

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Overview: The Creative Problem-Solving Process and the Physical Environment

*The business world is already launched on a new quest. The ancient pursuits—for capital, for new materials, for process technology—remain eternal. But now business seeks a new advantage—delicate and dangerous, and absolutely vital—the creativity advantage.*

*(Kao, 1996, p. 1)*

In today's global world, businesses compete with other innovative businesses for both clients and employees. The complex challenge of financial survival and growth in the global economy depends on the capabilities of organizations to respond aptly to changing demands for new products and services. Not surprisingly the Nomura Research Institute of Japan classifies creativity as the fourth biggest revolution, after the agricultural, industrial, and information technology revolutions (Kao, 1996). Organizations are increasingly seeking a competitive edge, which they are discovering in individual creativity and in organizational processes that support creative problem-solving (Goleman, Kaufman, & Ray, 1992; Higgins, 1994; Kao, 1996; Lubart, 1994; Williams & Yang, 1999). Many researchers emphasize creativity as imperative to organizational management, adaptability, competitiveness, and growth in the future (Basadur, 1997; Gunnarson & Niles-Jolly, 1994; Mumford & Simonton, 1997; Williams & Yang, 1999).

*What processes do organizations embrace to nurture creative products & services?* Recent conceptualizations in creativity research point to the physical environment, among other variables, as an indicator, mediator and promoter of both individual and organizational creativity (Becker & Steele, 1995; Csikszentmihalyi, 1996; Lubart, 1994; McCoy & Evans, 2002; Sternberg & Lubart, 1999;

Vithayathawornwong, Danko, & Tolbert, 2003). Although some research has looked at the impact of physical environments on overall individual and group creativity, few studies have focused on understanding the direct linkages between the physical environment and the creative problem-solving process. *The questions remains, are some physical environments more supportive, or inhibitive of, the creative problem-solving process than are others? If so, how, and to what extent is this relationship significant in enhancing the creative problem-solving process?*

The extent of the impact of physical environment on behavior is itself still being debated by researchers and designers. Consequently, three perspectives have emerged, as detailed by Bell, Fisher, Baum, and Greene (1990):

1. Architectural determinism: suggests that physical environment is the sole influencer of behavior that occurs within its confines.
2. Environmental possibilism (see Porteus [1977], cited in Bell, Fisher, Baum, and Greene): suggests behavior can be supported or hindered by the physical environment but is dependent on the extent to which its user makes those choices allowed within the environment.
3. Environmental probabilism (see Porteus): proposes that while users of the physical environment can choose varied behavioral responses in any environmental interaction, the display of a particular behavior in a particular environment has a specific probability and is influenced by the physical and non-physical environment. Studying creative problem-solving process and physical environments under this theoretical proposition allows us to determine if the physical environment is a cause, catalyst, or byproduct of the creative problem-solving process. (pp. 364-365)

Workplace designers and facilities managers try to understand, design, and manage the organization's physical environment in order to support the creative

problem-solving process. This study will help them to understand specific linkages between the creative problem-solving process and features of the organizational physical environment that support or hinder it. Understanding creative problem-solving environments will help professionals to plan and manage these physical environments in order to enhance the organization's functionality, competitiveness, the quality of products and services, and the satisfaction level of their clients and employees.

Before trying to grasp the intricacies of the creative problem-solving process and the inter-relationship to physical environments, the author examines these systems separately. First, literature on the basic construct of creativity is presented and explored for relationships to the creative problem-solving process. Second, the review of literature details how creativity and creative problem solving in organizations differs from individual or independent group problem solving. Lastly, the author examines previous research on the physical environment as it relates to service organizations.

The literature review concludes with an emphasis on identifying the external components in the organizational environment that impact creativity summarizing some of the theoretical observations regarding the relationship between the creative problem-solving process and the physical environment in which it occurs.

## **1.2 Understanding creativity**

In the literature, creativity is generally defined as the generation of novel (original, unexpected, unusual) *and* appropriate (useful, adaptive, actionable, socially valuable) ideas and products (Amabile, 1998, Halpern, 1989, Nickerson, 1999; Sternberg & Lubart, 1999). However, unlike its simple definition, creativity is a complex construct—a multifaceted phenomenon that has generated great interest

during the past six decades. The study of creativity has evolved from its early phases, in which mystical and psychodynamic perspectives were emphasized, to the development of psychometric, cognitive, socio-psychological standpoints and confluence theories as a basis to explain creative production (William & Yang, 1999; Lubart, 1994; Sternberg & Lubart, 1999).

