as an 'opportunity' signifying a positive way to deal with change (Dutton & Jackson, 1987). The communication of meaning, such as through the labeling of a disruptive change by trusted leaders is likely to result in more consensus which in turn is more likely to result in organizational action (Dutton & Jackson, 1987; Schwenk, 1984).

### *Leaders' sensemaking under crises*

While a strict definition to encompass all crises is problematic, they are often associated with sudden threats to high priority goals and the need to dramatically change prior practice (Hunt, Osborn, & Boal, 2009). Crises involve a movement away from stability to established new goals (Lichtenstein & Plowman, 2009) and also imply a time pressured change relative to standard operating procedures (Mumford et al., 2007; Williams, Pillai, Deptula, & Lowe, 2012).

Sensemaking within an organizational change process is related to understanding and is cognitive in nature (Gioia & Chittipeddi, 1991). In the leadership literature, research has highlighted the importance of context specific cognition, which underpins sensemaking and leaders' behavior as well as its influence on outcomes such as performance (Antes & Mumford, 2012; Barrett, Vessey, & Mumford, 2011; Lord & Hall, 2005; Mumford, Connelly, & Gaddis, 2003; Mumford et al., 2007). Leaders are critically important in the context of sensemaking under crises. They are bombarded with a stream of often conflicting data associated with ill-defined events and possible problems (Dutton & Jackson, 1987). It is their key role to make sense of this critical situation and to convey

this sense in their role of sensegiving to develop meaning for others (Foldy, Goldman, & Ospina, 2008). Leaders are also key in developing a resolution to any crisis. They need to project a vision to overcome a crisis based on their prescriptive mental model or mental template for the future (Mumford et al., 2007).

While the leadership role in sensemaking under crises is critical, leaders are likely to face two main types of problems common in organizations, which add to the difficulty of the task: ambiguity and uncertainty (Weick, 1995). Ambiguous facets of crises are likely to result in too many interpretations, while uncertain facets are likely to result in no interpretations as leaders are ignorant of what is happening (Weick, 1995). Events incorporating both ambiguity and uncertainty are likely to emerge over time when under a crisis (Mumford et al., 2007). Leaders should not act alone when confronting such difficult events. Rather they should work in teams because having different perspectives can enrich interpretations (Huber & Lewis, 2010).

When operating in management teams, leaders are likely to share perceptions and gradually create meaning through communication so there is cross understanding (Huber & Lewis, 2010). Cross understanding, through an accurate understanding of the mental models of others within a leadership team, may lead to changes to mental models because some individuals are convinced by and adopt the beliefs of others (Huber & Lewis, 2010). Such cross understandings are therefore likely to add to consensus.

While cross understanding may facilitate more accurate interpretations of events associated with a crisis, errors of judgment are also likely to occur. Prior research suggests that leaders put much reliance on case-based prior knowledge and experience when thinking but this can result in errors especially when addressing complex ill-defined problems that are likely to be encountered in crises (Eubanks & Mumford, 2010; Mumford et al., 2007). Such errors are also likely to limit leaders' creative thinking required to resolve a crisis (Mumford, Blair, Dailey, Leritz, & Osburn, 2006). A number of errors are likely in leaders' cognition, such as those linked to humans' limited information processing capacity (Cyert & March, 1963; Lord & Maher, 1990; Miller, 1956), and others more specific to sensemaking under crises. Mumford et al. (2007) discuss that dealing with crises make specific demands on leaders that are likely to result in a number of errors. The authors point to errors such as non-recognition of change; errors due to time stress and resource demands; underestimates of the response required due to a form of anchoring bias; and the nature of prior knowledge and the use of specific prototypical cases which may not be appropriate for applying to the current crisis. Clearly, to achieve performance in dealing with crises leaders have to reduce such errors. One major way they can reduce errors is by involving others with different ways of thinking in collective leadership and decision making.

#### *Cognitive diversity and consensus within leadership teams*

When confronting disruptive external change and crises, not all those adopting leadership roles are likely to think the same, even within the same firm. As previously observed, differences may be due to errors, such as focal errors, because leaders focus on different information or use different case based prior knowledge. Alternatively, some leaders may take more time than others to think through the issues.

Cognitive diversity and consensus in leaders refers to the differences and similarities in beliefs within their mental models. Much of the prior research is directed at strategic consensus or the shared understanding on a common set of priorities (Floyd & Wooldridge, 1992). In such studies it is usual to consider consensus in terms of the content of mental models, in particular the ends (objectives, goals) and means (strategies) used to achieve them in top management teams (Kellermanns, Walter, Lechner, & Floyd, 2005).<sup>2</sup> While the study of ends and means are clearly important to understanding sensemaking under crises, Markóczy (2001) suggests that this focus may limit a more holistic investigation. Consequently, there is a need to focus on the beliefs associated with the issues most relevant to leaders and how these beliefs are related (Markóczy, 2001).

In the decision making literature consensus and its implications for performance have been studied considerably but with inconclusive results (see Kellermanns et al., 2005, for a review). It is perhaps not surprising then, that prior research is not unequivocal as to the merits of consensus in leaders. Research highlights problems when leaders think in similar ways, such as underestimating the full extent of competition (e.g. Porac et al., 1989) so cognitive diversity may help eliminate bias and errors of judgment. Cognitive diversity in teams is also likely to increase creativity (Kilduff, Angelmar, & Mehra, 2000; Shin, Kim, Lee, & Bian, 2012) and is said to lead to more extensive discussions about strategic options to enable firms to change (Lant et al., 1992; Miller, Burke, & Glick, 1998). Differences in thinking are reported to increase the range of vision so that promising options are not missed (Eden & Ackermann, 2010). Such differences are more likely when leadership occurs via large management teams (Amason & Sapienza, 1997), incorporating individuals from different cultural backgrounds (Hitt, Dacin, Tyler, & Park, 1997) and various hierarchical levels (Ireland, Hitt, Bettis, Porras, & Auld, 1987).

On the other hand, researchers also report positive outcomes for management consensus relating to external change. Waiting for consensus to emerge can slow down decision making (Eisenhardt, 1989) but consensus itself has been found to subsequently positively influence the speed of decision making and action (Bourgeois & Eisenhardt, 1988; Dess, 1987; Eisenhardt, 1989). Cognitive consensus is also likely to be helpful when undertaking idea evaluation which is a key task for leaders (Mumford, Marks, Connelly, Zaccaro, & Reiter-Palmon, 2000; Mumford et al., 2003). It is also postulated to be important for shared commitment within management teams (Floyd & Wooldridge, 1992; Markóczy, 2001; Schwenk, 1986) and therefore important for responding to a crisis.

