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Innovation in the Knowing Organization: A Case Study of an e- Commerce Initiative

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Abstract

This paper explores the dynamics of information- and knowledge-based activities in one of the world's leading foreign exchange banks and its development of an innovative online trading system. These activities are analyzed using the framework of "the knowing organization," which postulates that learning and innovation in organizations result from managing holistically the activities of sensemaking, knowledge creation, and decision-making (Choo 1998, 2002). In sensemaking, project members at the bank were driven by their shared beliefs about the competition, customers and technology to enact the challenge of building an online dealing system. Knowledge creation focused on filling perceived gaps, and involved both expanding non-traditional capabilities within the group and acquiring expertise from outside the group. Decision making at the enterprise level to approve the project was formal and procedural, while decision making at the operational level was open and entrepreneurial. As predicted by the model, the interactions between these activities were vital. The outcome of sensemaking provided the context for knowledge creation and decision making, while the results of knowledge creation provided expanded resources for decision making. The three sets of activities were integrated through strong leadership, group norms of trust and openness, and a set of shared vision and values.

Keywords: sensemaking, knowledge creation, decision making, innovation

1. Conceptual Framework

1.1 Overview

An organization processes information in three arenas: to make sense of its environment, to create new knowledge, and to make decisions (Choo 2002). These arenas of sensemaking, knowledge creation, and decision making have typically been examined as discrete sets of activities occurring within organizations. While recognizing the value of each separately, it is the dynamics of the relationship among these activity-sets that generate the greatest potential for value-creation by organizations (Choo 1998). Sensemaking constructs the shared meanings that shape the organization's purpose and frame the perception of problems or opportunities that the organization needs to work on. Working with problems and opportunities often become occasions for creating knowledge and making decisions. An organization possesses three types of knowledge: tacit knowledge embedded in the experience and expertise of individuals; explicit knowledge codified as artifacts, rules and routines; and cultural knowledge expressed as assumptions, beliefs, and values. The creation of new knowledge involves the conversion, sharing, and combination of all three forms of organizational knowledge. The results of knowledge creation are new innovations or extensions of organizational capabilities. Whereas new knowledge represents a potential for action, decision making transforms this potential into a commitment to act. Decision making is structured by rules and routines, and guided by preferences that are based on interpretations of the purpose and priorities of the organization. Where new capabilities or innovations become available, they introduce new alternatives as well as new uncertainties. Decision making then selects courses of action that are expected to perform well given the understanding of goals and the conditions of uncertainty.

Thus, the organization's capacity to learn and innovate depends on its ability to manage and integrate a complex, unpredictable network of processes in which participants enact and negotiate their own meanings of what is going on; stumble upon and engage with new knowledge to make it work; and work within as well as improvise around set rules and routines to solve tough problems. The following sections describe each activity-set and their interactions.

1.2 Sensemaking

Weick (1995) described how people enact or actively construct the environment that they attend to, by bracketing experience, and by creating new features in the environment. Sensemaking is precipitated by a change or difference in the environment that creates discontinuity in the flow of experience engaging the people and activities of an organization (Weick 1979). These discontinuities provide the raw data from the environment which have to be made sense of. The sensemaking recipe is to interpret the environment through connected sequences of enactment, selection, and retention (Weick 1979). In *enactment*, people actively construct the environments which they attend to by bracketing, rearranging, and labeling portions of the experience, thereby converting raw data from the environment into

equivocal data to be interpreted. In *selection*, people choose meanings that can be imposed on the equivocal data by overlaying the new data with past interpretations that have worked before in explaining similar situations. Selection produces cause-effect explanations that render the environment understandable and meaningful. In *retention*, the organization stores or remembers the products of successful sensemaking as stories, explanations or causal sequences so that they are available for future sensemaking.

Organizational sensemaking can be driven by beliefs or by actions (Weick 1995). In *belief-driven processes*, people start from an initial set of beliefs that are sufficiently clear and plausible, and use them as nodes to connect more and more information into larger structures of meaning. People may use beliefs as expectations to guide the choice of plausible interpretations, or they may argue about beliefs and their relevancy to current experience especially when beliefs and cues are contradictory. In *action-driven processes*, people start from their actions and grow their structures of meaning around them, by modifying the structures in order to give significance to those actions. People may create meaning in order to justify actions that they are already committed to, or they may create meaning in order to explain actions that have been taken to induce or manipulate changes in the environment.

1.3 Knowledge Creation

Knowledge creating is precipitated by gaps in the existing knowledge of the organization or a work group. Such knowledge gaps stand in the way of solving a technical or task-related problem, developing a new product or service, or taking advantage of an opportunity. An organization possesses three categories of knowledge (Choo 1998): *tacit knowledge* embedded in the expertise and experience of individuals and groups; *explicit knowledge* codified in organizational rules, routines, and procedures, or made tangible in the form of physical artifacts; and *cultural knowledge* expressed in the assumptions, beliefs, and norms used by members to assign value and significance to new information or knowledge. An organization over time develops its own tightly integrated bundle of tacit, explicit and cultural knowledge, that when applied together constitutes its core capability. Core capabilities give the firm its distinctive competitive edge, because they have been cultivated over time, and are hard to imitate. According to Leonard (1995), core capabilities are the result of employees' knowledge and skills; physical technical systems; managerial systems that include reward, and incentive systems; and values and norms that determine what kinds of knowledge are sought.

Unfortunately, core capabilities become core rigidities over time if they are unrefreshed. From her field research, Leonard (1995) identifies four activities of high-performing firms that extend or create new capabilities: (1) shared, creative problem solving; (2) implementing and integrating new methodologies and tools; (3) experimentation and prototyping; and (4) importing knowledge from outside. In *shared problem solving*, the firm deals with challenging problems by bringing together people with different specializations and problem solving styles to generate the creative tension that, when properly managed, can lead to innovative solutions. In *implementing and integrating new methods and tools*, the firm is

skillful in introducing and integrating new techniques so that they are well adapted to the needs and existing capabilities of the firm. In *experimentation and prototyping*, the firm encourages experimentation on how to improve operations to be pursued as part of normal work practice. In this way, purposeful experimentation is everyone's responsibility, and not the specialized province of engineers or designers. In *importing knowledge from outside*, the firm is both creative and proactive in acquiring knowledge about new technologies as well as knowledge about the market.