Early theorists conceived of creativity as a trait innate in gifted individuals, thus denying that the creative problem-solving process can be improved upon. However, experts in the field of creativity have begun to support the view that all individuals are creative and that this trait can be further developed through training. This broader definition of creativity has shifted the basis of generating novel and useful ideas and products from an individualized personality trait to a process focus and a belief that creativity can be enhanced through attention to process and methods (Halpern, 1989; Higgins, 1994; Nickerson, 1999; Osborn, 1963; William & Yang, 1999). Recent conceptualizations of individual creativity are more holistic, emphasizing the interaction between the individual and multiple components in her or his environment that foster creativity (Amabile, 1998; Csikszentmihalyi, 1996; Sternberg & Lubart, 1999). This study takes a look at the basic approaches that have been used to understand creativity.

### 1.2.1 The four approaches to creativity

Although researchers have studied creativity from varied perspectives, Rhodes (1961) initially proposed that the underlying approach to the studies themselves can be classified into four basic types. Each of the approaches highlights one of the following as the most important aspect of creativity:

1. *Person*: Studies the traits, characteristics, or attributes of the creative personality.

2. *Process*: Studies the stages of thinking used to invent something new and useful.
3. *Product*: Studies the qualities of a product which make it creative.
4. *Press*: Studies the nature of the environment which is conducive to, or inhibitive of, creativity.

This framework has been cited as widely accepted components for creativity by numerous researchers, such as Isaksen (1995), Scritchfield (1999), and Vithayathawornwong, Danko, and Tolbert (2003). Although many researchers insist on using one approach over the others as their basis for explaining creativity, others suggest that none of the four approaches explain creativity by themselves; rather, all four complement each other to provide a holistic understanding of creativity. For the present study, the researchers acknowledge the usefulness of each of the four approaches of person, process, product, and press to understand creativity but focus on *process* as a dominant basis for understanding organizational creativity. The next section describes the researcher's emphasis on using 'process' as best suited to study organizational creativity.

### **1.3 The creative problem-solving process as a basis for understanding organizational creativity**

Woodman, Sawyer, and Griffin (1993) defined *organizational creativity* as “the creation of a valuable, useful new product, service, idea, procedure, or process by individuals working together in a complex social system” (p. 293). Since traditional systems tend to control the individual's work, they allow for little, if any, creative problem-solving within their job description. Williams and Yang (1999) argued that creativity in individuals is entirely different from creativity in organizations: “Creativity within an organizational setting is not simply individual creativity that

happens at work” (p. 373). Leonard and Swap (1999) resonated, “Creative *people* can be important to an organization, but group creativity depends more on managing the creative *process* than on a few ‘creatives’ ” (p. 16). Woodman, Sawyer, and Griffin (1993) further added to this argument—organizational creativity is definitely a function of individual and group creativity, but it is also a result of organizational characteristics and contextual influences. According to Woodman et. Al (1993), individual creativity is mediated through group creativity to influence organizational creativity. Therefore, to understand creativity in the organizational setting, we must look beyond the study of individual creativity and focus on the organization’s creative problem-solving process.

#### **1.4 The nature of the creative problem-solving process**

The creative problem-solving process has been studied as a separate field in an effort to understand the development of creative solutions. It is defined as the process used to take a problem from its initial state to a desired goal state using a step-by-step structure that problem solvers can follow to help them reach a desired goal. Many researchers have proposed conceptual models that characterize creative problem-solving as a phased or step-wise process (Higgins, 1994; Lubart, 1994; Leonard & Swap, 1999; Osborn, 1963). Generally these models recognize from four to eight phases of the process: 1) fuzzy mess, 2) fact-finding, 3) problem finding, 4) divergence, 5) convergence, 6) solution finding, 7) acceptance finding. Though not part of the actual problem solving phases, some researchers propose that incubation and insights are very essential to the process (Halpern, 1989; Osborn, 1963). These major phases of creative problem-solving are described in Figure 1.1. The actual process is less linear than the figure implies, allowing for movement back and forth between the phases.

<b>Process step</b>	<b>Description</b>
1) Fuzzy mess: Realizing a problem.	This is the incubation stage of the process in which the problem solver senses something missing and feels a need to find a better solution.
2) Fact finding: Finding or recognizing the problem.	To pinpoint the actual problem, the problem solver must eliminate peripheral clutter and distill essential details. A detailed analysis of the facts leads to the sometimes-implicit problem.
3) Problem finding: Defining or refining the problem.	To define the problem, problem solvers need to analyze it carefully. A well-represented problem is a good index of how well it is understood, and is the key to solve it. A well-understood and represented problem gets more specific answers.
4) Divergence: Seeking possible solutions.	Divergence is widely used by groups to generate a large number of ideas. It is the unrestrained offering of ideas by the individuals in a group.
5) Convergence: Evaluating alternatives.	Convergence evaluates the large number of ideas generated in divergence, and selects a few that best meet the initial problem criteria.
6) Solution finding: Settling on the best alternative.	Different ideas meet the solution criterias in varying degrees. Desirability of the solutions is weighed. Different solutions may be combined to meet all requirements. Multiple solutions can be created for the solution pursuer to select from.
7) Acceptance finding: Finding ways to apply the solutions.	Sometimes, in spite of finding a solution, the problem pursuer cannot find a way to implement it, making it difficult to end the problem. A creative strategy is charted to put the solution to actual practice.

