RESPONDING TO WEAK SIGNALS:
THE EMERGENCE OF ADAPTIVE DYANMIC CAPABILITIES FOR STRATEGIC RENEWAL

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Emergent adaptive capabilities: An empirical investigation of capabilities from crisis

"...the evolution of capabilities must be investigated as a separate empirical undertaking."
(Helfat & Peteraf, 2003: 1009)

Discontinuous environmental changes that are inconsistent with firms' dominant logics can create crises for firms. How do firms adapt in order to renew themselves strategically? Using two longitudinal case studies, we identify the emergence of adaptive dynamic capabilities under conditions of discontinuous change and show how those adaptive capabilities are transformed to allow firms to respond to weaker environmental signals. We discuss the implications of our findings for managers, and for theory and research on dynamic capabilities.

Responding to weak signals: An empirical investigation of emergent adaptive capabilities

Organizations increasingly must deal with discontinuous, complex and unpredictable change. How can firms learn to adapt to dramatic changes in the environment? How can firms learn to respond to weaker signals, thereby avoiding damage to the firm and developing better solutions? We contend that learning to respond to weak signals of environmental changes constitutes the development of dynamic capabilities for environmental adaptation, or what we call simply, *adaptive capabilities*. Adaptive capabilities can help to trigger and guide strategic renewal processes.

   We outline key elements that led to the learning, and emergence of adaptive capabilities. Driving the research is our sympathy with Simon's (1997) prescription to have, "…empirical regularities and observations of real organizations drive research, both in terms of explaining phenomenon and causal mechanisms" (Jacobides, 2006: 153). Using examples from two fine-grained, longitudinal research projects, we describe the process of strategic adaptation.

   Much work remains to be done on the concept of capabilities in general and dynamic capabilities in particular (Helfat, 2000; Bowman & Ambrosini, 2003). A key area of interest that remains understudied is an exploration of the evolution of capabilities (Helfat & Peteraf, 2003). "The question of how firms organize to achieve dynamic fit with these [high velocity, rapidly changing] environments merits further research attention," (Rindova & Kotha, 2001: 1264). Our data suggest that capabilities can emerge in times of organizational crisis as an adaptation mechanism in a rapidly changing environment. Understanding emerging dynamic capabilities and their development has both theoretical and managerial implications.

CAPABILITIES AND ENVIRONMENTAL CHANGE

We review the literature in two parts. First we describe research on strategy failures resulting from a failure to adapt to environmental change. Then we review the literature on capabilities in the context of environmental turbulence.

Adaptation Failures in Changing Environments

The idea that firms must be aligned with their environments has long been a dominant assumption of organizational theorists and strategists. Contingency theory, the structure-conduct-performance paradigm, institutional theory, population ecology, and the resource-based view all rely on some notion of fit. Firms that are out of alignment are expected to experience performance decrements, assessments of illegitimacy, and pressures for conformity. With severe misalignments, crisis can be the result. Yet noticing and interpreting changes in the environment is problematic for managers.

   Managers make sense of their environments via dominant logics (Prahalad & Bettis, 1986), interpretive frames (Greenwood & Hinings, 1996) or knowledge structures (Walsh, 1995), which consist of taken for granted beliefs, values, norms and scripts which guide their behavior. These knowledge structures create strategic blindness among organization members (Ansoff, 1977; Walsh, 1995). Bettis and Prahalad (1995: 7) claim that "organizational attention is focused only on data deemed relevant by the dominant logic. Other data are largely ignored". Similarly, Ansoff (1977: 56) notes that,

> Typically only historically familiar raw data find their way into the interpreted consequences. Reports on unfamiliar discontinuities, if they find their way into the firm, remain in raw form, because the methods and approaches for converting them into action typically do not exist.

Ansoff suggests that managers use environmental information only to confirm their prior models of reality, not change them. Fahey and Narayanan (1989) find little interconnectedness between changes in the macro environment and changes in the cognitive maps of managers' knowledge structures, and Klepper and Simons (2000) suggest that firms face great difficulty trying to change in fundamental ways from their industry entry experiences.

In a typical firm's environment, therefore, industry norms and relationships with other organizations serve to reinforce managers' knowledge structures, as do organizational capabilities, which may be embedded in rules and routines, structures, and management systems. When environmental stimuli come from outside of normal channels and interrelationships, and when these stimuli feature content that is inconsistent with the firm's dominant logic, managers are often unable to interpret them.   If critics of the firm express disapproval of the firm which is based in different value systems or which depends on different knowledge structures, the critics themselves appear illegitimate and the criticism they level appears unfounded, misinformed or exaggerated. Should critics hold sufficient power, the organization can face performance or even survival challenges if it does not adapt. Yet unlearning must occur before new ideas can be absorbed (Bettis & Prahalad, 1995). Sometimes firms' operational capabilities − developed over time and which have historically served the organization well − represent a barrier to change, and might need to be unlearned (Leonard-Barton, 1992). Further, Gilbert (2006) demonstrates that high levels of perceived threat amplify routine rigidity. These arguments suggest that under conditions of discontinuous change, organizations need different capabilities.

Organizational Capabilities

Organizational capabilities have recently received considerable attention in the literature. Their importance is directly linked to the continuing interest and development of the resource-based view (RBV) as a way to understand, conceptualize and implement competitive strategies. Capabilities are complementary to, or a subset of, the RBV. Williamson (1991) suggests that individually or together, RBV and capabilities are the leading approaches to strategy. Capabilities may be the key to the development of a dynamic resource-based view of the firm (Helfat & Peteraf, 2003).