At the heart of these activities are two fundamental processes: (i) the ability to *build new knowledge* over existing capabilities through shared problem solving and experimentation that draws upon accumulated experience and expertise; (ii) the ability to *absorb new knowledge* that depends on the existence of pre-existing related knowledge and a compatible, supportive organizational culture. Driving these processes is a certain degree of boldness and risk-taking, seen in the willingness to deliberately generate creative tension, encourage widespread experimentation, and be the first to work with new technology and tools. In summary, Leonard (1995) emphasizes the continuous interaction between knowledge-building activities and the core capabilities of the organization. While core capabilities are created and expanded through knowledge-building activities, these activities are themselves dependent on and enabled by the organization's core capabilities.

1.4 Decision Making

All decisions are about finding and choosing courses of action in order to attain some goals. The difficulty of making a decision then depends on how clear the goals are, and how well we know about alternatives that can achieve those goals. Decision situations in an organization can therefore be defined by two basic dimensions: goal clarity (to what degree goals are well-defined); and procedural certainty (to what degree alternatives are known). Figure 1 shows four modes of decision making depending on these two dimensions.

In the first quadrant (Fig. 1), when goal and procedural clarity are both high, decision making is likely to follow a *boundedly rational mode*, where choice is guided by decision premises and decision routines (March and Simon 1993/1958). Organizations specify decision premises that define what criteria to apply in evaluating alternatives (value premises), and what information is relevant (factual premises). These premises are embedded in decision routines that structure the decision process with rules and procedures. Choice follows the satisficing rule: choosing an alternative that is sufficiently satisfactory. Search is simplified by searching in the vicinity of problem symptoms or recent experience, and pursuing one goal at a time rather than optimizing across multiple goals.

	Low Goal Ambiguity/ Conflict	High Goal Ambiguity/ Conflict
Low Procedural Uncertainty	Boundedly Rational Mode	Political Mode
High Procedural Uncertainty	Process Mode	Anarchy Mode

Fig. 1 Four Modes of Organizational Decision Making

When goals are clear but the methods to attain them are not, decision making is in a *process mode* (Mintzberg, Raisinghani and Thêorét 1976), divided into three phases. The *Identification phase* recognizes the need for decision and develops an understanding of the decision issues. The *Development phase* activates search routines for a readymade alternative or design routines to custom-build a solution. The *Selection phase* focuses on the alternatives generated from the development phase and chooses a solution for commitment to action. The entire process is highly dynamic, with many iterations and cycles, interruptions, delays and speed-ups, and changes in tempo.

In the *political mode*, multiple groups pursue divergent goals, with each group being clear about its preferred alternative. In response to goal conflict, organizations behave as coalitions (Cyert and March 1963). Groups form coalitions or alliances to push for preferred alternatives. Organizations facing goal conflict pursue procedural rationality (March 1988) over goal rationality. They establish forums and procedures that allow groups to present their positions, ask questions, seek assurances, and move to a mutually acceptable solution through bargaining, negotiation and compromise.

In the *anarchic mode* (Cohen, March and Olsen 1972), when goal and alternatives are both unclear, decision situations are like "garbage cans" into which problems, solutions are dumped by participants as they are generated. A decision happens when problems, solutions, participants, and choices coincide. When they do, solutions are attached to problems, and problems to choices by participants who have the time and energy to do it. Which solutions are attached to which problems depends on which participants with what goals happen to be on the scene, when the solutions and problems are entered, as well as the overall mix of choices and problems.

Organizations engage in all four decision making modes, with different decision situations calling for different decision approaches. The (boundedly) rational mode would economize time and effort by applying learned rules and routines to familiar, well structured situations. The phased, dynamic nature of the process mode helps organizations to progressively search or design solutions in unfamiliar but consequential situations. The political mode allows alternative points of view to be heard and can prevent complacency or parochialism. The anarchic mode is a way for organizations to discover goals and find new solutions in unfamiliar, unclear situations.

1.5 The Knowing Organization

Information flows continuously between sensemaking, knowledge creating, and decision making, so that the outcome of information use in one mode provides the elaborated context and the expanded resources for information use in the other modes, as shown in Figure 2 below.