**Figure 1.1: Phases of the creative problem-solving process**

#### 1.4.1 Essential components of the creative problem-solving process: Divergence, Convergence, Teamwork

Finding the right solution to a problem is important, but problems often have more than one right solution. The problem-solving process makes complementary use of divergence and convergence to come up with the best solution. Divergence helps provide multiple solutions to a problem. The most important characteristics of divergent thinking are originality, fluency, and flexibility (Raudsepp, 1983). Originality is the ability to come up with *fresh* and *distinct* ideas; fluency is the ability to generate a *large* number of ideas at a fast pace to match the problem criterion; and flexibility is the expertise to *rework the idea* to suit initial problem criterion. Brainstorming is a method widely used by groups for divergence. It uses the principles of deferring judgment, striving for quality, freewheeling, and seeking combinations to find solutions to a problem (Steege, 1999).

While divergence is an important component of the creative problem-solving process, a second important component is convergence (Firestein & McCowan, 1988). Convergence is described by Firestein and Treffinger (1983) as “when one ceases to diverge and focuses on decision making” (p. 33). They described the benefits of effective convergence as “to reinforce the process, keep it on track, focus on idea ‘builds,’ guide idea improvement, set rhythm and pace, provide transition, insure manageable evaluation and protect ownership” (pp.33-34). By deliberately alternating between these two thinking modes, problem solvers can increase creative production (Wright, 1995). Thus, divergence and convergence are both important to the creative problem-solving process; and so they both imply teamwork is indispensable to each.

Teamwork and groups are essential to organizational creative problem-solving. The differences in individual styles, competencies, motivation, gender, personality, expertise, teamwork values and skills, and habits of team members generate the



creative abrasion that triggers divergence (Isaksen, Puccio, & Treffinger, 1993). The role of the facilitators assumes great importance to ensure effective teamwork—they must appear nonjudgmental, pose the right questions to generate solutions, and guide the team back if they lose focus.

## **1.5 Impact of the organizational physical environment:**

### **Understanding servicescapes**

The physical environment in organizations is best defined by Sundstrom and Sundstrom (1986) as “the appearance and layout of buildings, the arrangement of rooms, furnishings, and equipment, as well as ambient conditions” (p. 2). Physical environments have been examined by a model based on constantly changing systems effecting the environment. These systems are not just statically present but they also influence our understanding and response to the space, the quality and time spent in them, and the sequence of actions (Bell, Fisher, Baum, & Greene, 1990; Canter & Craik, 1981; Cassidy, 1997; Farbstein, 1978; Sundstrom, Bell, Busby, & Asmus, 1996).

Considerable research efforts have also focused on the impact of the office environment on work productivity (Bitner, 1992; Bradley & Osborne, 1999; Davis, 1984; Steele, 1973; Sundstrom & Sundstrom, 1986). The physical environment has been shown to influence consumer and employee attitudes about the organization in service settings (Bitner, 1990 & 1992; Nyugen & Leblac, 2002; Wakefield & Blodgett, 1999). Bitner (1992) defined these built physical environments in service organizations as *servicescapes*. According to her, “servicescapes provide a visual metaphor for an organization’s total offering, assume a facilitator role, and convey distinctiveness” (p. 57). In interpersonal service businesses such as hotels, restaurants, professional offices, banks, retail stores, and hospitals, the physical setting is widely

acknowledged to influence behavior, thus affecting the organization's image (Bitner, 1992). In these interpersonal servicescapes, the customer interacts with employees in the organizational physical environment; these physical environments can influence and affect the customer's experience, the nature and quality of this social interaction, and can also influence employee affect, productivity, and group effectiveness (Bitner, 1992).

#### 1.5.1 Dimensions of the organizational physical environment

To understand the particulars of the physical environment that influence the behavior of employees and clients in an organization, one must examine the different dimensions by which researchers have studied the organizational physical environment. Bitner (1992), who studied service organizations, classified servicescapes along the following physical dimensions:

1. Ambient factors: include lighting, temperature, noise, music, and color. These factors are especially influential when they are extreme, when the employees and customers spend considerable time in them, and when they conflict with expectations.
2. Spatial layout and functionality: refer to the ways machinery, equipment, and furnishings are arranged: their size and shape, spatial relationships, and their ability to facilitate performance. Their effect is noticeable when tasks are complex and time sensitive.
3. Signs, symbols, and artifacts: include items in the physical environment that serve as explicit or implicit signals, communicating symbolic meaning and first impressions about the space to its users.