Operational Capabilities. It is important to differentiate between 'operational' capabilities and 'dynamic' capabilities (Zahra & George, 2002). Firms compete in their markets via operational capabilities embedded in their value chains. Operational capabilities are high-level routines (Winter, 2000), "coordinated sets of tasks" (Helfat & Peteraf, 2003: 999) or firm-specific processes, that are used to deploy resources to achieve firm goals (Amit & Schoemaker, 1993; Makadok, 2001). Operational capabilities enhance the value generating potential of the firm's resources (Makadok, 2001). They allow firms to create new products and processes, and to respond to changing market circumstances (Teece & Pisano, 1994). Capabilities become 'institutionalized' in firms (Leonard-Barton, 1992: 123):

> Because core capabilities are a collection of knowledge sets, they are distributed and are being constantly enhanced from multiple sources….They are not easy to

change because they include a pervasive dimension of values, and as Weick (1979: 151) points out, 'managers unwittingly collude' to avoid actions that challenge accepted modes of behaviour.

Indeed, existing knowledge may be disadvantageous to organizations if managers over-generalize from past experience (Argote, 1999; Eisenhardt & Martin, 2000). Core capabilities can become core rigidities in the face of changing environments. In other words, operational capabilities are organizationally embedded processes that are used to enhance the productivity of other resources, but that can become dysfunctional in changing environments.

Dynamic Capabilities. Like operational capabilities, dynamic capabilities are organizationally embedded, non-transferable processes (Makadok, 2001). Lavie (2006) defines dynamic capabilities as, "capacity to modify existing capabilities." Managers use them to "build, integrate, or reconfigure operational capabilities" (Helfat & Peteraf, 2003: 999), in order to address rapidly changing environments (Teece et al., 1997). Similarly, Eisenhardt and Martin (2000) describe dynamic capabilities as the organizational and strategic routines by which firms achieve new resource configurations in high velocity markets. "High velocity markets are ones in which market boundaries are blurred, successful business models are unclear, and market players (i.e., buyers, suppliers, competitors, complementors) are ambiguous and shifting" (Eisenhardt & Martin, 2000: 1111).

Zollo and Winter (2002) suggest that dynamic capabilities consist of routines (like operational capabilities), that provide a systematic way of changing operational capabilities. Helfat and Peteraf (2003), similarly, suggest that both operational and dynamic capabilities consist of routines; those to perform tasks, and those to coordinate tasks. These capabilities enable organizations to perform consistently and reliably (Helfat & Peteraf, 2003). Given that capabilities can become dysfunctional, dynamic capabilities may be as likely as operational capabilities to lead to core rigidities. Winter (2003: 992) argues that "there is broad consensus in the literature that 'dynamic capabilities' contrast with operational capabilities by being concerned with change."

Eisenhardt and Martin (2000) contend that dynamic capabilities consist of relatively simple routines that enable the development of new, situation-specific knowledge. The simple routines provide enough structure to enable managers to make sense of a large volume of stimuli. They involve "engaging in experiential actions to learn quickly," the use of "prototyping and early testing," and fast iteration through trial and error processes to gain immediate feedback on changing conditions (Eisenhardt & Martin, 2000: 1112). "Dynamic capabilities also rely more on real-time information, cross-functional relationships and intensive communication among those involved in the process and with the external market" (ibid.). Managers can adjust quickly to changing circumstances because they are collecting real-time information and responding to it immediately, thereby building their own intuition (Eisenhardt, 1989) to enable even faster adaptation.

The literature on dynamic capabilities tends to gloss over the issue of whether dynamic capabilities should be defined solely within the context of dynamic environments, or whether they function for change regardless of the degree of dynamism (Zahra *et al.*, 2006). While Teece's et al., (1997) definition requires rapidly changing environments, Zollo and Winter (2002) suggest that environmental change is not required. We recognize, given the emerging definition of the concept (see Table 1 for a comparison of definitions), that dynamic capabilities can exist in other environments too. Examples of dynamic capabilities include product

development processes (Winter, 2003), team building processes (Dougherty, 1992),and the redeployment of assets (Capron, Dussauge & Mitchell, 1998).

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While a number of studies have investigated dynamic capabilities, we know little about their emergence. Montealegre (2002) has made one of the few attempts to generate a process model of dynamic capability development. However, in the case of Bolsa de Valores de Guayaquil, managers had the luxury of time, and capabilities evolved gradually to orchestrate and leverage resources already held (Montealegre, 2002), which is more indicative of dynamic capability evolution. Rindova and Kotha's (2001) study suggests a transformative process. Empirical studies of the emergence of dynamic capabilities address a significant gap in the literature.

Research Questions

An especially problematic context for adaptation is a situation where firms have been in relatively stable environments for long periods, and then are faced with significant environmental change. Core capabilities are likely to become core rigidities very quickly, and firms' dominant logics tend to prevent successful adaptation by screening out stimuli as irrelevant or incorrect, especially if the stimuli are seen as threatening (Gilbert, 2006). Managers tend to adhere rigidly to past models under conditions of threat (Staw, Sandelands & Dutton, 1981), until crisis forces business failure or radical change. In such a situation, how can a firm adapt? Can new or different dynamic capabilities emerge?

The companies in our studies faced precisely this situation. MacMillan Bloedel, in the forest industry, and Syncrude, in the synthetic crude oil industry, were both well established firms in environments which had been stable for many years. Suddenly, criticism emerged, from social and environmental stakeholders, that was nearly incomprehensible to managers. In both cases, the firms faced crisis situations. By learning and re-applying learning, both firms were able to avoid future crises and develop new capabilities to respond to social and environmental issues.