While both cognitive diversity and consensus in managers adopting leadership roles are reported to have positive outcomes for firms, there is relatively less research emphasis placed on investigating these at an individual level rather than the firm level of analysis (see the following for exceptions, Hitt et al., 1997; Hodgkinson & Johnson, 1994; Hodgkinson & Maule, 2002; Ireland et al.,

<sup>2</sup> It is worth noting that much research in this decision making domain has used proxies for cognition such as top management team demographics rather than cognition itself (see Markóczy, 1997).

1987; Lindell, Melin, Gahmberg, Hellqvist, & Melander, 1998; Markóczy, 2001; Porac et al., 1989; Reger & Huff, 1993). We use this individual level of analysis in a single firm to help throw light on leaders' sensemaking over time when dealing with a crisis (Friedrich et al., 2009). While there is limited prior empirical research into individual differences in management cognition within the same firm as they deal with a crisis, longitudinal empirical research on stability and change to individual manager's cognition in this context is even more limited.

#### *Stability and change to mental models under crises*

Researchers agree, but based on rather limited empirical evidence, that the stability of mental models is a problem when managers face environmental change. Empirical evidence for a cognitive explanation for organizational inertia in the face of change has been found in several contexts. Grønhaug and Falkenberg (1989) were amongst the first to investigate changes in strategy when firms experience environmental jolts. The authors attributed the lack of change they found to biased management perceptions of their environments and a lack of competencies in dealing with new conditions.

Other empirical studies have also identified cognitive influences on inertia based on longitudinal documentary evidence (Barr et al., 1992), longitudinal questionnaire evidence (Hodgkinson, 1997) and in-depth cognitive interviews (Reger & Palmer, 1996). These studies highlight disastrous consequences for firms when leaders become locked into mental models that are no longer appropriate for new conditions. This problem is not easily resolved because mental models have been found to change slowly even when environments change rapidly (Reger & Palmer, 1996).

In another study by Lindell et al. (1998), based on longitudinal documentary evidence at an individual decision making level, researchers found that a framework of strong stable beliefs, values and assumptions can prevail in an individual over long periods of time (at least over the three-year term of the study). This stability, the authors suggest, may be based on those beliefs that are likely to be formed early on in managers' careers. However, Lindell et al. (1998) also found continuous mental adaptation, but this was focused on situational factors. Evidence suggests that mental models can change due to experience, but once they have been built up over time they remain stable and difficult to change (Barr et al., 1992).

The study by Markóczy (2001) provides one rare example of more detailed empirical evidence of changes to cognitive consensus over time within individual managers as they grapple with external change. The findings highlight that consensus increases over time during strategic change but the locus of consensus was not found within leaders in the top management team. The findings also suggest that consensus building occurs due to a larger number of individuals that agree, rather than any alteration to the strength of agreement. Such initial findings have led other researchers such as Mumford et al. (2007) to theorize more deeply about leaders' cognition when firms face disruptive change and crises.

#### *Descriptive and prescriptive mental models under crises*

Based on cognitive vision formation theory developed by Mumford and Strange (2002), Mumford et al. (2007) provide a theoretical grounded conceptual model to help explain how leaders address change and resolve crises over time. This model postulates that the onset of a crisis would first force leaders to activate descriptive mental models based on case based prior knowledge and experience as they confront ambiguous and novel problems (Eubanks & Mumford, 2010; Mumford et al., 2007). In other words, leaders would initially use a mental model based on how their world is currently configured and operates to try to make sense of what is happening. As these descriptive mental models are based on prior knowledge and experience individuals will likely produce different interpretations of any external change and its impact on the firm (Mumford et al., 2007). Leaders would then develop a prescriptive mental model over time as the basis of a vision formation process for the future to overcome any crisis (Mumford & Strange, 2002; Mumford et al., 2007; Strange & Mumford, 2005).

Currently, empirical evidence for this theory is rather limited. Strange and Mumford (2002) report a study based on documentary evidence which found that it is indeed the content, in terms of goals and causes, that was key when determining a prescriptive mental model as a basis for vision formation in historical charismatic and ideological leaders. Strange and Mumford (2005) report a further experimental study which confirms the importance of descriptive mental models based on past experience and the abstraction of key goals and causes for vision formation. Both these studies focus on the analysis of visionary statements of leaders rather than their mental models.

Consequently there is an express need, as Strange and Mumford (2005) report, for more direct longitudinal studies focusing on the changes to mental models which underlie leaders' vision formation in crises. Currently, theory implies that leaders near the start of a crisis will draw on different case-based prior knowledge and experience so there is an expectation that considerable cognitive diversity will be present even within leaders within the same firm as they confront a crisis. This insight leads to the following working hypothesis:

**Hypothesis 1.** Near the start of a disruptive external change and subsequent crisis cognitive diversity will be apparent in managers adopting leadership roles.

Cognitive diversity will be demonstrated by differences in objectives, means or strategies to achieve objectives and other causal beliefs represented in the mental models of managers adopting leadership roles within the same firm as they address the same crisis.

Later, as the crisis develops and the impact of the disruptive change becomes clearer, problems are likely to be addressed and start to be resolved. When responding to a crisis, theory suggests that cognitive consensus is likely because managers gradually create

meaning through communication and agree on a prescriptive mental model for the future. Therefore prior research suggests the following working hypothesis:

**Hypothesis 2.** When responding to a crisis cognitive consensus will emerge over time in managers adopting leadership roles.

Cognitive consensus will be demonstrated by increasing similarities in objectives, means or strategies to achieve objectives and other causal beliefs represented in the mental models of managers adopting leadership roles within the same firm as they address the same crisis.

As part of this developing consensus, some leaders are likely to change their mental models more than others. Prior research suggests that this change may be due to a number of factors. For example, leaders may initially apply prior case based knowledge but this knowledge may not help in the current crisis. There is likely to be errors of judgment initially when confronting ambiguous events. These may be resolved by communication with other leaders within the firm and by additional information on important aspects of the disruptive change. Consequently, there is an expectation for the following:

**Hypothesis 3.** When developing cognitive consensus some leaders will change their mental models more than other leaders.

Change to mental models will be demonstrated by changes to objectives, means or strategies to achieve objectives and other causal beliefs represented in the mental models of managers adopting leadership roles within the same firm as they address the same crisis.