Similar to Bitner, Nguyen and Leblanc (2002), who studied corporate image in service organizations, classified the dimensions of a physical environment in terms of providing for the following needs:

1. Operations: allows organizational workflow with maximum efficiency; and
2. Marketing: influences the customers' attitudes and beliefs toward the service organization and its corporate image.

Davis (1984), who studied physical environments in office settings, provided a framework similar to that of Bitner (1992). He viewed the physical environments in organizations as composed of:

1. Physical structure: the architectural design and physical placement of furnishings in a building that influence or regulate social interaction;
2. Physical stimuli: aspects of the physical setting that intrude upon and influence the user's behavior; and
3. Symbolic artifacts: objects that individually or collectively guide the interpretation of that social setting.

Each of these researchers, Bitner (1992), and Davis (1984), Nguyen and Leblanc (2002), have used different terminology to emphasize *functionality* and *symbolism* as the basic dimensions of the organizational physical environment. Davis (1984) suggested that because physical variables are observable and can be described with considerable accuracy, the study of physical variables has an advantage over the study of psychological variables. Hence, viewing an organization's physical environment using all three frameworks provides the researchers with a strong basis for studying the physical variables in an organization as an effective means to understanding its creative workings.

## 1.6 Enhancing the creative problem-solving process:

### Social components

Much research has focused on the intangible organizational influences of creativity. The internal environment of the organization—its *culture*, *climate*, and *structure*—as a promoter of creativity, has generated a great deal of interest in recent decades (Amabile, 1998; Andriopoulos, 2001; Gunnarson & Niles-Jolly, 1994; Tesluk, Farr, & Klein, 1997; Williams, 2001). Earlier researchers did not include the physical environment in their definition of internal environment, nor did they explore it as an organizational resource (Becker, 1981; Payne & Pugh, 1976). The term *culture* refers to the broad pattern of an organization's beliefs and values; *climate* refers to the employees' shared perceptions of the organization on a day-to-day basis; and *structure* refers to the formal characteristics of an organization (Andriopoulos, 2001; Tesluk, Farr, & Klein, 1997).

These intangible values, beliefs, and assumptions that shape the organization's internal environment are translated into more tangible aspects such as behavioral patterns, the structuring and design of the larger organizational work, and even the physical design of the work environment (Tesluk, Farr, & Klein, 1997). Leonard and Swap (1999) agreed, "Workspace design reflects the organization's mission and values including the importance of creativity, more eloquently than does a formal mission statement" (p. 161).

This relationship between the physical environment and the organization's internal environment is clearly recognized in socio-technical systems theories. These theories suggest that the internal physical environment plays a definite role at the individual, interpersonal, and organizational level. They suggest that the physical layout, which forms part of technology along with task characteristics and equipment, needs to harmonize the worker-job relationship (Sundstrom & Sundstrom, 1986). At

the individual level, each user's workstation needs to support the job function, leading to a collective level of job performance. At the interpersonal level, personalization in the workplace influences face-to-face conversations and the formation of small groups. At the organizational level, the theories suggest, organizational structure is represented in work roles and work-units.

The inseparable interrelationship between the physical environment and organizational spirit is illustrated in the DEGW London office example given by Becker and Steele (1995). According to them, the physical environment in this organization is not just about design aesthetic; it expresses the everyday organizational working with carefully designed furniture and spatial layout. They observed, "The whole building showcases the corporate culture. The building *is* the corporate culture" (p. 32).

Enough research exists to support the understanding of organizational creativity in terms of an organization's internal (socio-psychological) environment. Research also indicates that an organization's internal environment shapes its physical environment. However, this apparent link between an organization's creativity and its physical environment has not been empirically established.

## **1.7 Enhancing the creative problem-solving process:**

### **Physical components**

Recent conceptualizations of creativity suggest that physical environment facilitates the development of creativity in varied settings. Empirical research has found that children who took creativity tests in an enriched environment scanned that environment while answering questions (La Greca, 1980, cited in Amabile, 1983), and scored higher than those tested in a barren environment (Friedman et. al, 1978, cited in Amabile, 1983). Csikszentmihalyi (1996) rationalized the impact of the physical

environment on creativity, “Even the most abstract mind is affected by the surroundings of the body. No one is immune to the impressions that impinge on the senses from the outside” (p. 127).