Sensemaking in organizations seeks to answer two questions: What is going on in the environment? What does it mean for us as an organization? The outcome of sensemaking are shared interpretations about how the environment is changing, and what direction the organization wants to take in the changing environment. The results of sensemaking are a set of goals and issues that reflect the purpose and identity of the organization in the changing environment. These shared meanings and purpose contribute to the formation of the mental models by which people in the organization recognize and perceive problems and opportunities. When the problem *situation is novel* or unfamiliar, the organization may find that it lacks the knowledge or capability to solve the problem or exploit the opportunity. It faces a *Knowledge-Gap*: having to develop or acquire new knowledge in order to address the problem or opportunity. The organization thus embarks on knowledge creation. When the problem situation is *sufficiently familiar*, the organization believes it already has the knowledge to proceed and it makes a choice among alternative courses of action that are believed to be able to address the problem. The organization faces a *Decision-Gap*. The outcome of knowledge creation is a set of new capabilities or new innovations. These expand the range of options that is available for decision making. However, they also introduce new uncertainties. New capabilities and innovations are untested, so decision making can become riskier. The outcome of decision making is the selection of and commitment to a course of action. While new knowledge represents a potential for action, it is decision making that transforms this potential into a commitment to act. The outcome of decision making is a pattern of action that is goal-directed in the short term (decisions are based on premises derived from current beliefs), and adaptive over the longer term (actions generate new signals that induce new cycles of sensemaking, knowledge creation and decision making).
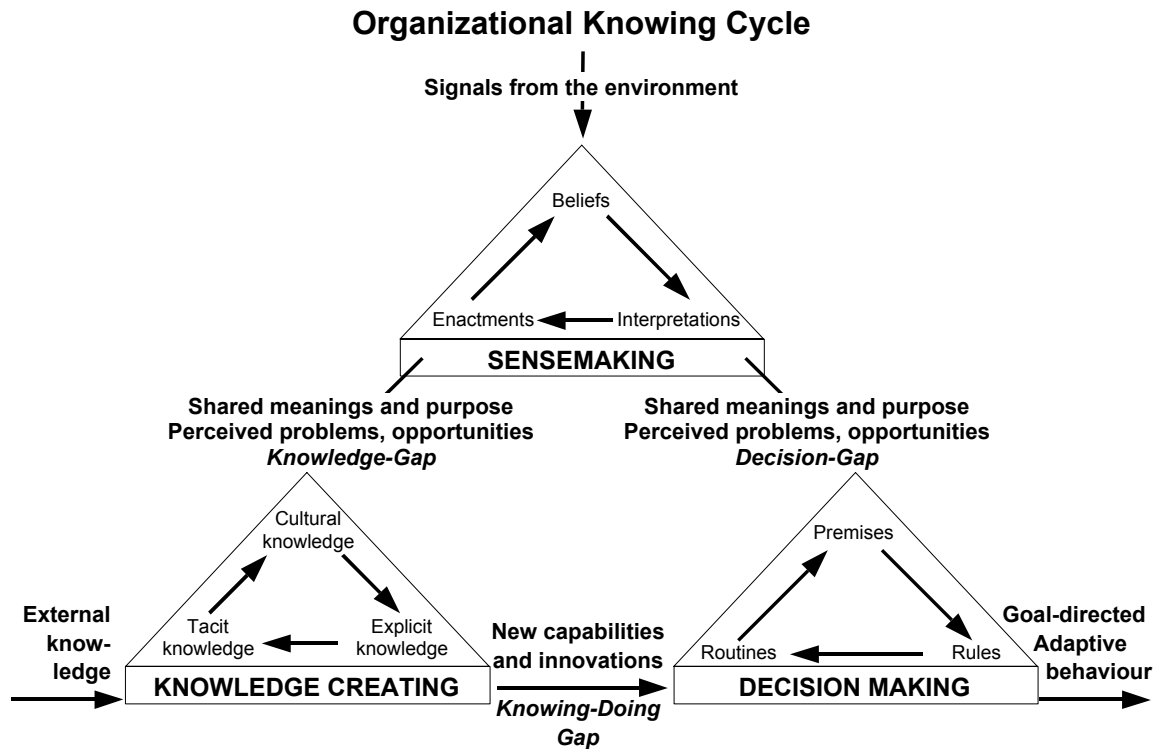
Organizational Knowing Cycle

Fig. 2   The Knowing Organization

2. FX Direct Project

Royal Bank of Canada (RBC) is Canada's largest financial institution as measured by market value and assets. RBC Capital Markets (RBC CM), one of its major lines of business, provides wholesale financial services to large corporate, government and institutional clients. It is one of the world's leading foreign exchange banks and the global leader in Canadian dollar trading. Ranked among the top ten in the world by revenues, the foreign exchange group is an active market maker in spot, forward, swaps and derivative products in all major currencies.

RBC CM launched its Internet foreign exchange trading system, FX Direct, in May 1999. Using FX Direct a client can obtain customized quotes, monitor currency rates, and transact spot, forward and even-sided swaps. All transactions can be initiated and completed within seconds, on the client's computer screen. FX Direct communicates with the Bank via a secure, encrypted, channel on the Internet when used in conjunction with the client's regular Internet Service Provider. Thus, FX Direct allows a customer to use a PC to instantly check what the current exchange rate is, lock in on the rate and buy the currency there and then.

Figure 3 displays a demo screen where a client seeking to buy USD500,000 is shown a spot rate that is valid for a given time interval (indicated by the horizontal graphical bar). The client initiates and completes the trade by clicking on the "Accept" button. In the past, customers would have to telephone traders and provide detailed instructions. At the time of its launch, FX Direct was considered to be the most advanced in the world.
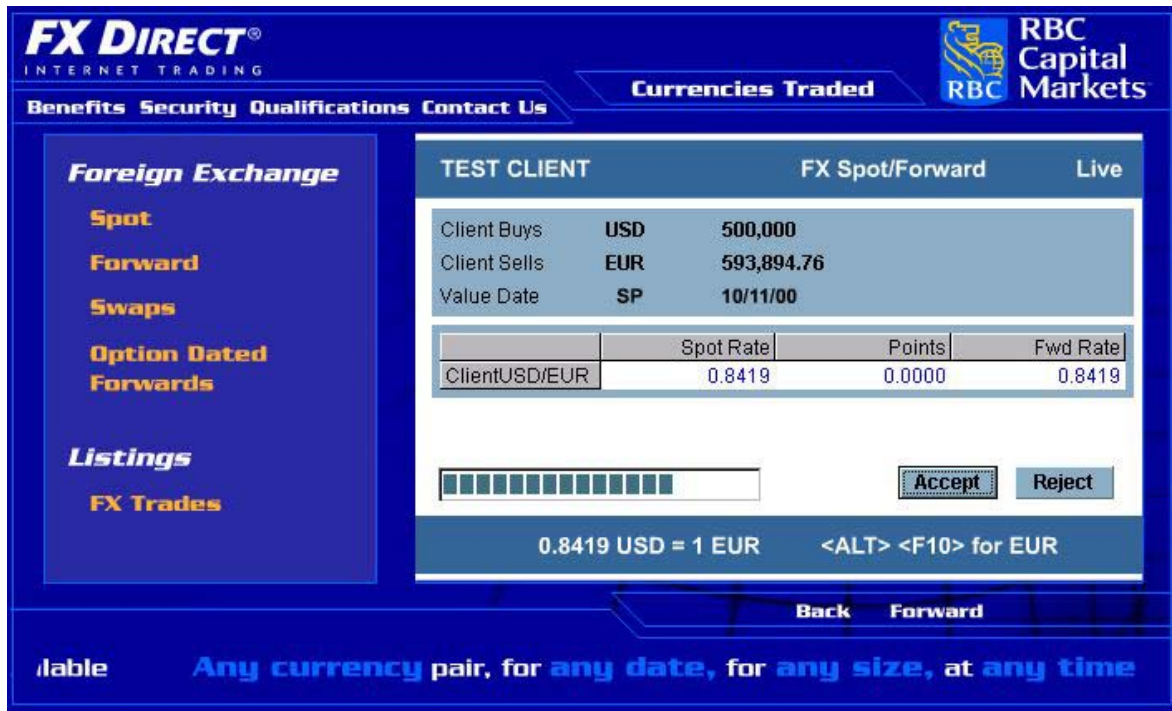
Fig. 3   FX Direct Screen