Data and Methods

Precisely because we are exploring phenomena that are not well understood in the literature, we rely on the logic of inductive inquiry (Glaser & Strauss, 1967; Rindova & Taylor, 2001). The organizational embeddedness of capabilities suggests that any exploration of capabilities should be empirical and organizational (Eisenhardt & Martin, 2000). We conducted two longitudinal case studies. Both projects were conducted independently, in different industries, and both featured qualitative analysis of multiple sources and types of data which enabled us to triangulate data within each study and to gain multiple comparative vantage points on the phenomena of interest (see Appendix 1: Data Sources). Cross-case analysis revealed substantial similarities with potentially broad applications.

Data

MacMillan Bloedel Case. Data consisted of interviews, field research, organizational documents, and media reports. Sixty-nine interviews of approximately 90 minutes each were conducted with multiple members of the organizational field in three waves: 1996, 1999/2000, and 2004. Field research involved attendance at 45 presentations, meetings and public events. Company and stakeholder documents were analyzed along with websites, texts of speeches, books, and over 5000 newspaper articles published between 1985 and 2004.

Syncrude Case. Data were collected using interviews, focus groups, participant observation, and archival sources. The first informal discussions with Alberta's Energy and Utilities Board (EUB) began in 1993 (shortly after Syncrude (SC) filed its application with the EUB to amend its license for the Mildred Lake Oil Sands operation) and with SC in 1993 and 1994. Formal interviews, focus groups and participant observation with the company, regulators and the community, were done in two waves; autumn and winter 1995 and in the summer and autumn 1996. Transcripts from the 1993 environmental public hearings represented the bulk of the data by volume (6,088 pages). Interviews (sixty hours) accounted for the second largest volume of data and were invaluable in terms of generating interpretations for understanding organizational dynamics and the hearings (and what went on behind the scenes).

Analysis

For each case, chronological narratives were constructed from the raw data. Using a grounded theory and interpretive approach, data were analyzed for changes in the character of field members' actions, responses and interpretations, along with their causes and effects. We used computer assisted qualitative data analysis to subject large amounts of data to detailed ethnographic analysis. We attended to processes using narratives, visual mapping, and grounded theorizing (Langley, 1999; Miles & Huberman, 1994).

We then engaged in cross-case analysis. Upon sharing the narratives of each study, we were struck by the common process by which both fimrs overcame a failure in strategizing, and learned new adaptive capabilities through emergent processes. We revisited our case studies separately, and concentrated on the following aspects as an empirical starting point for comparability: 1) initial signals of environmental change; 2) early responses by the firm to these signals; 3) the results of the firm's early responses: reactions of external actors and the effects of those reactions on the firm; 4) the firm's learning process in identifying new ways to respond; 5) the firm's subsequent responses, illustrating new understandings and using new capabilities. We compared each firm's experience in each aspect, then used a visual mapping strategy (Langley, 1999) to construct models that described the general processes involved in each. Visual mapping is a useful technique for the analysis of processes because it allows for the presentation of the patterns and ordering of processes and events over time (Miles & Huberman, 1994). We then went back to the individual cases to document commonalities and differences across the key components of the model, and to refine and abstract the model. We used our narratives to understand the underlying forces driving the activity sequences we identified.

RESULTS

We present the results from each case separately and then compare the two cases on the key aspects we identified for the cross-case analysis. We show evidence of each firm's learning of new capabilities, and the firm's subsequent reapplication of these capabilities in other situations requiring adaptation. We identify and define adaptive capabilities. We then present the models we use to describe the evolution of adaptive capabilities in our two cases.

The MacMillan Bloedel Case

MacMillan Bloedel (MB), the oldest and most respected forest company operating in British Columbia (BC) in the 1980s, was the chief target of sharp criticism from environmentalists regarding its practice of clear cutting forests which involves cutting all of the trees from an area. Environmental groups called it "forest rape." They claimed it destroyed eco-systems, reduced bio-diversity, led to erosion of soil into streambeds, and threatened fish and animal species. Forest companies claimed clear cutting was the only safe and economical way to log, and that clear cutting was akin to harvesting wheat; trees were replanted and the land was managed as a farm. On the BC coast, clear cutting was used for 95-97% of the logging done by all forest companies in the 1980s and early 1990s. First Nations groups (First Nations is the collective term used by the aboriginal peoples of Canada to refer to themselves) were also concerned about the logging done by forest companies on the land on which they had unresolved land claims (logging would diminish its value), and environmentalists and First Nations co-operated against logging.

Early Signals and Responses. In the early 1980s, environmentalists began protesting at logging sites, and blockading logging roads. Initially, MB ignored these acts, but then obtained court injunctions and had protesters arrested. MB managers dismissed the environmentalists as being "loose with the facts", uninformed of the science, and fringe radicals who broke the law. At the same time, First Nations sought the preservation of Meares Island as a sacred site. The government formed a stakeholder planning team, from which MB withdrew after a few months. Subsequently, the First Nations supported by environmentalists took MB and the government to court to prevent the logging of Meares Island. MB fought the lawsuit to the Supreme Court, but lost in 1985. Then, another First Nations group and environmentalists went to the federal government to ask for the preservation of South Moresby Island. The Canadian government pressured BC to create a public park in 1987, which it did.

These initial signals were ignored and dismissed, until they had a material impact on MB's operations. The company became more tactical in its responses to the problem, stepping up its logging plans in areas that were likely to be contentious (e.g., log an area before protest campaigns picked up steam). When there was protest, MB took environmentalists to court for trespassing, then offered a token reserve as a park. The public was outraged. MB began a public relations campaign downplaying the validity of environmentalists' claims. Furthermore, MB stimulated the formation of an industry association and a 'grass-roots' group of forest workers and community members with a pro-logging agenda, both designed to fight environmentalists' and First Nations' campaigns.