Researchers have argued that not only do physical environments echo an organization’s creativity; they also contribute to the social conditions within an organization that in turn foster creativity. While researchers such as Amabile (1983, 1998) have argued that managerial initiatives influence creativity more than the physical environment does, other researchers such as Becker and Steele (1995), Bradley and Osborne (1999), Csikszentmihalyi (1996), Firestein (1992), Leonard and Swap (1999), and McCoy (2001) support the view that it is possible for physical environments to aid organizational creativity. These researchers have argued that the workplace can affect work output; hence flexible and creative spaces can facilitate creative production.

A study of 25 employees in Brazilian organizations by Alencar and Bruno-Faria (1997) found that physical environment was rated as the seventh most important factor in stimulating creativity in any work environment by 24 % of the respondents, and was ranked higher than technological and material resources by 12% of the respondents. The same group of respondents rated physical environment as the fifth most important hindrance to creativity in any work environment (16%), equal to the hindrance caused by lack of equipment and material resources (16%), and inadequate salaries and benefits (8%), among other factors. This study clearly indicates the importance of the design of physical environments, which is far underrated compared to some other factors typically thought to promote or hinder organizational creativity. Another recent study by Vithayathawornwong, Danko, and Tolbert (2003) found that physical environment positively influences creativity in organizations. The physical environment is itself mediated by the organization’s internal climate, namely

dynamism at the inter-personal level and freedom on the individual level, both significant socio-psychological conditions that promote creativity.

John Kao (1996), has suggested that creativity can be facilitated not only by clearing employees' minds and beliefs but also by clearing physical space. Emphasizing the impact of the physical environment on creativity, Kao suggested that the physical environment confers tangibility to creativity and thus stimulates creative work by creating the psychological freedom and belief to achieve it. According to Kao, some requirements of such a space are that it be "safe, casual, liberating," (p. 58).

Although researchers agree on the influence of the physical environment on creativity, little research exists to establish this relationship empirically. Subsequently, the study of the interrelationship between physical environment and the creative problem-solving process has not progressed beyond anecdotal observations and propositions. The next part of the literature review outlines some of the more useful observations. These observations are based on individual creative problem solving process but offer us a good guideline on how the physical environment impacts individuals in an organization.

According to Csikszentmihalyi (1996), thought processes are affected by the physical environments in which creative work is done. Creative individuals take great pains to ensure that they can work in comfort without interruption, and to feel in control. They mold their surroundings to echo their thoughts and actions. Novel, complex, and stimulating environments; beautiful and magnificent views; and alien cultures all create excitement, allowing individuals to experiment with novelty and make subconscious connections to aid incubation. On the other hand, long periods of preparation and evaluation benefit from ordered, familiar, comfortable settings, which allow for concentration without distraction. Evaluation and elaboration also require the existence of the domain.

Another observation was provided by Thompson (1992) writing of the prolific inventor Dr. Yoshiro NakaMats, who holds over 2300 patents, more than double the number held by the next prolific inventor, Thomas Edison. Dr. NakaMats divides his problem-solving process into three phases and uses specifically designed creative problem-solving environments for each phase. To start the generation of ideas, Dr. NakaMats uses the “static room.” The “static room” contains only natural things—a rock garden, running water, wood, and plants—which help him to free-associate. He uses the “dynamic room” to analyze ideas; this room is dark, with black and white striped walls, leather furniture, and special audio and video equipment. Different moods of music, along with the room’s environment, help him to draw conclusions. The third room is actually a “swimming pool,” where Dr. NakaMats does his creative swimming to invent his best ideas and then writes them down on a special underwater Plexiglas writing pad. The example of Dr. NakaMats shows how different physical environments can be used during different phases of the creative problem-solving process.

While the example of Dr. NakaMats illustrates the use of the physical environment for different phases of one individual’s creative problem-solving, the use of the physical environment for organizational creative problem-solving can be illustrated by the London consulting office of former Arthur Andersen, now Accenture, which uses the design concept of “Zones”. Each zone reflects different physical environments within the office.

The “Chaos” zone is separated from the rest of the floor by partitions decorated with bright red pictures of connecting wires and cables, and is designed to facilitate divergent thinking. Everything is portable, so desks and equipment can be wheeled around when people need to meet. A red brainstorming room is intended to perk up lagging creativity, while calmer blue and green rooms can be used for more contemplative activities. At the other end of the floor, the “Zen” zone is for incubation. The panels separating this area have scenes from



nature. A sign reads, “No meetings. No phones. No interruptions.” Between Chaos and Zen stretches a corridor called the “touchdown Bar,” which houses workspaces where workers can sit, plug in phones and computers, and work for a while. (Carter, 1998, cited in Leonard & Swap, 1999, p. 142)

Elaborating on their observations of the impact of the various physical environments on the creative problem-solving process, Leonard and Swap (1999) summarized, “Organizations need a *creativity ecology*—an interdependent, interactive, self-sustaining, and reinforcing system that includes not only people and processes but also settings” (p. 136). According to them, the right use of architecture, internal space, acoustics, even furniture can support creative problem solving. Comfortable, demarcated but inter-connected spaces, well-equipped with sufficient writing materials; with lots of proper stimuli—visual, smell, touch, music—can encourage divergence and convergence. Creativity also needs quiet places for incubation. Playground areas, such as those designated for refreshment, exercise, and socializing, can also work as incubators. Most important, employees should be able to choose the environment they want and be able to reconfigure it to suit themselves.