These working hypotheses will be investigated and developed in the empirical phase of the research.

## Method

To contribute to the literature on leaders' sensemaking under crises this current study was designed to investigate similarities and differences in beliefs and values at an individual level over time (Bougon, Weick, & Binkhorst, 1977; Markóczy, 1997; Wacker, 1981; Walsh, 1988; Weick, 1979). This research agenda did not allow us to use documentary evidence which has been used as a longitudinal data source in some prior studies (e.g. Barr et al., 1992; Nadkarni & Barr, 2008; Nadkarni & Narayanan, 2007). Documents such as letters to shareholders assume leaders' consensus and do not highlight individual differences in cognition. Instead, multiple data collection techniques were used within single case study method (see Yin, 2014). This method allowed the investigation of different leaders' cognition within the same organizational context, including different responses to the same crisis.

### *The case study firm and context*

The empirical research was conducted within a single not-for-profit organization anonymously named 'Health Change UK' which operates in the health sector in the United Kingdom.

### *Sample*

Cognitive consensus and diversity as well as changes to mental models were investigated within all the leadership teams and included 12 leaders within the organization which has approximately 200 employees. The respondents consisted of all 4 top managers (TM) i.e. all of the top management team including the CEO; 2 trustees (TR) including the chair of trustees and the treasurer who both act as non-executive directors on the board; 6 regional leaders operating at middle management level (MM) within the branch network.

As the purpose of the research is to understand leaders' cognition when facing a crisis, it is essential to provide the detailed research context for the study. Therefore, we start by outlining the crisis that 'Health Change UK' faced in 2011 at the start of this research.

'Health Change UK', and many other similar providers in health services in the U.K., have sourced large amounts of their funding from various government contracts via taxpayers' money. The main government department having overall responsibility for this funding has been the Department of Health within the U.K. Government. A large majority of these contracts were commissioned via the National Health Service Primary Care Trusts (NHS PCTs). For many years contract commissioners' requirements within Trusts have remained stable and specific contracts have rolled over based on the satisfaction of the work. However, due to changes in the external political environment in 2010, the funding and tendering process for these contracts altered significantly based on the plans put forward by a new U.K. Government (Department of Health, 2010).

The new government introduced major changes to public services. The most significant changes related to the proposals to reform the healthcare system. Under the plans, general practitioners (doctors in local surgeries at the front line) would be given much more responsibility for spending the budget. There were also plans to increase competition so the use of the private sector and third (voluntary) sector was to be encouraged. It has been dubbed one of the most radical plans in the history of the health service in the U.K. and has been very controversial.

Many of the current government's policies are argued to be necessary to combat both the economic crisis of the global recession and also to reduce the nation's large budget deficit. In the Comprehensive Spending Review of 2010 it was apparent that efficiency savings would be required from all areas of public funding and also some budgets would face dramatic cuts. As a result of these reforms 'Health Change UK' were facing some very uncertain times as they were not sure how the funding environment was going to change.

However, there was more certainty about one major change that was fundamental for the financial viability of 'Health Change UK'. Commissioners of health services were required to ensure that there was competitive tendering on all contracts and that there was a transparency on the performance of service providers. They were to ensure that the principle of payment by results (money following service performance) was enshrined in future commissioning of health services. Consequently, competition for 'Health Change UK' increased dramatically with much larger organizations competing directly with them on tendering for health services. Some of these larger organizations had significant economies of scale and introduced lower price competition into the health sector which meant that the continued existence of 'Health Change UK' was questioned. It was this threat and the subsequent crisis due to the loss of large contracts that the organization was facing at the start of the research.

#### *Data collection*

To triangulate the data, an interview protocol with different stages was developed to include a variety of data collection techniques to support the investigation of leaders' cognition. For the first phase all 12 interviews were conducted over a two-month period by the same researcher using an identical interview protocol in each case. The same data collection procedure was followed for the second phase of data collection 18 months later. Due to the need to compare leaders' cognition we used sorting technique, common in psychological research (Rosenberg, 1982), as the basis of the standardized procedure for developing cognitive maps outlined by Markóczy and Goldberg (1995). The essence of the technique is that a large identical pool of factors is consistently presented to a variety of respondents for them to sort out which are the most important. This technique is used to standardize the production of cognitive maps which is vital when they are to be compared and contrasted.

#### *Pilot stage and designing the pool of factors*

The pool of factors that represented individuals' beliefs about the organization and its environment were derived from the literature (Buzzell, Gale, & Sultan, 1975; Combe, Rudd, Leeflang, & Greenley, 2012; Hambrick, 1981; Markóczy, 2001; Markóczy & Goldberg, 1995; Miles, 1980; Walsh, 1988) and also adapted through pilot interviews with six employees of the company. This pilot was designed to investigate management cognition at all levels of the organization, so managers representative of different organizational levels were included. The Business Development Manager who regularly attends board meetings represented the views of the top management team as we wanted to include all individuals for this group in the main study. These six individuals were not part of the main study but this small scale evaluation helped test the validity and robustness of the interview protocol and explored different meanings of the factors included in the sorting task.

The main problem highlighted in this pilot study was the terminology used for the factors in the sorting task. They were based on prior research in the profit sector so did not apply completely to the health related not-for-profit case study firm. Therefore, the wording of some factors had to be altered to a more commonly accepted language used in this health sector. As no further modifications were required 54 factors were promoted to be used in the main study. During each interview in the main study all participants were offered the chance to write down any additional factors they believed were important to the success of their organization but no one contributed any further factors.

#### *Interviews using multiple data collection methods*

All the face-to-face interviews with the managers adopting leadership roles included four stages using multiple data collection techniques.

**Stage 1** All interviews were initiated by using sorting technique as a starting point to the development of causal cognitive maps following the standardized procedure outlined by Markóczy and Goldberg (1995). This technique is used to standardize the production of cognitive maps and is also used to reduce interview bias because there is no communication between researcher and respondent during the sorting process (Walsh, 1988). Sorting technique is designed to identify each participant's beliefs about important factors for success so a standard aim is introduced in each interview; that of factors 'important or not important for the success of the organization'.