*"Our inclination was to fight. Managers ... took the position that we were doing better than anyone else in the world, and that we didn't do anything wrong. **And we didn't do anything wrong**"* (Former MB Executive).

MB's responses were consistent with its dominant logic. Executives interpreted environmental protection demands in economic terms, failing to understand the deeply held values of others.

"Too many single interest groups are demanding too much from the forest resource. What is wrong and what disturbs me and what has built up unbearable pressure on MB is the relentless hot pursuit of each interest group of a bigger portion of the pie" (MB CEO at the 1985 Annual General Meeting).

MB also had a standard response to infringements on the company's "rights": legal action. Executives said:

"The prevailing thought in the company was that we had the legal rights to tenure and any diminishment of timber-driven economics for the sake of non-timber values or assets was against the interest of the people in B.C. because of the diminishing ability to create wealth."

"We took a very legalistic approach, fought like hell."

Furthermore, the criticism of clear cutting was incomprehensible to managers because it was heavily entrenched in the dominant logic.

"We never really questioned the whole theory of clear cut. We had a belief that we knew the business and we knew the world, therefore we couldn't be wrong with our belief."

Reactions to MB's Responses and Stronger Signals. The public relations strategies failed to convince the public. Polls indicated public distrust MB. Criticism broadened and deepened among stakeholder groups in BC and internationally, impacting bottom line results and access to timber supply and markets. An environmentally-friendly government was elected in 1991, aligned with public support for the environmentalists. A rash of new parks was created and logging regulations and enforcement were toughened. Over 700 protesters were arrested in Clayoquot Sound in 1993, and by 1994, some of MB's customers began announcing that they would stop buying MB's clear cut wood.

Failure of Strategizing. These stronger signals had substantial implications for MB's performance; executives understood that their strategies had failed. In 1996, senior managers reflected:

"No one, industry or government, expected [Clayoquot Sound] to become the international icon that it did." "Suddenly we found that we weren't in Kansas anymore." "We've learned the hard way that the technical, scientific, factual and economic answers don't represent the full equation any more..."

Managers did not have, however, an understanding of how to respond more effectively.

Organizing for Learning. A new Vice-President, Environment, was hired externally to respond to the problem in 1994. At her urging, a novel approach was initiated. Company officials met with environmental group leaders and First Nations' representatives from 1994-1996 to gain a thorough understanding of their perspectives and to negotiate possible solutions. Through this bridging structure, MB managers learned and internalized their critics' perspectives. This learning enabled new strategizing and new forms of organizing that were more socially and environmentally acceptable.

Subsequent Responses. Strategies were revisited when weak signals of failure were later observed. Managers were more sensitive to signals. For example, when environmentalists complained that logging should not take place at Sulfur Creek in 1996, MB managers immediately redirected their operations away from there. When logging in Clayoquot Sound became unfeasible economically under new environmental requirements, MB formed a sustainable forestry joint venture with First Nations in 1997. Greenpeace helped to market the

wood at premium prices. This experimental venture enabled MB to test operational and marketing strategies for sustainable forestry.

At several stages, MB managers returned to stakeholders to develop and test new strategies. In 1998, MB announced it would completely phase out clear cut logging. The company instituted an advisory board to monitor and advise on its social and environmental practices. MB applied the same approach to its employee and union relations, which improved dramatically from 1998 to 1999. Managers and union members worked together to identify innovative approaches to avoid a plant shutdown and to provide training for employees who also provided input to the CEO in an employee council. In 1999, MB managers took their new adaptive capabilities to other forest companies, actively encouraging them and other stakeholders to become involved in joint research and solution-seeking in what became known as the Joint Solutions Initiative. Though MB was sold to Weyerhaueser in 1999, the firm's adaptive capability became firmly established in the firm and the field, leading to the agreement of all parties to the adoption of eco-system based management in 2003 and 2004, (approved by government in 2006).

The Syncrude Case
Syncrude operates a large scale oil-sand mine, bitumen extraction plant, and an upgrading facility that processes bitumen extracted from the oil sands into light crude oil. The key issues for many stakeholders were environmental impacts of the mining and extraction/upgrading processes – toxic tailings, air emissions, land reclamation and end-land use. In the 1980s when the oils sands 'experiment' was ramping up to larger scale production, environmental impacts were identified by SC and regulators, and requirements were placed into licensing permits, including the requirement to engage in public consultation with stakeholders. Licenses were open to challenge upon expiration or amendment. When a licensing application was strongly contested, the regulatory body could order a public hearing.

Early Signals and Responses. In the early 1990s environmental groups and First Nations signaled their unease with SC's plans (formalized in their 1993 EUB application) to increase production. Environmentalists and First Nations were especially concerned with issues related to the remediation of toxic tailings but also end land use, air emissions and impacts on flora and fauna. During the public consultation process stakeholder groups (called "interveners" by regulatory agencies) perceived that the company was merely "going through the motions" and not addressing concerns. SC seemed to believe that, at a public hearing, science would win out over the "uninformed, confusing and irrelevant" demands of hostile interveners. They thought that science (the dominant paradigm of its engineering culture) would "win the day". Local environmental groups linked up with national and international environmental groups (ENGOs). Interveners sensed SC's desire to get to public hearings quickly and attempted to delay the start of those hearings in order to prepare a better "fight" against the company. The public became involved when newspapers began to pick up the story with emotive headlines such as "lakes of death." This referred to the toxic tailings ponds, some of which were 22 square kilometers in size. The tailings ponds were toxic to living organisms and were stored behind dykes in artificial ponds. There was not yet a clear remediation strategy. Toxic tailings remediation became a key issue.