3. Research Method

This research studied the way that the foreign exchange business within Royal Bank Capital Markets (RBC CM) leveraged knowledge in the FX Direct project to create a new business model supported by Internet technology. The system was completed with investment costs significantly below that of the competition and at an impressive speed. The initiative also enabled the group to enhance its ranking to become ninth largest in the world.

The FX Direct project was considered an appropriate case study for investigating the utility of the Choo model for understanding how organizations process information in order to respond to their environments. It provided an opportunity to examine sensemaking, knowledge creation, and decision making in the context of an organization that was pursuing an innovative project characterized by high levels of uncertainty and ambiguity. Specifically, the study addressed the following research questions:

What was the sensemaking that led to the project being conceived?

What actions or beliefs guided the sensemaking?

What were the knowledge gaps identified?

What were the dynamics of knowledge creation that filled these gaps?

How was the decision to invest in the project made?

How were decisions made in the course of the project development?

The primary data collection method is the semi-structured, open interview based on ethnographic interview principles. Every member of the project team was interviewed. Each of the eight interviews took between an hour and an hour and a half, and together produced nearly 150 pages of transcripts. Interview transcripts were coded using thematic analysis (Aronson 1994, Boyatzis 1998). From the transcribed conversations, identifiable themes and patterns of experiences were listed as the first step. This can come from direct quotes or paraphrasing common ideas. The second step was to combine and catalogue related patterns into sub-themes. Themes are defined as units derived from patterns such as "conversation topics, vocabulary, recurring activities, meanings, feelings, or folk sayings and proverbs" (Taylor & Bogdan, 1989, p. 131). Themes that emerge from the informants' stories are pieced together to form a comprehensive picture of their collective experience. The "coherence of ideas rests with the analyst who has rigorously studied how different ideas or components fit together in a meaningful way when linked together" (Leininger, 1985, p. 60). Constas (1992) states that the "interpretative approach should be considered as a distinct point of origination" (p. 258). The third step is to build a valid argument for choosing the themes by reading the related literature. By referring back to the literature, the interviewer gains information that allows inferences to be drawn. Once the themes have been collected and the literature has been studied, the researcher formulates theme statements and develops a story line.

The overall goal of thematic analysis is therefore to construct a collective narrative of what happened and why, based on the recollections and experiences of group members. The major phases of the data collection and data analysis activities are listed below. The questions that guided the open interviews are in Table 1.

1. Semi-structured, open interviews with all members of project team.

2. Principal investigators separately carry out initial thematic coding of interview transcripts.

3. Investigators compare thematic analysis to identify common themes, ambiguities and gaps.

4. Meetings with project team members to clarify and collect more information.

5. Meeting with project team to discuss findings.

Table 1. Interview Questions

Sensemaking	*Knowledge Creating*	*Decision Making*
• How was the project idea first conceived? What was happening (the triggers, information signals) that caused CM to focus on this project?	• What additional knowledge or information was needed to flesh out the idea or implement the project?	• Who were the decision makers for this project? Who funded the project? Where did resources come from? How were resources allocated?
• What was the "problem" or "challenge" or "need" being addressed? How did you talk about the idea of this project?	• What additional knowledge or expertise was missing or had to be found for the project to happen?	• What was the decision process that gave the green light for the project to go ahead?
• Was it clear to you what the "problem" or "challenge" was?	• Where did you find this expertise/ knowledge?	• How long did the decision process take? Was it smooth? Were there delays? What were the reasons for delays?

Did it fit with your assumptions and expectations? • Did you purposely attempt to go after any kind of specific information to get a fuller picture of what was happening? • What were your feelings about the problem/ challenge/project during this time? • Was there consensus about the need for the project? Why? • To what extent was the project new or familiar? Were there recent, comparable experiences? • Looking back, what surprises you about the way the project was initiated? • What kinds of things were you already doing that helped to develop this solution?	• What was the actual process of designing and developing this solution? • Who was actually involved in developing this? • What was learned along the way, as the project progressed? • Was there any particular information or knowledge gap that was especially critical/crucial to the project? • Did the project break new ground for the organization? In what ways? • What were the major challenges in developing this solution?	• What criteria were used to evaluate the project? • What was the most compelling feature of the project that "sold" it to the decision makers? What was the most problematic issue? • Was there previous experience with this "type" of problem? Was there a "precedent" or "template" that could be followed? • Was there conflict in the decision making process? • How would you describe or characterize the decision making style of the organization? What about the decision making style for new, "risky" innovations?