**Stage 2** After the sorting task each respondent was asked to rank order the ten most important factors for success (rank order 1 for the most important to rank order 10 for the least important) and these ten factors were used to generate cognitive maps in real time during the rest of the interview. This approach was taken, as it is possible to verify the accuracy of the cognitive maps produced by the participants during the interviews and it alleviates the need for any post hoc interpretation by the researcher (see Hodgkinson, Maule, & Bown, 2004). Production of cognitive maps during the interview also ensures that the elicitation task is meaningful to participants (Hodgkinson & Healey, 2008).

**Stage 3** The cognitive mapping procedure was then followed by an in-depth interview to develop a more detailed understanding. Each participant was asked to explain each factor chosen and the links within each cognitive map before laddering was used to investigate antecedents and consequences of a focus on any particular factor (Gutman, 1982; Reynolds & Gutman, 1988).

Additionally, at the end of the interviews for the second phase, participants were presented with their cognitive maps from phase 1. The interviewer then asked the respondents to discuss any similarities and differences over the intervening period. From the 24 interviews (both phases) a total of 157 A4 pages of transcriptions were produced.

Stage 4 Each respondent also completed a questionnaire during the interview process to provide information on their age, gender, job role, location of work, time spent at the company and objectives for the company.

## Analysis and results

To investigate similarities and differences in beliefs within the organization, individual differences between pairs of maps were analyzed (see Markóczy & Goldberg, 1995). This provided a statistical value between individual maps so each participant's cognitive map was individually compared to the other 11 participants. Following Markóczy and Goldberg (1995), if a value of 0 is present then the maps are exactly identical whereas a value of 1 represents a completely different cognitive map. A zero value is nearly impossible because this represents identical causal cognitive maps where all 10 factors and all cause–effect beliefs are the same. It is only evident on the matrix when compared with the participants' own map. The value of 1 can be quite common and occurs several times in the dataset as various participants chose a completely different set of 10 factors to another participant (see Table 1).

### Cognitive diversity

Table 1 presents the data near the start of the crisis. There are considerable differences in the factors chosen by the various leaders to achieve success indicating that their objectives are different as are their strategies or 'means' to achieve their objectives. Of particular interest are the clear differences within the top management team (TM01 – TM04) with high scores for cognitive differences. For example, the difference between TM02 and TM03 is 1 (maximum) indicating that two leaders within a small top team have chosen a completely different set of factors as important for success.

Multidimensional scaling (MDS) was applied to the dataset to provide an initial overview of the whole data. The settings were modified using 'PROXSCAL' with 'Proximities = Dissimilarities', 'Proximity Transformations = Interval' and 'Initial Configuration = Torgerson'. The stress values in our study were found to be quite high ( $S$ -Stress = 0.14) but expected due to the complexities around dimensionality when analyzing this type of dataset (Markóczy & Goldberg, 1995). This technique allowed the data to be presented in two-dimensional space so that the positioning of respondents with respect to each other could be evaluated indicating similarities and differences in their cognitive maps (see Fig. 1).

Fig. 1 indicates wide differences between the cognitive maps of the leaders. Of particular interest is the considerable differences and lack of cognitive consensus within the leadership as a whole and particularly within the top management team and trustees, all of whom sit on the same board of directors. From the laddering interview transcripts it was apparent that at the beginning of the crisis the leaders had divergent perspectives on the disruptive external change and its implications for the organization. Despite there being a general consensus regarding the nature of the change, which had implications for the way the company needed to operate, sensemaking appeared very idiosyncratic. The leaders themselves focused on different aspects of their environments. This focus ranged from concentrating on their competitors as in the case of a member of the top team (TM01) to other aspects such as

**Table 1**  
Matrix for comparing individual's cognitive maps from phase 1.

	TM01	TM02	TM03	TM04	TR01	TR02	MM01	MM02	MM03	MM04	MM05	MM06
TM01	0.000											
TM02	0.971	0.000										
TM03	0.686	1.000	0.000									
TM04	0.784	0.809	0.889	0.000								
TR01	0.705	0.689	0.889	0.587	0.000							
TR02	0.971	0.797	0.814	0.889	0.971	0.000						
MM01	0.971	0.439	0.912	0.805	0.903	1.000	0.000					
MM02	0.515	0.903	0.822	0.705	0.754	0.971	0.971	0.000				
MM03	1.000	0.889	0.898	0.822	0.771	0.784	0.898	0.903	0.000			
MM04	0.903	0.771	0.667	0.907	0.805	0.814	0.784	0.839	0.801	0.000		
MM05	0.903	0.971	0.818	0.780	0.670	0.889	0.805	0.809	0.775	0.780	0.000	
MM06	0.735	0.889	0.814	0.537	0.788	1.000	0.570	0.835	0.889	0.784	0.670	0.000
Average = 0.813												
				TM01–04				TR01–02				MM01–06
Mean				0.856				0.971				0.808
Median				0.849				0.971				0.805
Max				1.000				0.971				0.971
Min				0.686				0.971				0.570
Range				0.314				0.000				0.401
SD				0.119465				#				0.096514

TM – Top manager (member of the Top Management Team).

TR – Trustee (non-executive directors).

MM – Middle manager.

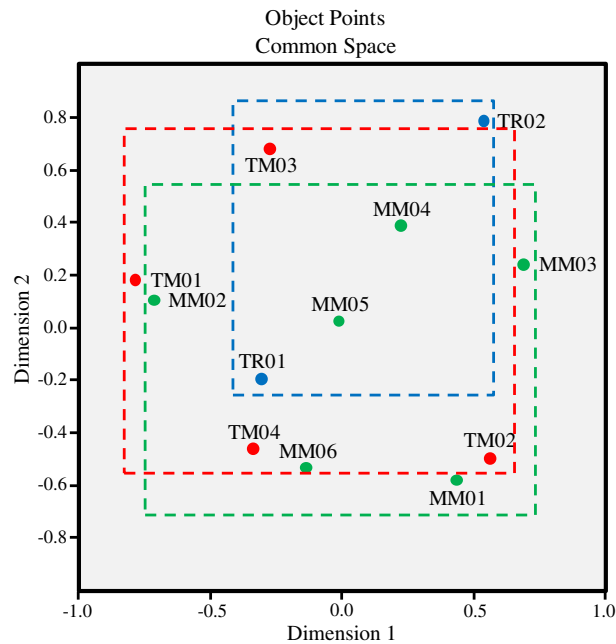


Fig. 1. MDS of comparing the maps of participants in phase 1.

the government, funders (contract commissioners), staff, new markets, strategic alliances, or cost cutting. The following quotations highlighted these contrasting perspectives.