Similarly Tom Kelly, General Manager of IDEO, a leading design consultancy known for their product development and innovation strategy and the author of *The Art of Innovation*, says of the use of physical environments at IDEO, “The process of innovation doesn’t happen in a vacuum” (Kelly, 2001, p. 121). Providing proper facilities for employees to thrive and grow is nearly as important as hiring talented people. According to Kelly, the workplace is a greenhouse for innovation, where all the elements in the space help to promote the growth of good ideas. These elements include building workplace neighborhoods—spaces that encourage community as well as privacy, serendipitous encounters as well as focused work—that reflect the character and personality of their employees and projects. There is no hierarchy in such a space, everyone has a free reign over it, and it is easily configurable. The space

is simple, to provide a sense of history but also of current trends; evolves with teams and projects; and tells stories about the employees and the company. It is a place for show-and-tell “a mindset and a physical statement” (p. 145).

The above examples illustrate the relationship between the physical environment and the creative problem-solving process for individuals and organizations. These examples also stress the importance of different physical environments for each phase of the process.

### **1.8 Proposed research**

This study examines the creative problem-solving process as a means of studying organizational creativity. It explores one organization’s creative problem-solving process in relation to their physical environments, through the subjective experiences of the employees and the clients who experienced the process first-hand, for a particular project.

## CHAPER TWO

### METHOD

#### 2.1 Case introduction

This research focuses on BrainStore Ltd., a consulting firm in Biel, Switzerland. BrainStore follows a systematic creative problem-solving process in a physical environment specifically designed to support their processes - clear structure, crystal clear timing and team mix (figure 2.1). BrainStore has provided a wide range of creative solutions, for an equally wide range of clients. BrainStore's clients include big corporations like BMW, Colgate Palmolive, and DuPont, and Non-profit Organizations like Greenpeace, and AIDS clinics. From generating advertising ideas for Coca-Cola, Switzerland, to convincing people to get vaccinated against Hepatitis B (Federal office of public health, Bern), to creating a new soft drink for young people (Migros Genossenschaftsbund, Zurich). BrainStore also provides solutions to individuals, tackling small interpersonal problems like getting a grandson out of bed in the morning, suggesting ideas for a carnival costume, or choosing a gift for Christmas (BrainStore promotional brochure, pp. 14-15). BrainStore likes to position itself as "*The Idea Generation Factory*" (Marcus Mettler, CEO, BrainStore). Although the process is creative, BrainStore uses the metaphor of the factory to communicate their philosophy of creative and timely solutions for their clients. BrainStore has been featured in publications such as *Time* (April 2, 2001) and *Fast Company* (April, 2000).

BrainStore's executives strongly believe that the physical environment is a key component of its creative-solving process. In an interview, Mr. Marcus Mettler, CEO & founder, BrainStore Ltd., elaborated, "Our job needs to be self-explanatory; the more coherent the workspace is to workflow, the more efficient the workplace gets." (Transcript 5, June 26<sup>th</sup>, 2001, p. 24). He added, "It is extremely important to have

clear structures for clear competence.” (p. 19) According to Ms. Nadja Schnetzler, CEO, BrainStore Ltd., “The interior is about what the employees do and think. It also makes the clients realize that the space is about work. It was always important to us, that we show how the process of idea finding works in the physical environment.” (Transcript 3, June 25<sup>th</sup>, 2001, p. 6)

1. Clear structure, organized chaos.
2. Crystal clear timing and pricing.
3. Team mix is fundamental.
4. Quality of ideas thanks to quantity of ideas.
5. No stars. No privileges.
6. Speed, Speed, Speed in idea generation.
7. Trend observation for inspiration.
8. Idea-focused interviews.
9. Daring ideas with high potential.
10. Visualization of ideas is central to success.
11. Universal use.
12. World-wide media recognition.

**Figure 2.1: Key elements in BrainStore’s creative problem-solving process.**  
**(Brainstore, (n.d.) Industrial idea production section)**

This study attempts to investigate whether the physical environment at Brainstore does, support the company’s creative problem-solving process and if so how?