4. Findings

To set the scene, we highlight a number of milestones in the development of the FX Direct project. In January 1997, senior members of the RBC CM foreign exchange group attended a demonstration of an electronic dealing system created by a software firm TraderTech (a pseudonym). This led to the RBC group deciding to develop its own online dealing system. The project proposal was approved by Systems Priority Committee at RBC CM in October 1997. In May 1998, the system went live with its first internal customer. In October, the first external client, a customer in Vancouver, used the system to purchase USD 60,000. In April 1999, the system was converted to a Web-based infrastructure, and the new system was launched officially the following month. In 1999, the FX Direct system won two awards: the ITX Award (IT Excellence) presented by CIO Canada; and the CIPA Award of Excellence, CIPA Best of Category Award - E-Commerce, presented by Canadian Information Productivity Awards.

The following sections present the main sensemaking, knowledge creation, and decision-making events and issues identified from the thematic analysis of the interview transcripts.

4.1 Sensemaking

In the mid-1990s, the more experienced members of the management team developed shared beliefs about the business environment that the RBC CM foreign exchange group was operating in. Three key drivers emerged as recurrent themes in the interviews. First, in terms of *competition*, the group was in a highly competitive business, where there were strong pressures to lower costs and raise transaction efficiency. Moreover, there was a keenly felt need to defend its market against US banks and to expand into new segments where it did not yet have a significant presence. Second, in terms of *technology*, there was rapidly growing use of computer and communications networks to gain access and transaction efficiencies, underlined by the accelerating adoption of the Internet and the World Wide Web. Third, in terms of *customers*, they were becoming more sophisticated technologically and in their expectations. Customers were demanding greater value-add in customized products and services, not just the transmission of information. As the leader of the group describes it, the goal was to move from an "agency" type trader to an "advisory" trader who provides tailored research, technical advice, and more derivative components: "a sales force that was less one of an agency in terms of its nature, more like an advisory in terms of its role, and so if you could automate far more of the agency type trades, that would free up this individual whom you had armed with a skill set to play an advisory role and make him far more efficient as you need fewer of them to do all these trades."

There was a well-defined event that triggered the development of FX Direct. In January 1997, two experienced traders attended a product demonstration of an automated dealing system presented by TraderTech, a software firm:

> "[A colleague] and I accepted an invitation from what was then called Dow Jones
> Telerate, who were an information services provider here in Toronto, to attend a
> meeting to look at something that might resemble an electronic business-to-business,
> not in the parlance we use today business-to-business, but a system. So, we had as luck
> would have it, both of us had a free lunch time and so we went and visited Dow Jones
> Telerate and there met a young gentleman [from TraderTech] .... A tremendous amount
> of aura, or good will about him. You know, if we'd been different personalities, maybe
> we wouldn't have been in talking to him, but we had a chance to chat with him ...

> "[The demo] was a deal capture screen where somebody could put in a request or a
> transaction and the person at the other end of the line could sort of do a deal fulfillment
> type … play a deal fulfillment role, but aside from that it was all very vague. The
> concept was though, if you could do this, and you do it with enough of your
> transactions, as the world was then, as I saw it, it was going to stratify between those
> who could essentially be an agency type trader i.e. I want something, here is the price, I
> source the price, I give you back the price, you decide a deal. That's a somewhat
> inefficient market, and one that is suspect or is very subject to price sensitivity i.e. if
> you don't have the best price, what other value are you adding."

This specific encounter with a software company demonstrating an electronic dealing system connected with the shared beliefs about competitive pressures, how the technology was evolving, and the growing customer demand for greater value-add and personalization. The idea formed that an online system could be developed to address these concerns by lowering costs, increasing transaction efficiency, and releasing resources to pursue high value-add services and new market segments. Although other competitors had also seen the same product demonstration, not all of them would have been primed by beliefs about competitive and customer pressures to react to the demonstration with this particular interpretation.

However, seeing the connection between the technology and the business need was only part of the sensemaking process. Another major element at work during the initial contact was the interaction between the individuals from the software firm and RBC CM. A high degree of personal rapport was quickly established with key individuals of that firm, creating a form of "swift trust" (Meyerson, Weick and Kramer 1996) that enabled the highlighted idea to plant its roots and grow. Two study participants stressed how this "person-to-person" connection was as vital as the "technology-to-business" connection:

> "... much of what we have done is intuitive. The Royal Bank Foreign Exchange team, the nucleus of that team, are long tenured individuals, where we tend to know how each other think and react very well, and personal relationships are very important in terms of how we do business and how we choose to do business, and I felt intuitively in that same interview that [the software firm principals] were men that we could trust, and men that we could do business with, and that was very key, very key, because if it was the product and the product alone and we thought that the individuals selling it lacked integrity, then we wouldn't have done what we did. We felt they were men of principles, there were very two important elements present that day that gave us the confidence to go ahead."

> "So here I had met [one of the software firm principals] in the years earlier, great, I still speak extremely highly of this fellow, he's probably worth a few billion dollars now, and he's a person that you would walk across the street to meet and spend time with. That's the type of person he is, and you established early on a rapport that you want to do business with this guy, and I have never wavered in the fact that I trust him, despite the fact I recognized in some respects our goals are congruous, in some respects they are not, and so in the early stages they were a software provider only."

In summary, the series of events in early 1997 may be characterized as a form of belief-driven sensemaking, where individuals noticed and connected with a specific event ("bracketing"), and were convinced enough to act on the idea ("enactment"). This enactment was galvanized by the feelings of rapport and trust that developed between the experienced RBC individuals and the principals of the software firm.

4.2 Knowledge Creating

As work began on building a system that would deliver FX services via the Web, team members identified three sets of knowledge and technological capabilities that would be required: (1) connectivity over the Internet that was secure, and yet allowed clients to access the service through their regular Internet service providers; (2) strong data encryption that would provide encryption beyond the levels normally required for conventional e-commerce transactions; (3) pricing engine/dealing system which would be based on the TraderTech system. Thus, the requirements for secure connections and data encryption were perceived as critical knowledge gaps. To address these gaps the project expanded internal know-how within the group, as well as linked up and partnered with external expertise.