SC's response to the involvement of ENGOs was to recognize as 'legitimate' only those stakeholders who were directly affected by its operations, ignoring others. They become focused on their strategy of getting to public hearings as quickly as possible where they were sure the science would win. A public hearing was called.

Reactions to Syncrude's Responses and Stronger Signals. As soon as the 1993 public hearings started, interveners petitioned to have the hearings postponed. Cross-examinations of SC's managers and specialists were extensive and highly detailed. SC's lawyers responded in kind with detailed and aggressive cross-examinations of stakeholder witnesses. Relationships between SC and interveners (especially First Nations) worsened. The hearings became confrontational and adversarial. SC believed that First Nations were trying to blackmail them for economic benefits and were purposely dragging out the hearings. First Nations and other interveners believed that they were "being sold a bill of goods": that SC was trying to push through their application without meaningful consultation, exchange and compromise.

Failure of Strategizing. These stronger signals (lengthening proceedings, worsening of relations with key stakeholders) increasingly made it clear during that SC's application might be refused. This came as a shock to management who suddenly realized that their assumptions about dealing with stakeholders had been ill-informed and dysfunctional. Their strategy had failed and the hearings had cost the company an estimated 1.5 million dollars (Newell, 1999) with the real possibility of a negative outcome.

Management desperately sought a solution and resolved the immediate crisis with agreement (initiated by First Nations and negotiated face to face behind closed doors "without the lawyers present") to a sincere, meaningful, consultation process to address First Nations', and environmentalists' concerns. What the company learned as a result of that 'backroom' meeting was, in the words of one manager, "the value of trust and commitment underpinned by closer relations with stakeholders." SC next had to learn how to deliver on their commitments.

Organizing for Learning. SC restructured their management and communication processes for dealing with stakeholders. The environment department moved from being a sup-grouping within operations to the domain of a vice-president so that environmental issues were dealt with at a top management, strategic level. Public consultation became a key strategic element. What they learned from subsequent stakeholder engagement was translated into new logics. These were communicated through the organization, became linked with key initiatives and began to be an essential aspect of SC's business processes.

"We really operate differently from all other oil companies. I mean if anybody is interested in what we're doing, we allow them to come up here, we show them around, then we say, here's our library with all our reports, here's the photocopying machine, here's the coffee pot. If you need any other questions here, then come down. In other words we let them browse. It's gotten us in some hot water periodically because they see some draft report with some comment handwritten that we rather wished he hadn't but we feel that it's less of a risk than the concept that we're trying to hide anything, you know. All of our environmental stuff is visible and transparent, you know" (SC manager).

Relations with stakeholders improved. Specific individuals developed personal relationships with their counterparts (or with leaders) in stakeholder groups including regulators. For example, a key SC engineer knowledgeable about tailings remediation met often with his/her counterpart in the regulator. SC kept to its commitments for meaningful consultation with a wide range of stakeholders.

Subsequent Responses. SC's new logics informed activities throughout its value chain. The new logics did not replace former ones, *e.g.*, economic maximization, but rather merged with them. For example, when advised that regulators planned to revise emission standards, SC re-engineered an entire process so that emission standards would be exceeded, but also so that the efficiency of the process would be improved to the point of yielding a positive economic

return on costs. The result was less pollution than permitted, good relations with regulators and other stakeholders, and a more efficient system that reduced costs.

Similarly, other weak signals prompted innovative solutions. To meet its commitment to local First Nations, it trained First Nations entrepreneurs to run their own out source businesses contracted to Syncrude. While SC would not lend entrepreneurs the money to start a business, they would help develop their business plans and go to the bank to provide a business commitment and support.

Even in the area of scientific experiments, SC responded to weak signals.

"I want to make sure we're doing relevant research in a sense that it's not just doing good research, but it has to be then acceptable to the people, to the stakeholders" (SC scientist).

SC initiated joint research and development projects with competitors and with regulators. Their scientists and managers engaged in air and aquatics impact consultations, joint work on mining impacts and processes, oil sands recovery projects, and general upgrading and environmental issues.

"We're looking for technical solutions that are socially acceptable so we feel we have enough people around the table and even though they're all technical, they feed into other groups where they also have a feeling for whether this or what would be socially acceptable" (SC manager)

In all cases SC sought diverse sets of stakeholders including suppliers, unions, environmental groups, First Nations and regulators. When SC subsequently applied for a license for its new Aurora Mine which would allow their production capacity to be expanded, there were no demands for public hearings, and the application went uncontested giving SC the right to develop approximately 7.5 billion barrels of oil (Newell, 1999). SC is widely regarded as a model of corporate responsibility in Canada and in the energy industry.

Cross Case Analysis

Table 2 compares the key concepts across the cases. Both firms went through a common process of experiencing a failure of strategizing in the face of environmental shifts to which they responded with core rigidities based on their dominant logic. Firms did not, perhaps at the time could not, respond to stakeholders' criticisms that were founded in differing value systems. For example, the core value for environmentalists was eco-environmental preservation and for First Nations was an improved and sustainable quality of life. These basic values conflicted with firms' dominant logics. Both firms responded to failure by initiating cross-boundary organizing structures for learning. As a result, both re-strategized, developing better responses. Each firm adjusted its dominant logic based on its cross-boundary learning processes and the subsequent reactions to its strategies. Upon receiving new, more moderate signals of environmental changes, both firms returned to cross-boundary organizing structures to renew their learning, and subsequently developed structures to engage with stakeholders for experimentation, learning and adaptation. As the firms' experience with these adaptive capabilities grew through replication with stakeholders, the routines and structures for stakeholder engagement became enculturated within the organizations.