“I think we should look at all our competitors...people that we constantly come up against with tenders and we do need to be looking to see what they're doing and how we can do what they're doing a bit better or more cheaply.” TM01

“I think the change of government has brought about immense changes in the way that government impacts upon services ... they've put in place a framework that determines who will do that and how they will do it...government policy in the current environment is integral to everything we do.” TM02

“If we don't get sufficient funding just to keep the service going, then obviously we can't offer anything...suddenly the external world has hit us...how do we motivate staff so they don't just think that we're pushing them to do targets, targets, targets; actually we're also looking after them.” TM03

“I think trustees sometimes feel very frightened about moving into new areas of work...I understand their reluctance, but for me it feels crucial for us to be able to thrive in a marketplace that's becoming more and more difficult.” TM04

“Sometimes you're going to see benefits in partnering with somebody else, sometimes as senior partner, sometimes as junior partner...it's probably less risky to do that — to recognize your own limitations and to work alongside somebody else.” TR01

“The fact that the world is changing around us all the time. The funding is uncertain...when people are under threat they 'hunker down' and sort of get set in their ways kind of thing, whereas organizationally we have constantly to be ready to change.” TR02

“It's how you then structure an organization, isn't it? If you've got to do cost-cutting, then that has an effect, doesn't it? What do you cut? Is it staffing and how do you deliver that and how does that affect morale for example? And I think that's quite a complex one to deal with really.” MM01

“Last year I've seen so much change...than in the whole of my working profession... the support from head office to translate what funders want is really critical... The way that one communicates really has an effect on whether staff want to go along with what's changing or not.” MM03

In summary, the data indicate that in phase 1 of the interviews considerable cognitive diversity existed in the leadership as a whole and even within each leadership team. Considerable differences were found in the cognitive maps of the leaders highlighting alternative focus of issues of importance as well as different objectives and strategies or means to achieve them. The findings support [Hypothesis 1](#).



*Towards cognitive consensus*

Next, we wanted to assess any changes to individuals' mental models as the crisis progressed. Therefore, we analyzed the cognitive maps based on the factors contained in the cognitive maps and the causal relationships between them during phases 1 and 2. To provide a more detailed analysis, the standard method of calculating in-degrees (or the number of links leading into a factor) and out-degrees (or the number of links leading out of a factor) for all factors in all the cognitive maps was used (see Bougon et al., 1977). Calculating the in-degrees of the different factors helped identify the objectives or end states and also the 'means' or strategies respondents believed the best way to achieve these objectives. Additionally, the frequency of chosen concepts and the accumulated rank order was collated. To keep a simplified scoring system a conventional ordinal ranking model was used (Cook & Kress, 1985) but without any intensity of preference (so 1st = 10pts to 10th = 1 pt).<sup>3</sup> The etiographic representations and accumulated rank order scores for phases 1 and 2 are represented in Table 2.

Table 2 indicates the changes in objectives in the leadership as a whole between phases 1 and 2 of the data collection. The following objectives have become much more important to the leadership as a whole as the crisis has progressed: 'Service quality', 'Motivation of staff', 'Relationships with partners' and 'Innovative services'. 'Service quality' in particular is considerably more important in phase 2 moving from an in-degree score of 43 and a rank order score of 44 in phase 1 to 125 and 90 respectively in phase 2 (see Table 2). These increases indicate that 'Service quality' and its improvement is seen much more widely by the leadership as the most important objective for the organization. This increasing consensus towards a focus on improving service quality and the importance of staff motivation is reflective of trial and error learning based on losing contracts and tendering for new contracts. Considerable change, such as improving the tendering process was required to subsequently resolve the financial crisis. Tendering was improved by collating data on past successes, such as on patient improvement and demonstrating efficiency savings, and quoting this data in new tender documents.

Table 2 also indicates other factors have moved up the agenda in the leadership as a whole such as the factors representing the increased importance on analysis of data such as 'Detailed information/data on customers' and 'Detailed analysis of company finances'. Other factors also increased in importance as the crisis progressed such as 'Developing staff' and 'Employee flexibility' that impact on improving service quality.

The focus on attempting to resolve the organizational crisis following the disruptive change is also evident in other data. In phase 1 only three leaders chose 'Responsibility to commissioners' (the fund holders) as an important factor. However, by phase 2 this stakeholder is discussed much more widely. Additionally, by phase 2, 'Competition' is discussed just as often but it has moved from a dialogue of the unknown to the known with specific competitors named in discussions. A major theme that came out of the in-depth laddering interviews in phase 2 was the increased chaos produced within the organization by losing contracts and the subsequent learning that occurred. In accordance with the sensemaking literature these discussions were framed retrospectively (Weick, 1995). The following quotations from leaders highlight this retrospective sensemaking.

"XXX (Service A – 55% of turnover) was tanking seriously (experiencing significant problems) and...people were really unhappy whereas I think now we've been through the pain of the restructure...losing XXX (Service B – 21% of turnover), losing XXX (Service C – 6% of turnover), big wake up calls for the staff." TM01

"I think that 12 months ago 'Health Change UK' was a different organization. It was slightly myopic and didn't have much of a sense of what its competitors were up to and we lost contracts...I think now we've got a good appreciation of what our competitors do and how they compete." TM02

"I was still feeling the ricochet of the fallout from losing the XXX (Service B) contract actually and we were in a bit of a state of anxiety around that...last year has seen us win new contracts...it's allayed those anxieties." TM03

"In the world that we live in currently with competitive tendering if we're not good value we won't get the tender...if our price differential is too great we won't even get anywhere close...So for me knowing what competitors' prices are and knowing what our prices are is absolutely crucial." TM04

"I think we have learnt that the amount of change that we've got means we need more resource in the sense of in head office, in the sort of senior (top) management group...So where we were previously doing the same thing in lots of different places you could have a fairly light touch management." TR01

"We lost XXX (Service B), we got things wrong in XXX (Service C). We've had to spread our boundaries...a year ago we weren't in XXX (Service D – 2% of turnover), we weren't in XXX (Service E – 4% of turnover), we weren't in XXX (Service F – 19% of turnover)...the committee (board of directors) has certainly become much more aware of it's a new world." TR02

"The sense I've got is we're more aware of, as it were, fragility. I think we're far more in a competitive market. I think that's had a rocky start on various occasions, but we've won some large contracts and lost some large contracts as well. I think we've learnt pretty rapidly." MM01

<sup>3</sup> A simple scoring system allowed the comparison of the highest to lowest ranked factors between phases 1 and 2. A change in the ranking is assumed to indicate a change in the importance of a particular factor as the crisis developed.