Internally, the FX team hired new members who had the required complementary expertise in non-traditional areas such as electrical engineering, law, and e-commerce. The team leader described how he was also looking for individuals with an entrepreneurial mindset:

"So, you are starting to try to bring in a different skill set into the [team]… we're no longer looking for the CFA, MBA, personal tax, number of years of experience, to go into the business model. There is no business model. There is no business viability, so you go out and try to find people who at least understand systems, who might understand the math, who certainly understand dot coms, and therefore by nature are risk takers in their own right."

Bringing together the requisite skillsets was the first step. For the team leader, the larger challenge was to create a group culture where people would feel safe and be encouraged to innovate:

"... Assemble a group with a different skill than that which you traditionally assembled around you, and then promote, or if you prefer, foment, an environment of trust where people feel free to advance their opinions without being shouted down ..."

At the same time as it was building its internal capability, the FX group realized that for the secure connection and data encryption requirements, it needed cutting-edge technology, and would have to look outside the firm (or even the country) for it: "So now we started to think, we are now over our depth, or out of our league. Moreover, we are probably out of our systems people league. We need some advice and counsel. We need to start talking to people." The group was fortunate in finding and linking up with external partners to supply and develop these technologies: "... I still think by fluke, we ended up with the AT&T people in Raleigh, South Carolina, who were retired AT&T engineers who were available on a consultative basis. And we approached them with a problem and that was: How do you design a connectivity piece that will satisfy the Royal Bank of Canada?" Somewhat to the surprise of the group it was able to build strong and close working relationships with these partners, based on trust and rapport:

"The curious thing here was [these] individuals were between 60 and 70 years old, on

average, from Raleigh, South Carolina, a reasonably [conservative] part of the US,

dealing with these individuals at the Royal Bank of Canada. So it's a Canadian bank, it's

an institution that they probably haven't heard of, and certainly would not have been

synonymous with trying to be at the cutting edge of the internet at that time. So we were

unlikely bed follows is what I would say... but there was an awful lot of behaviours

there that you started to get to a point where you really trusted these people."

Although the project clearly involved a significant amount of technology development and integration, team members stressed that the project was driven by the business side, the traders. One person put it thus: "I want to make the comment though that it was really… it's this group that made it go. This wasn't the sort of IT world… this is front end business people [sales and trading professionals], and it wouldn't be the global view because back there when this got off, we said that this was very much Toronto, this was very much people like that ..." A sub-theme that was apparent in the interviews was a certain tension between the information systems group and FX group. There was a felt need to "level the playing field" and the way that the FX group hired new people with business and technical skills might be seen in the light of this concern.

In summary, it is possible to discern many features of the capability/knowledge-building model developed by Leonard (1995) at work in the FX Direct project. The project was an example of an attempt to expand upon existing core capabilities (of the trading professionals). Leonard had suggested that an important way of doing this is to bring together a diversity of expertise and problem-solving styles. Here's how one experienced member of the FX group saw the new hires who had technical and legal knowledge:

"... my skills are more to the business side and I feel that what [two new members

recruited] will bring are complementary to what we need here in the business, within

the business. It's a different discipline, it's a different approach to decision making.

Foreign exchange people are very strange people. We make our living in a very

different way, and we tend to be very immediate. We make our decisions like that [hits

table], and we need a little more… these people bring discipline to us."

These new hires also enhanced the absorptive capacity of the firm, increasing its own stock of knowledge and so enabling it to assimilate, evaluate, and exploit new technologies.

A major motif that kept surfacing in the interview conversations was the important role of personal rapport and trust in supporting knowledge creation and transfer. It seems that the more experienced group members relied heavily on a kind of tacit knowledge to form an instinct or intuition about working with specific individuals or groups to jointly develop new knowledge. One team member sums up well this kind of "personal" tacit knowledge that is anchored in intuition and feelings:

"... quite honestly it has taken twenty years of experience to execute what it is we did,

and [we have] been in the business for that period of time, so when we examine risks,

and to be sure, three years ago what we were doing was not without risk to business or

career, so that when you are dealing with people that you trust, and you feel ... you look

at each other and say this is intuitively correct, and then that the people that we were

dealing at TraderTech were also, we felt, people that we could do business with, and I was just trying to emphasize that if we hadn't had that feeling for these people, it probably never would have happened because a lot of what we do, I feel, or any success we've had, has been intuitive, where you get to a decision point and you say "Well, I think we'll go that way." Why? "Well, it just felt right."

4.3 Decision Making

In the fall of 1996 (the year before the project was approved), there had been a change of the decision making structure at the bank with respect to new information systems projects. One participant elaborated on this change:

"We used to have a head of our systems department when we, the foreign exchange trading, was a part of Royal Bank. When we came from the bank to [Capital Markets], which was in the fall of '96, the head of our systems department, his culture and approach to work was very different ... and they replaced him with the new CIO. And … this was also an essential element. This never would have been approved by [the former CIO], never, what I did, the old man. His view was that the systems department decided what the business would use, and they would come and tell us, it's time for you to use this. [The new chief] is a new style CIO and he regards the business as his client. And it was his recommendation that a formalized process be established for approval of systems."

At the enterprise level, decision making to approve new projects such as FX Direct was formal and procedural. Two committees were directly involved: the Operating Committee at RBC CM Global Markets, and the Systems Priority Committee. The SPC Committee, chaired by the company President, would hear the business case and make a decision based on quantitative, financial premises such as revenue generation and cost reduction. The team leader described the process as follows:

"[A business case] was presented to the Operating Committee of Global Markets, and then it was presented to the SPC, which is the Systems Priority Committee, which is a, if you want to call it a catch all, they catch all of the systems projects because we only have X amount of money to spend on a yearly basis, and that was then put in front of [the President] who chaired that committee. So, he was at all of these… it was the law of diminishing returns, how many of these things can you invest in, and which ones do you want to spend money on? And that passed muster as an active process."