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DISCUSSION AND THEORY DEVELOPMENT

The firms sought to internalize what were initially incomprehensible stimuli, through cross-boundary organizing processes, *i.e.*, they invoked structures and processes to engage and learn with hostile groups. When initial responses to these external pressures proved unsatisfactory, the firms developed *adaptive* capabilities which resulted in improved performance in the specific instance, and an increasing ability to deal with future external pressures. In other words, adaptive capabilities first emerged, and then coalesced into dynamic capabilities as they were reapplied across multiple settings. Elements of the process included: 1) a disconnection between environmental signals inconsistent with the firm's dominant logic and the organization's ability to deal with those signals (failure of strategizing), 2) cross-boundary organizing for learning, resulting in re-strategizing and new responses, 3) (re)organizing and (re)strategizing in response to subsequent stimuli, and 4) the development and enculturation of standard routines for scanning, interpreting, organizing and strategizing, enabling adaptive responses to even weak signals from the environment.

While these organizing efforts may, at first, have been designed as impression management tactics, they had a significant impact on the way the firms interpreted divergent stimuli, and subsequently, on their strategizing. Not only did firms adapt their responses to the immediate situation, but they also changed their responses. By engaging with hostile stakeholders, the firms learned, and subsequently translated that learning into new logics, capabilities and renewal. Firms were then able to respond to weaker signals from the environment and take action in a way that enhanced their ability to survive and to continue to generate broad stakeholder value in continually changing contexts precisely because they had developed new dynamic capabilities.

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We illustrate our findings, and present a more general model, in Figure 1. In the illustration, environmental signal strength is weak at first, and does not break the threshold of the firm's attention. As the firm fails to respond to environmental pressures, the pressures build – signal strength becomes stronger. When firm managers finally attend to the signals, the firm responds with a strategy consistent with its dominant logic, which is inconsistent with the pressures in the firm's environment, the strategizing fails and a crisis results. As the firm engages in cross-boundary organizing to learn new responses and change its dominant logic, it heightens its attention to the signals in the environment, and develops new strategies and responses. If signal strength reduces as a result (as modeled here), the firm's attention may drop again, since managers may feel the problem has gone away. Subsequent increases in signal strength are likely to trigger again the firm's attention and its cross-boundary organizing. The firm replicates the set of actions which resulted in some success previously. As the firm gains more experience with stakeholder scanning, cross-boundary organizing and re-strategizing, it develops standard routines which become encultured within the firm. Such routines raise the firm's attention threshold for environmental signals and improves the adaptiveness of responses.

Implications

Our model has significant implications for theory and managerial practice. For theory, our research identifies a process through which dynamic capabilities for adaptation emerge. Adaptive capabilities involve the ability to notice changes in the external environment quickly, to understand stakeholders' perspectives, and to develop successful responses to demands before they create survival risks. Adaptive capabilities emerged in our cases in the context of a failure of strategizing, followed by cross-boundary organizing and joint sensemaking with stakeholders. They involved an expansion and adjustment of the firm's dominant logics which enabled the firms to respond to weaker signals and develop a lasting adaptation capability. Then adaptive capabilities evolved into dynamic capabilities through replication and enculturation.

It is important to note that saying a firm possesses adaptive capabilities is not the same as saying that the firm is perfectly adapted to its environment. Adaptive capabilities are designed to adapt to changes in the environment, but our data do not speak to how a firm determines to which changes in the environment the firm should adapt. The existence of a performance crisis clearly signaled to our study firms that they had to adapt to their critics. In so doing, however, they did not respond to the desires of other stakeholders, and perhaps acted contrary to those desires. Selecting among the changes in the environment is problematic at best. When environmental changes emerge through stakeholders, Mitchell, Agle and Wood (1997: 853) present a model for determining "who and what really counts". Stakeholders with power, urgency and legitimacy, they suggest, must be attended to over others. Yet even this model does not flag *potential* power, urgency or legitimacy, or indirect stakeholder actions, when one stakeholder convinces another to act on its behalf (Frooman, 1999).

Senior managers in our studies were directly involved in the processes that lead to the emergence of dynamic capabilities. Hierarchical position impacts capability development (Burgelman, 1988; Gavetti, 2005), in that senior managers can set priorities, make decisions and mobilize resources quickly. Blyler and Coff (2003) propose that social capital is necessary but insufficient for dynamic capabilities. Adner and Helfat (2003) suggest that a combination of managerial human capital, social capital and management cognition are reflected by dynamic capabilities. We suggest, therefore, a central role for senior management in the emergence of capabilities. For example, senior managers' actions and cognitions are important to the process of dynamic capability emergence (Helfat & Peteraf, 2003; Kaplan, Murray & Henderson, 2003) and leadership affects how organizations respond to discontinuities. Even if capabilities emerge at a more junior level, they are unlikely to become enculturated and replicated within an organization without senior management support.

Strategic renewal is brought about in many ways and not just through the application of dynamic capabilities. An organization can be forced to change by a major environmental shift which may send it scrambling for solutions and engaging in "ad hoc problem solving" (Winter, 2003: 992). If the organization does not find a solution that enables it to adapt to the change, it may not survive. If the major environmental force 'blows over' like a tropical storm, the organization may merely revert to the pre-storm status quo. If, however, the environmental change becomes the new environment, creative solutions formed during that period of adhocracy might need to be transformed into more replicable patterns of behaviour. Our data and analyses suggest that ad hoc problem solving signaled early stages of the emergence of adaptive capabilities.

Our study is rich in practical implications for managers. We identify cross-boundary organizing processes through which firms can learn from external actors to expand their

dominant logics, especially in situations of strategy failure. Learning-through-organizing can lead to superior subsequent strategizing. Using learning-through-organizing as a regular strategy can help an organization develop the capability to adapt its dominant logic synchronously with changes in its environment, avoiding the survival risks inherent in more complacent or inertial organizations.