**Table 2**

Etiographic representations and accumulated rank order scores for phases 1 and 2.

Phase 1	ID	Rk	Phase 2	ID	Rk
Helping clients achieve 'recovery'	87	52	Service quality	125	90
Target focused	64	38	Helping clients achieve 'recovery'	60	50
Planning ahead	54	26	Motivation of staff	58	55
Service quality	43	44	Relationships with partners	45	40
Relationships with partners	41	28	Innovative services	31	18
Supporting clients with their problems	37	14	Target focused	28	31
Accessibility	36	10	Responsibility to funders/commissioners	27	46
Employee relationships	35	29	Targeting new funders	25	12
Targeting new funders	33	25	Detailed information/data on customers	20	8
Barriers to change within the organization	32	28	Responsibility to trustees	19	12
Motivation of staff	31	34	Measuring customer achievements	17	25
Internal efficiency	26	17	Internal efficiency	17	26
Innovative services	25	19	Response speed to change in customers' needs	17	11
Learning to improve	24	5	Developing staff	17	19
Competitor analysis	23	7	Planning ahead	14	18
Differentiation of services from competitors	22	14	Employee flexibility	13	13
Open communication	21	14	Detailed analysis of company finances	13	12
Measuring customer achievements	19	15	Level of funding	12	20
Shared corporate culture	18	11	Accessibility	11	16
Responsibility to funders/commissioners	15	24	Learning to improve	9	2
Control of service costs	15	20	Building resources for the future	7	5
Company brand image	14	22	Promoting the service	6	10
Price differentiation from competitors	13	20	Employee relationships	6	9
Support from head office	13	15	Knowledge of competitors	4	8
Level of funding	12	26	Knowledge of customers	4	8
Knowledge of customers	9	10	Price differentiation from competitors	4	18
Employee flexibility	8	9	Differentiation of services from competitors	4	6
Building resources for the future	8	14	Supporting clients with their problems	4	3
Personal motivation	8	10	Competitor analysis	4	12
Taking risks in decision making	7	1	Government policy	3	10
Knowledge of internal operations	6	4	Company brand image	3	5
Developing staff	6	15	Shared corporate culture	3	9
Government policy	4	20	Control of service costs	3	7
Cooperation across all departments	4	1	Open communication	2	9
Promoting the service	4	1	Barriers to change within the organization	0	3
Current resources	2	3	Economic conditions	0	7
Detailed information/data on customers	0	8	Taking risks in decision making	0	5
Range of extra services	0	4	Support from head office	0	2
Geographical position of services	0	2	Cooperation across all departments	0	0
Response speed to change in customers' needs	0	1	Current resources	0	0
Detailed analysis of company finances	0	0	Geographical position of services	0	0
Economic conditions	0	0	Knowledge of internal operations	0	0
Knowledge of competitors	0	0	Personal motivation	0	0
Responsibility to trustees	0	0	Range of extra services	0	0

"Learning from mistakes, learning from our losses. XXX (Service B) was the other big thing...this time last year that people were recovering from and then we had the XXX (Service A) change...XXX (Service B), XXX (Service A) and XXX (Service C), that's a huge learning curve in one year." MM03

In summary, the crisis at the organization caused by a reduction in funding and changes to competitive tendering meant that 'Health Change UK' was questioning its financial viability. The commissioners supplying the contracts were seen as increasingly important so the leadership was finding out what was needed to be successful in a new competitive landscape. By phase 2 of the data collection the leadership had learned about its new competitors and had taken steps to improve its service quality. They had also become much more effective at competitive tendering. Consequently, the organization had retained some contracts and added some new ones. The sensemaking and learning that occurred over time resulted in increased cognitive consensus by phase 2.

We used another form of analysis to compare the leadership as a whole over the two phases. The analysis listed in Table 3 demonstrates the number of mapped factors and the number of links between the factors within each cognitive map. Additionally, the link density for mapped nodes shows the number of links divided by the number of mapped factors (see Edén, Ackermann, & Cropper, 1992). Similarly, the absolute link strength density for mapped nodes exhibits the sum of all link strengths divided by the number of mapped factors (see Langfield-Smith & Wirth, 1992). Map Density for Mapped Nodes – The number of links divided by the theoretical number of maximum links between mapped factors (number of mapped factors \* number of mapped factors – 1) (see Hart, 1976). These scores are important to investigate issues such as cognitive complexity and focus within cognitive maps.

Table 3 indicates a reduction in cognitive complexity as cognitive consensus emerged. Of particular significance is the reduction in the number of links between factors important for success and the reduction in link strength. The reduction in these two measures

**Table 3**

Additional analysis comparing the cognitive maps from phase 1 to phase 2.

	Phase 1	Phase 2
Number of mapped factors	40	38
Number of links	274	202
Total link strength	797	553
Total ABS link strength	819	635
Link density for mapped nodes	6.85	5.32
Link strength density for mapped nodes	19.93	14.55
Link ABS strength density for mapped nodes	20.48	16.71
Map density for mapped nodes	0.18	0.14

Note: 'ABS link strength' is absolute link strength ignoring positive and negative in the causal relationships.

suggests that the leadership as a whole became much more focused on fewer cause–effect relationships when managing their organization in the later phase of sensemaking when attempting to resolve the crisis. In this second phase the leaders became less focused on external issues and more focused on internal issues as their response to the crisis took shape.

Additionally, the movement towards cognitive consensus over the course of the crisis is further supported in Table 4.

Table 4 presents the data of comparing the similarities and differences in individual cognitive maps (Markóczy & Goldberg, 1995) 18 months later. While there are still some high scores for cognitive differences there is also some movement to cognitive consensus. For example, the difference between TM02 and TM03 has moved from maximum distance value of 1.00 in phase 1 to a value of 0.541 in phase 2 indicating a considerable movement to cognitive consensus and agreement on some factors for achieving success. In diagrammatic terms the dimensionality (distance ratio) has narrowed in the cognitive maps of the leadership as a whole as can be seen in Fig. 2.

In summary, there was an expectation, but based on limited prior longitudinal cognitive research, that we would find a narrowing in the dimensionality in common space maps indicating more cognitive consensus due to sensemaking over time as the crisis progressed (Figs. 1 and 2 taken together highlight this to an extent). The findings, therefore, support Hypothesis 2 to some extent.