"... a proper MBA-style business case was developed that showed here are the costs savings because we are going to centralize all of the retail vanilla or linear activity though this machine. ... That was the basis on which the business case was predicated, and the idea that went forward was that if you could save X number of these bodies and do that over X number of years and we can ramp up the business that goes through here

> ... we can't build you a predictive value or revenue model, but we can give you a
> definitive cost savings model, and that became very compelling from a cost standpoint.
> Now, intellectually, that resonated very well in an organization that almost pays as
> much to its employees that cut costs as those who build businesses."

Thus, decision making at the enterprise level appeared to follow a rational model that emphasized decision premises (cost savings, payback periods) and decision routines (committees, and business case evaluations). From the perspective of the Operating Committee and Systems Priority Committee, the overall business goals were clear, as were the alternatives that had been submitted formally for their evaluation.

In contrast, decision making at the project level was of a different nature. The tightly-knit project team met frequently in discussions that were informal, frank, and open. The emphasis was on speed (in a race to market), a willingness to take risk, and a reliance on gut feeling and intuition. The fear of failure was an important part of the group ethos. Here is how several team members described the decision culture during the project:

> "The fact that we were in the middle of Y2K at a critical point, so resources were
> stretched badly upstairs. There were some organizational issues so that CM tends to be
> a very lean running shop, and that leanness just about got us a few times. It doesn't
> matter how creative or innovative you are, when resources get stretched to that point
> you really have to reach down and not be shaken from that end vision ... That was a fear
> motivator, and also, with an investment dealer, if you fail, you pay a price. More than
> likely, you are fired, that was also a motivator. So you tend to stick with it."

> "… how can I put it? There was… fragility to the commitment. It was "Go ahead, but
> you'd better do everything right." If we'd gotten in trouble early, if there had been a
> reversal ... I don't think there would have been any tremendous surprise if we had failed
> and they would have said "Well, that's that. There goes half a million dollars. It'll be a
> while before we try that again..."
> "... but you know, I don't think this was necessarily the firm saying "Let's do this, we're
> all behind you 100%." It was like "You want to do what?" And that's the nature of the
> beast."

At the project level, it was possible to discern decision making in the process mode and the anarchy mode. Thus, there were deliberate searches for existing technologies from outside the firm as well as cycles of design that custom-developed the new system. These search and design routines are characteristic of the process mode of decision making. At a few important points in the project, alternatives were made available or presented themselves almost by chance or good timing, and these "solutions" were picked up by the project group. For example, attending the TraderTech software demonstration was described as a lucky event, and finding the engineers in South Carolina was a matter

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of good fortune. The dynamics of chance and timing, and individuals attaching solutions to problems, are features of the anarchy mode of decision making. The anarchy mode is not dysfunctional but a way of dealing with high uncertainty common in innovative projects involving new technology.

The co-existence of informal, entrepreneurial decision making at the project level within a broader structure of enterprise level decision making that was formal and procedural was made possible *through the "political cover" provided by executive sponsors. The role of "executive sponsors" was apparent in these comments from two team members:*

> "[The team leader] was my executive sponsor. He is the head of foreign exchange, [his boss] is the head of all three trading businesses. He runs this whole room. And they gave me the political cover, if you will, they remained for the first year, remained fairly distant, but they were watching."

> "... we had the backing of [the team leader]. He, first of all, was a significant executive sponsor himself, then [*his* boss] was behind it, and he had already spoken to [the chair of the committee] before the meeting ever took place. And I think that… lobbying if you will… pre-sell or lobbying… so that by the time we got there it was pretty evident that we had done our work… done our homework, and it wasn't I would say a rubber stamp, but we would have had to surprise them or said something surprising or said something that disturbed them for it not to be approved by that point."

The quote above suggests that tactics were employed that are characteristic of political decision making models: lobbying and pre-selling as variations of coalition building; doing the homework beforehand, and ensuring no surprises as a an important part of procedural rationality.

5. Summary

The main findings of the study are summarized in Table 2 and placed in the conceptual framework in Figure 4. As can be seen, the knowing organization model was found to be useful in identifying and analyzing the structure and dynamics of key processes in the FX Direct Project. The concepts of sensemaking, knowledge creation, and decision making were helpful in framing research questions, formulating interview questions, analyzing interview transcripts, and identifying the key elements that shaped project development. In sensemaking, project group members were driven by their shared beliefs about the competition, customers and technology to bracket and enact the opportunity of developing an innovative online dealing system. Knowledge creation focused on well-defined gaps, and involved both expanding non-traditional capabilities within the group and acquiring expertise from outside the group. Decision making at the enterprise level to approve the project was formal and procedural (rational and political modes), while decision making at the operational level was informal and entrepreneurial (process and anarchy modes).

Table 2. Summary of Findings (1)