This capability can be used in multiple contexts, enabling firms to learn more from their customers, alliance partners, regulators, suppliers, employees, and others. For example, eBay has adopted organizing mechanisms to ensure they continue to understand their customers' needs. Learning to listen to, and deeply understand a stakeholder's mindset can lead to strategically better outcomes. Furthermore, as organizing mechanisms become standardized, and as external viewpoints are internalized, strategizing becomes simpler, more structured, and requires fewer resources.

Finally, managers are interested in capabilities precisely because they are core to organizational advantage. "The purpose of a capability − by definition − is to enhance the productive value of the other resources that are in the firm's possession. Therefore a firm's capabilities can only generate economic profit *after* these other resources are acquired" (Makadok, 2001: 389 italics in original). In the contexts of the empirical studies described here, we suggest a potential economic value of adaptive capabilities, namely that without them, current resources *lose* their value, access to precious resources might be cut off, and organizational survival may be at risk. This has implications for what managers do. In reactive or anticipatory change (normal) times, managers should mainly focus their attention on choosing resources and constructing capabilities internally to orchestrate and leverage resources. In times of crisis, managers must instead focus on capabilities to protect resources. This requires a different logic − a logic, not of leverage, but of change (Eisenhardt & Martin, 2000).

We studied two cases in the Canadian resource sector, in different industries. Both dealt with ecological concerns, and both featured involvement by First Nations and environmentalists. One was over an extended period of time (over 15 years), while the other took place over a shorter time frame (only 18 months). Yet from each, analyzed independently, common processes emerged that led to the ability of both organizations to adapt to new environmental pressures.

Future research may want to question whether the leader who can orchestrate capabilities and resources in "normal" times can do so in times of crisis. Perhaps different leadership, experiential knowledge and other competencies may be critical to developing adaptive capabilities. More cases exploring the process of dynamic capability development would be welcome to determine if the processes described here are common in other organizations and environments and with other types of dynamic capabilities. It is likely that the process we observed is specific to adaptive capabilities. However, if dynamic capabilities are designed to coordinate other capabilities, and only those dynamic capabilities that are valued in an environment will lead to higher performance, then adaptive capabilities may be more likely to lead to higher performance by positioning and directing the use of other dynamic and operational capabilities.

CONCLUSION

Our empirical investigation of the emergence and transformation of adaptive capabilities contributes to the understanding of strategic renewal. We have illustrated the processes by which adaptive capabilities emerged. While other dynamic capabilities may emerge under different

circumstances, and using different processes, emerging adaptive capabilities represent an important contribution. Adaptive capabilities serve to align the use of operational and dynamic capabilities with forces in the environment. Such alignment is likely to be associated with strategic renewal, and performance benefits.

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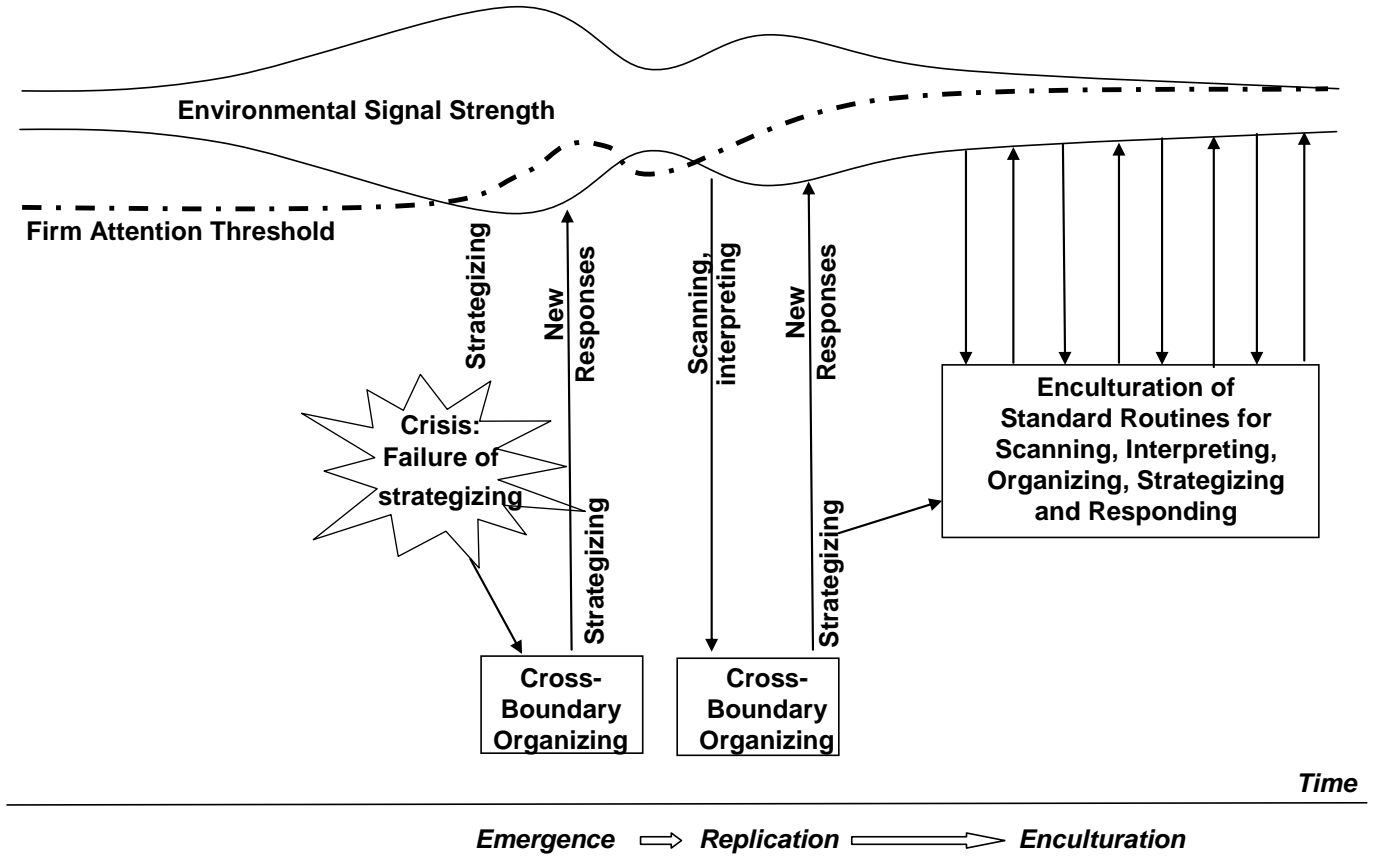**Table 1: Representative Definitions of Dynamic Capabilities**