However, while consensus increased slightly in the leadership as a whole, much more consensus was evident within the three leadership teams as the responses to the crisis developed. This finding is contrary to Markóczy (2001) who found that there was no increased consensus within the top management team when studying the development of cognitive consensus within individual firms as they responded to change. We found an increase in the similarities of objectives and strategies (or means) to achieve them as well as other cause–effect beliefs in the cognitive maps of the leaders within each well-defined leadership team. Cognitive diversity was reduced within the top management team, within trustees (non-executive directors) and within middle managers (regional leaders). As our findings run contrary to prior research we discuss the possible explanations for our findings and their implications in the discussion section below.

#### *Changes in cognition from phases 1 and 2 (18 months)*

We have already discussed some of the changes to the cognitive maps of the leaders over time (18 months), such as a movement to cognitive consensus on the main objectives (see Table 2 and discussion). However, we have not compared each complete cognitive

**Table 4**

Matrix for comparing individual's cognitive maps from phase 2.

	TM01	TM02	TM03	TM04	TR01	TR02	MM01	MM02	MM03	MM04	MM05	MM06	
TM01	0.000												
TM02	0.809	0.000											
TM03	0.550	0.541	0.000										
TM04	0.903	0.731	0.593	0.000									
TR01	0.678	0.792	0.678	0.898	0.000								
TR02	0.792	0.971	0.797	0.917	0.667	0.000							
MM01	0.797	0.716	0.716	0.580	0.912	0.917	0.000						
MM02	0.784	0.497	0.560	0.477	0.912	0.917	0.583	0.000					
MM03	0.907	0.705	0.797	0.898	0.907	0.826	0.674	0.587	0.000				
MM04	0.797	0.689	0.792	0.712	0.898	0.814	0.797	0.670	0.670	0.000			
MM05	0.898	0.577	0.419	0.814	0.889	0.670	0.797	0.424	0.570	0.655	0.000		
MM06	0.971	0.809	0.822	0.630	0.889	0.689	0.652	0.465	0.678	0.801	0.678	0.000	
Average =	0.726												
				TM01–04				TR01–02				MM01–06	
Mean				0.688				0.667				0.647	
Median				0.662				0.667				0.670	
Max				0.903				0.667				0.801	
Min				0.541				0.667				0.424	
Range				0.362				0.000				0.376	
SD				0.149938				#				0.10972	

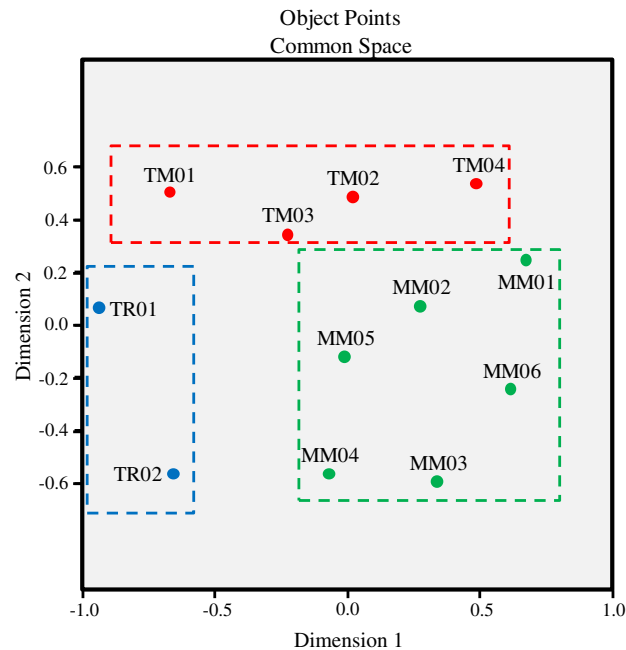


Fig. 2. MDS of comparing the maps of participants in phase 2.

map for the leaders from phases 1 and 2. Table 5 provides the values for each individual's map when each map is compared between phase 1 and phase 2 using the same MDS technique.

The data indicate that large changes have occurred to the cognitive maps of nearly all the leaders in the organization. Only two middle managers (regional leaders MM01 and MM05) show low scores for cognitive differences and therefore only the cognitive maps of these two leaders were relatively stable between phases 1 and 2. The findings, therefore, support Hypothesis 3.

## Discussion

Before outlining the conclusions and discussing the possible fruitful areas for future research arising from the present study we first discuss the limitations.

The findings are based on a single in-depth case study when leaders confront a single crisis. Therefore, the study offers little in the way of generalization. A limitation of case study research is that it allows the findings to be used for theory building or discussed in relation to theory only (analytical generalization). This limitation, however, is balanced by the advantage that case study method can provide a deep understanding of leaders' cognition under crisis in a naturalistic setting. As the context is so important for understanding leaders' cognition under crises we feel that case study research has a lot to offer this emerging domain.

The use of causal cognitive mapping is a technique with known limitations. Hodgkinson and Sparrow (2002), for example, report that the type of errors to be expected is related to the technique used to generate the maps. The hand drawn mapping technique used in this study as a modification to the standard method outlined by Markóczy and Goldberg (1995) has advantages and limitations. The main advantage is that the respondents draw the maps themselves in real time which is likely to be more accurate than post hoc drawing by the researcher. The main limitation is that the hand drawn method puts particular demands on the respondents' recall memory and is therefore likely to provide some inaccuracies in the representation of individuals' beliefs.

It is difficult to determine whether all the changes to cognitive maps represent learning how to respond to the crisis as the basis of vision formation or whether changes to maps highlight initial errors of judgment. We suggest that future research could tackle this issue by additional data collection using an experimental research phase. Experimental research methods are well developed in management cognition research and these methods could be used in conjunction with the data collection techniques used in this study, such as cognitive mapping, to explore the influence of errors in more detail.

Limited changes to cognitive maps could highlight a time delay which is a form of error identified as contributing to inertia in prior research (Barr et al., 1992). The longitudinal research reported in this current study included two phases of data collection separated by 18 months. There are some advantages to this research design, such as allowing enough time for changes to take place but without

Table 5

Comparison of individual's change in cognitive maps from phase 1 to phase 2.

TM01	TM02	TM03	TM04	TR01	TR02	MM01	MM02	MM03	MM04	MM05	MM06
0.889	0.659	0.686	0.553	0.788	0.889	0.376	0.597	0.674	0.693	0.328	0.550

experiencing a significant number of respondents leaving the organization. However, we note that further data collection phases would have been beneficial. Our findings point to the slow development in cognitive consensus towards a prescriptive mental model for the future. Therefore, additional data collection phases would likely have contributed to additional insights into this slow development. We note that additional phases of data collection could also have contributed to further understanding of how much cognitive consensus is likely within the leadership as a whole when responding to a crisis.