Findings	Conceptual constructs
1. Sensemaking	
Shared beliefs about the business environment. 3 key drivers:	Belief-driven sensemaking
Competition: Need to lower cost, increase efficiency, defend/expand markets.	
Technology: Growing use of Web to gain access and transaction efficiencies.	
Customer: Demanding greater value-add in customized products, services.	Bracketing
Perceived opportunity: A specific encounter with a software company (at a product demo) triggered the idea of an online foreign exchange trading system.	Enactment
2. Knowledge Creating	
Knowledge gaps clearly identified:	Perceived knowledge gaps
Secure connection over the Internet	
Strong data encryption	
Pricing engine/system.	
2.1 Internal knowledge: Assembled a team with expertise in complementary, non-traditional areas. Shared passion to innovate and to learn something new.	Extending internal core capability and absorptive capacity
2.2 External knowledge: Linked up with external partners to fill critical knowledge gaps. Developed strong and close working relationships with these partners.	Importing and integrating external knowledge
3. Decision Making	
3.1 Enterprise-level decision making: formal, procedural; business case presented based on premises of saving costs, short payback period (decision premises suggest risk aversion, caution, cost/revenue considerations).	Rational model: decision premises and routines
3.2 Project-level decision making: informal, open, entrepreneurial; emphasizes speed to market; risk-taking.	Process and anarchy model
Executive sponsors provided "political cover" that bridged enterprise-level and project-level decision making.	Political model
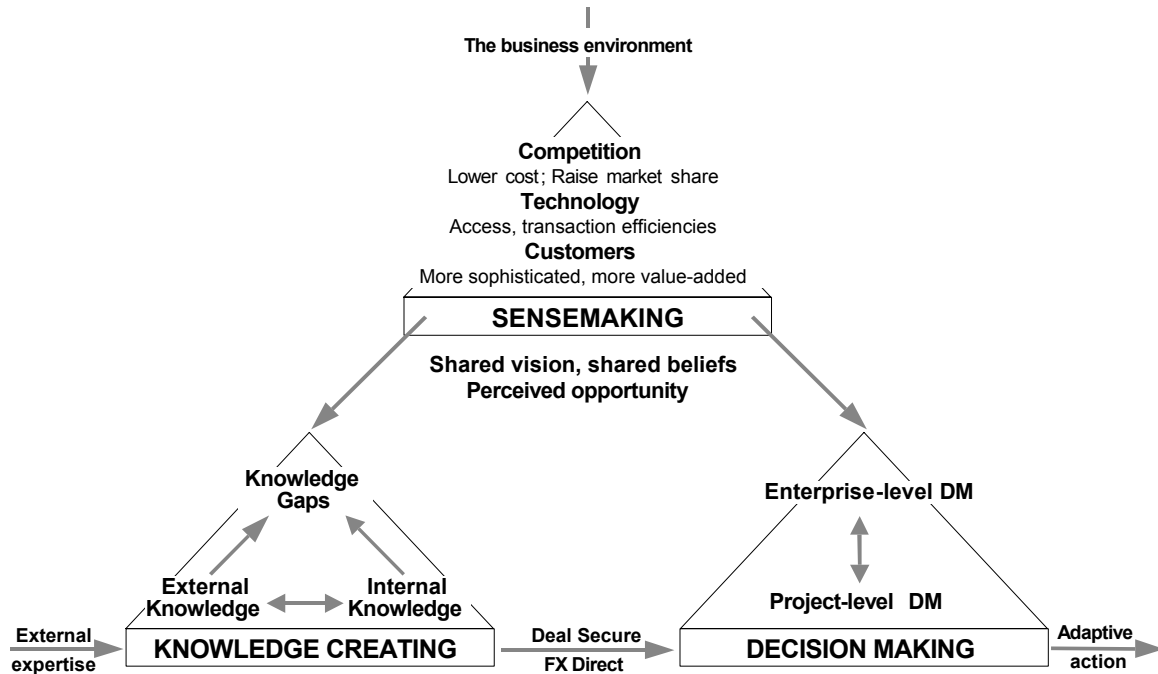
Fig. 4 Summary of Findings (2)

In organizations, sensemaking, knowledge creation, and decision making tend to be separated as distinctive functions assigned to different groups. For example, line executives make decisions; training or engineering create and apply new knowledge; marketing or planning scan and make sense of the external environment. For the organization to innovate and learn, these processes need to be integrated and managed holistically. Our analysis of the FX Direct project suggests that this coherence and focus may be brought about through strong leadership, a cohesive team, and a core of shared vision and values. In the project, we noted that leadership was willing to take risks based on a high degree of personal commitment. Team members pulled together in an environment built on strong group norms of trust and openness. Everyone shared the vision and the conviction that this was the future, and while their careers may have been on the line, the project presented a unique opportunity to break new ground and gain valuable new experience. Essentially, the project group had created its own team culture of risk-taking, collaboration and innovation that was quite distinct from the more conservative culture of its parent institution.

At a more general level, the study helps us to approach two questions: Where is the knowledge in an organization? How can this knowledge be mobilized? The knowing organization model suggests that the knowledge of an organization is *dispersed* and embedded in its activities of sensemaking, knowledge creation, and decision making. Thus, organizational knowledge is distributed in the beliefs and interpretations that frame sensemaking; the experience and intuitions that enable knowledge creation; and the premises and procedures that structure decision making. At the same time, the mobilization of

this knowledge requires the continuous *interweaving* of these sets of knowledge into a single canvas of learning and innovation. Thus, beliefs and interpretations about the external environment shape the shared vision that guide knowledge creation and decision making. From time to time, the knowledge creation activity itself would require making sense of new possibilities; and making choices about available options. Making decisions would also have included making sense of particular goals and objectives, as well as creating new knowledge and assessments about risks and returns. It is this continuous, dynamic interplay between making sense, making knowledge, and making decisions that lies at the heart of organizational innovation and learning.

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Innovation in the Knowing Organization: A Case Study of an e-Commerce Initiative

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Abstract: This paper explores the dynamics of information- and knowledge-based activities in one of the world's leading foreign exchange banks and its development of an innovative online trading system. These activities are analyzed using the framework of "the knowing organization," which postulates that learning and innovation in organizations result from managing holistically the activities of sensemaking, knowledge creation, and decision-making (Choo 1998, 2002). In sensemaking, project members at the bank were driven by their shared beliefs about the competition, customers and technology to enact the challenge of building an online dealing system. Knowledge creation focused on filling perceived gaps, and involved both expanding non-traditional capabilities within the group and acquiring expertise from outside the group. Decision making at the enterprise level to approve the project was formal and procedural, while decision making at the operational level was open and entrepreneurial. As predicted by the model, the interactions between these activities were vital. The outcome of sensemaking provided the context for knowledge creation and decision making, while the results of knowledge creation provided expanded resources for decision making. The three sets of activities were integrated through strong leadership, group norms of trust and openness, and a set of shared vision and values.

Keywords: Sensemaking, knowledge creation, decision making, innovation.