## 2.2 Procedure: Narrative case methodology

To understand and analyze the influence of the physical environment at BrainStore on its creative problem-solving process, this study uses the narrative case methodology. Portillo and Dohr (2000) defined the narrative case as “a hybrid combining characteristics of the narrative inquiry and case study research” (p. 44). The case study is a step-by-step empirical analysis of a phenomenon in its actual setting (Yin, 1994). According to Orum, Feagin, and Sjoberg (1991), a single case study can be used to study unique events as they occur, furthering a rich understanding of the event and the events leading to it.

While the case study, by itself, is a valuable tool in research, narrative inquiry complements case study data by using the narrators’ perspective to translate subjective experiences from individual perspectives and to transfer them to others through “storytelling.” This inferred knowledge cannot be acquired by any other method but the narrative inquiry (Reissman, 1993). According to her, “narrators create plots from disordered experience” (p. 4), to reveal the frame of reference that ties the narrator’s experience to the facts. “It opens up the forms of telling about experience, not simply the content to which language refers. We ask, why was the story told that way?” (p. 2).

Undoubtedly, different individuals construct different, subjective accounts about the same situations in their narratives; hence a *narrative is not meant to be read as an exact record of what actually happened*. Although a deep distrust of subjectivity exists in mainstream social science, “their rootedness in time, place, and personal experience, in their perspective-ridden character” makes subjectivity valuable in personal narratives (Personal Narratives Group in Reissman, 1993, p.5). Narratives also help researchers to incorporate the viewpoints of multiple narrators on a situation, whose added insights helps readers relive the narrators’ experiences, thereby further enhancing the understanding of the issue.

The traditional case study does a good job of finding out the “what” and “when,” but the narrative inquiry helps the reader to understand the “why” and “how” of a process or situation. The narrative case hybrid is most suitable for this research because it not only allowed the researchers to acquire objective facts through the case study, but it also allowed emotional tensions to surface through the narrative. Thus, these methods used together contributed to a holistic understanding of the variables under study.

The researchers used case study format initially to collect and understand information about the organization being studied and then further analyzed the issues through the narrative analysis framework. The case study data collection included qualitative interviews and observation, pictorial documentation, and archival records. A subsequent detailed analysis drew on the interviews and subjective experiences of the narrators, along with the help of the background information collected, to construct the narrative.

#### 2.2.1 Studying creativity and physical environment through the narratives

Despite the growing use of narratives in many disciplines, its potential has not been fully utilized in the field of design (Danko, 2000). Narrative analysis was particularly helpful to this study, the goal of which was to explore the complex and multifaceted issues involved in examining the relationship between physical environment and the process of creativity, which according to Portillo and Dohr (2000) are “time-and-place linked as well as developmental” (p.43). A narrative captures different perspectives on the same issue. Creativity itself is a multifaceted and contradictory construct; hence, a narrative can offer more insights to the study of creativity and is thus precisely helpful to its study (Portillo & Dohr, 2000).

Ganoe (1999) also argued similarly that narratives are best suited to the study of physical environments. According to her, studying the physical environment through narratives allows for “understanding and expanding the meanings of design” (p. 2), providing subjective insights into the relationship between users and their environment. Portillo and Dohr (2000) stated that, by evaluating shared and individual experiences from multiple viewpoints, we can derive knowledge to better understand the design process.

Narratives are well-suited to providing multiple perspectives on this issue. It allowed the interviewees in this study a medium well-suited to frame their own understanding of the relationship between creative problem-solving and the physical environments at BrainStore. Furthermore, it allows the readers of this narrative to enrich their understanding of this issue—and to pose further questions.

### **2.3 Data collection**

Data was gathered from direct observation and semi-structured interviews. According to Howe (1988), “a semi-structured interview is built around a core of structured questions prepared in advance to explore core issues. The interviewer may deviate from these structured questions to confirm and verify interviewee responses and to probe emergent issues. Being on site—listening, observing, and recording—the interviewer begins to comprehend the interviewees’ language, understand their experience, and comprehend the context of the information” (pp. 320-21).

The process of collecting primary case data started with two preliminary phone interviews, on-site observation and followed by qualitative structured personal interviews which took place over three days at the office of BrainStore, in Biel, Switzerland. All interviewees voluntarily agreed to be recorded during interviews and granted permission to be identified in ensuing publications. The interviews targeted

key multiple voices in order to get an encompassing view of the space use. Those interviewed included the organization's leaders, employees, and clients. The interviews averaged an hour-and-a-half long. The interview protocol was designed to reconstruct the problem-solving process for a specific project and to reflect on the role of physical environment in the process in as much detail as possible. Figure 2.2 lists the core interview structure and questions, and Figure 2.3 lists the key informants.