Authors (year: page)	Definition
Helfat, (1997: 339) quoting Teece and Pisano, (1994: 51)	"…the subset of the competences/capabilities which allow the firm to create new products and processes and respond to changing market circumstances."
Teece et al., (1997: 516)	"…the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments."
Eisenhardt and Martin, (2000: 1107)	"…the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve and die."
Zahra and George, (2002: 188)	"…are geared toward effecting organizational change…influences the firm's ability to create and deploy the knowledge necessary to build other organizational capabilities."
Zollo and Winter, (2002: 340)	"…a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness."
Adner and Helfat, (2003: 1012)	"…the capabilities with which managers build, integrate, and reconfigure organizational resources and competences."
Helfat and Peteraf, (2003: 999)	"…do not involve production of a good or provision of a marketable service. Instead…dynamic capabilities build, integrate, or reconfigure operational capabilities."
Winter, (2003: 992)	"…dynamic capabilities contrast with ordinary (or 'operational') capabilities by being concerned with change…[they] govern the rate of change of ordinary capabilities."
Lavie, (2006: 153)	"…the incumbent's capacity to modify existing capabilities."
Marcus and Anderson, (2006: 19)	"…the ability to renew, augment, and adapt competencies over time."
Zahra et al., (2006: 918)	"…the abilities to reconfigure a firm's resources and routines in the manner envisioned and deemed appropriate by its principal decision-maker(s)."

Table 2: Cross Case Analysis

Concept	MacMillan Bloedel	Syncrude
Dominant Logic Elements	Stakeholder engagement is not necessary. Economics and science logics are primary. Legal action is the most appropriate response to critique/protest.	Economics and science logics are primary. Stakeholder engagement is required but not necessary. Formal, bureaucratic, legal resolution is best response to stakeholder demands.
Initial Signals and Responses	Moderate signals: Dismissed criticism. Avoided stakeholder engagement. Legal responses to protests. Strong signals: Public relations; strategic efforts to avoid issues and build support; legal responses.	Minimize stakeholder engagement. Moderate signals: Local environmental groups link up with ENGOs. Attempt to limit number to recognized stakeholders with narrow definition. Strong signals: "lakes of death" publicity. Push for formal public hearings.
Failure of Strategizing	Over 700 arrests. Bad reputation. Customers threatening to stop buying. *"We don't have time to do the proper thinking and analysis sometimes that these issues deserve. But that is hard to do when the camera crew is coming in three minutes and you have people scaling the side of your building, you have an operation that's on the verge of economic chaos, and the union's going to shoot you."*	Public relations nightmare. Possibility of application being denied. *"Instead of most of the parties realizing that a compromise is the right decision I think all it served to do was they were more firm, that it should be their position and nothing else ...everybody was angry and looking for the next shot at Syncrude... I think it set Syncrude back a long ways."*
Cross-Boundary Organizing	1994-1996: meetings with First Nations and environmentalists.	1993: Backroom meeting with First Nations group to begin process of reconciliation. Post 1993: Commitment to consultation
Subsequent Re-application; responding to weaker signals.	1996: redirected logging in Sulfur Creek; 1997: Joint Venture with First Nations supported by environmentalists; 1998: Permanent advisory board struck on social/environmental issues. 1998: New employee/union engagement strategies. 1999: Convinced industry members to engage with environmentalists. 2000-2006: The industry worked with environmentalists, First Nations, the government, and many other interested stakeholders to develop and agree on eco-system based management.	Series of joint initiatives and consultations with diverse stakeholder groups including unions, regulators, competitors, local communities, First Nations groups, and environmentalists. Even scientific experiments and process upgrades subjected to litmus test of stakeholder acceptability.
Changes in Dominant Logic	Stakeholder engagement is necessary and beneficial.	Stakeholder engagement is necessary and beneficial.

Figure 1

Process Model of Emergence of Adaptive Capabilities

Appendix 1

Data Sources

Source	MacMillan Blodel Case	Syncrude Case
Interviews	Senior Managers/Executives at MB: 15 Managers and Consultants at MB: 9 Other Industry Members: 28 Environmentalists: 10 Government: 3 Community Members: 4	Managers Syncrude: 11 Managers EUB: 9 Managers AEP: 3 Community Members: 2
Archival Sources	Media: over 5000 newspaper articles from 1985-2006 Company, government, industry association and stakeholder documents and websites Books	Transcripts of Hearings: 29 days totaling some 6,088 pages of transcripts Newspaper articles: 23 Industry/Gov't Reports: 14
Fieldwork	45 presentations at meetings and public events	Participant Observation: 8 days
Other		Focus groups: 2