We did not focus on the communication of vision in statements from leaders to followers. Analysis of documentary evidence and attending staff meetings, in conjunction with cognitive mapping of both leaders and followers, may help in understanding the articulation of a prescriptive mental model for the future in more detail. Currently, we do not know how many of the 'new' objectives and cause-effect beliefs were articulated to followers and in what form. Given the cognitive diversity between the leadership as a whole, perhaps the CEO articulated a single vision based on one way forward (their own) to resolve the crisis, or possibly delayed articulation due to this lack of consensus. Modifying the research design to include additional data would help clarify the links between leaders' mental models and the articulation of a vision to resolve a crisis.

When considering the main contributions emerging from our empirical study we highlight the following. First, prior longitudinal research on leaders' cognition largely assumes consensus because evidence is drawn from organizational level documentary evidence (e.g. Barr et al., 1992). This approach has several weaknesses. It underplays the importance of sensemaking in individuals and ignores individual differences that can occur within teams of leaders. An understanding of cognitive diversity and consensus within the leadership is important for a deep understanding of organizational responses to disruptive change and crises. Given the findings, assuming consensus in leaders within firms may be regarded as an assumption too far.

Second, the findings point to less cognitive diversity and more cognitive consensus within leaders as sensemaking occurs over time. Evidence for an emerging viable prescriptive mental model for the future was found but in a way not expected from a review of prior theory (Mumford et al., 2007) or empirical findings (Markóczy, 2001). Cognitive consensus occurred within well-defined leadership teams much more than within the leadership as a whole. The findings point to emerging cognitive sub-cultures of leadership when facing a crisis based on converging beliefs within leadership teams but different beliefs between leadership teams even in a single organization. The findings therefore lead to an additional hypothesis to be investigated by further research:

**Hypothesis 2a.** When responding to a crisis, cognitive consensus around a viable prescriptive mental model for the future will initially emerge within well-defined leadership teams.

Third, we contribute data and analysis to compare with the theoretically grounded conceptual model presented by Mumford et al. (2007) for investigating leaders' cognition under conditions of organizational crisis and change. Our data did not attempt to test or address the complete conceptual model but the data allows some theoretical generalization by comparing our data with theory. Our findings focus on two parts of the conceptual model only; the activation of descriptive mental models and the development of a viable prescriptive mental model for the future.

When we compare our findings to the conceptual model presented by Mumford et al. (2007) of particular significance is the considerable cognitive diversity within leaders as a whole when developing a viable prescriptive mental model for the future. Given the time lapse since the crisis first became apparent (well over 2 years before phase 2 of data collection) there were still considerable differences in beliefs in how to achieve success within the new competitive landscape. Considering that a number of successful changes had been implemented to deal with the crisis before stage 2 of the data collection, we find this lack of consensus surprising. The data implies that consensus over a viable prescriptive mental model occurs initially within teams of leaders but is problematic between teams and there is little cognitive consensus when considering the leadership as a whole. Another possible explanation for our findings is that our data needs to take an even longer-term perspective on the development of a prescriptive mental model within the leadership as a whole.

When comparing the data with the discussion of the conceptual model presented by Mumford et al. (2007), we confirm the importance of experiential and tacit knowledge to problem solving when making sense of new conditions and the development of a viable prescriptive mental model for the future. Of particular importance to the leaders in our case study organization was learning about new competitors, and the services they were offering, as well as the new reality of competitive tendering. Learning how contract commissioners (fund holders) evaluated tenders in respect to competitors was key to this latter issue. Experiential knowledge, based on both successes and failures in tendering for contracts, led to an improved tendering process. These improvements enabled the organization to obtain more new contracts and become more financially viable. An improved success rate in competitive tendering resulted in four new contracts equating to 30.8% of turnover following the original contract losses of 27.2% of turnover.

Fourth, the findings also confirm that it was not the identification of the crisis or change that was problematic for the leaders but learning how to operate through trial and error in a new competitive landscape (see Barr et al., 1992). The two important issues of note are the increased significance of service quality and the importance of staff motivation. The focus on these two issues is consistent with some of the problems faced by the organization as a result of increased low price competition after government changes. The organization had to improve its service delivery to justify its higher prices.

Fifth, the findings also confirm that studying the locus of consensus is particularly important when understanding sensemaking and an organizational response to change (Markóczy, 2001). Consensus is particularly important in leadership teams (Yammarino, Mumford, Connelly, & Dionne, 2010). In contrast to Markóczy (2001), however, we found emerging consensus in all leadership teams within the organization as the response to the crisis developed. This finding can be explained by the focus on a specific crisis in the current study. Markóczy (2001) found consensus within a specific interest group that benefited from change, but when in crisis the implications for any specific interest group is likely to be unclear. When responding to more benign and gradual change, an

interest group is more likely to develop because they can see the benefits of change more clearly and this might explain the different findings in this case.

To add to deeper understanding future research should analyze the interaction within leadership teams to help understand more fully how cognitive consensus is formed. Interaction within the leadership teams as well as with external stakeholders could influence individuals to change their mental models. Communication between team members, both formally and informally, is likely to facilitate cross understanding and this is a possible explanation for our findings (see Huber & Lewis, 2010). We did not investigate communication between leaders and the influence of dominant leaders on others so this may be a fruitful field of research for the future.

Further studies could also look into the role of followers (other employees) in this context because of the differences found between leadership teams. It would be interesting to see if followers recognized the differences in the mental models within different leadership teams as this may influence how they responded. Given our findings, an interesting question to investigate would be: did followers agree with the analysis and future objectives put forward to resolve the crisis by one leadership team more than another?

Another possible fruitful field of research is into the influence of emerging consensus on individual performance, team performance, and/or organizational performance. This research option is particularly important due to the cognitive differences found within individuals and leadership teams in our study.

Finally, future research could be directed at the antecedents to any change and lack of change in the mental models of leaders as they respond to a crisis. Mumford and Strange (2002) and Strange and Mumford (2002) suggest an explanation for a lack of change to mental models based on the style of leadership. Ideological leaders may be more likely to be consistent in their thinking even when responding to a crisis so future research could explore this possible effect.

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