Along with the interviews, permission was also sought to photograph the BrainStore office (see Figures 2.4–2.11) and to observe their creative workshops. The researcher also collected archival data in the form of print and other collateral material from the BrainStore office as background information for better understanding of the case and their particular creative problem solving process.



ABSTRACT (Purpose)

- Selection criteria for case
- Professional background of the individual
- Overall mission and competitive strategy of the business

ORIENTATION (Time, place, situation and participants)

- What initiated the project?
- Time frame of the project?
- Goals of the project?
- Choice of design firm?
- Who was involved in the decision making?
- First impression of the space? Did it match expectations?

COMPLICATING ACTIONS (Tensions, discomfort, sequence of events)

- Fears in beginning of the process?
- Pivotal decisions in the process?
- Internal or external forces impacting the project?
- How long did it take to resolve the issues?
- What were the constraints in the project? (Budget, resources, time)
- Most difficult decisions
- Most tense/difficult moments
- Points of doubt in reservations with process?

RESOLUTION (Describing the outcomes)

- What was the solution?
- How was it innovative? Evidence?
- Solutions in comparison to competitors?
- Reactions by competitors?
- Does the solution reflect corporate mission and strategy? How?

EVALUATION (Perceived meaning and attitude of behavior)

- Evidence, anecdotes of success?
- Evidence, anecdotes of the role of design in supporting success?
- Consequences of the solution?
- Would you like to do it again? (Why or Why not)
- What would you do different next time?
- What lessons can be drawn from this example?
- Favorite part of the process? Why?
- Favorite quality feature of the space? Why?
- Most fun part of process?

**Figure 2.2: Core interview structure and questions.**

**Figure 2.2 (continued)****CODA (Central meaning in present context)**

- What three words/ adjectives would you use to summarize/describe the process? (Beginning, Middle End)
- What three words would you use to summarize your impressions/use of the space?
- Long-term impacts of solutions/process on business strategy? Short-term impacts?
- Has this changed the way you work? Changed you personally?
- What makes for good design in the workplace?
- Specific synergies in process? Between design and productivity?

1. Markus Mettler, Principle In Charge, FDP case & CEO, BrainStore.
2. Nadia Schnetzier, CEO, BrainStore.
3. Sandro Morgan, Project Manager, BrainStore.
4. Sven Weber, Graphic designer, BrainStore.
5. Laurent Burst, Creative Brain, BrainStore.
6. Romeo, Burkhalter, Interior Designer, BrainStore.
7. Theodor Fessler, Client, FDP Party.
8. Mrs. Degoumois, Client, FDP Party.

**Figure 2.3: Interview informants for the BrainStore-FDP case study.**



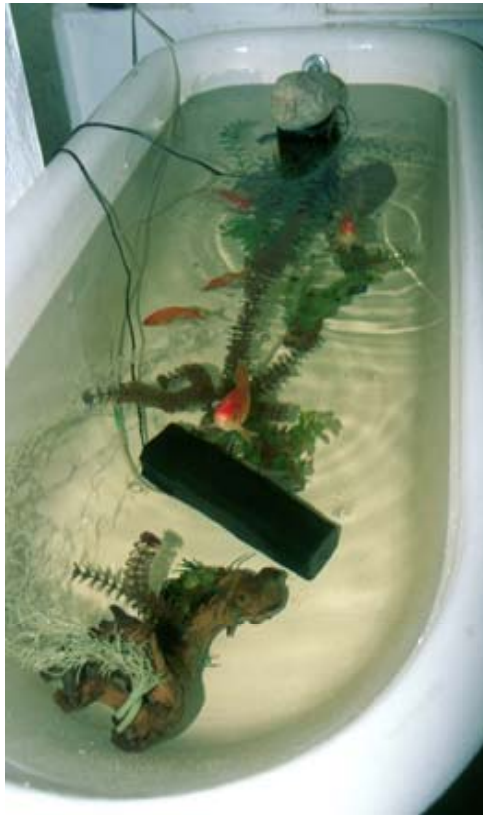
**Figure 2.4:** The Magenta boarding room. BrainStore's entrance lobby, based on the concept of an airplane boarding station.



**Figure 2.5:** Magenta wall with one of the bathtubs in the entrance lobby to shock the client with unusual color and artifacts.



**Figure 2.6:** Radio-wave-controlled timepiece and various production zones. The timepiece signifies the importance of time for BrainStore, and the production zones give the impression of a factory.



**Figure 2.7:** One of the bathtubs with goldfish used earlier as a meeting table, giving clients and employees a relaxing place to meet.



**Figure 2.8:** Gathering space with old industrial washbasins rebuilt as community tables to invoke the concept of animals gathering at the common watering hole.



**Figure 2.9:** Painted wall from the unusual paint fest in one of the main meeting areas, now signifying emotional values for BrainStore.

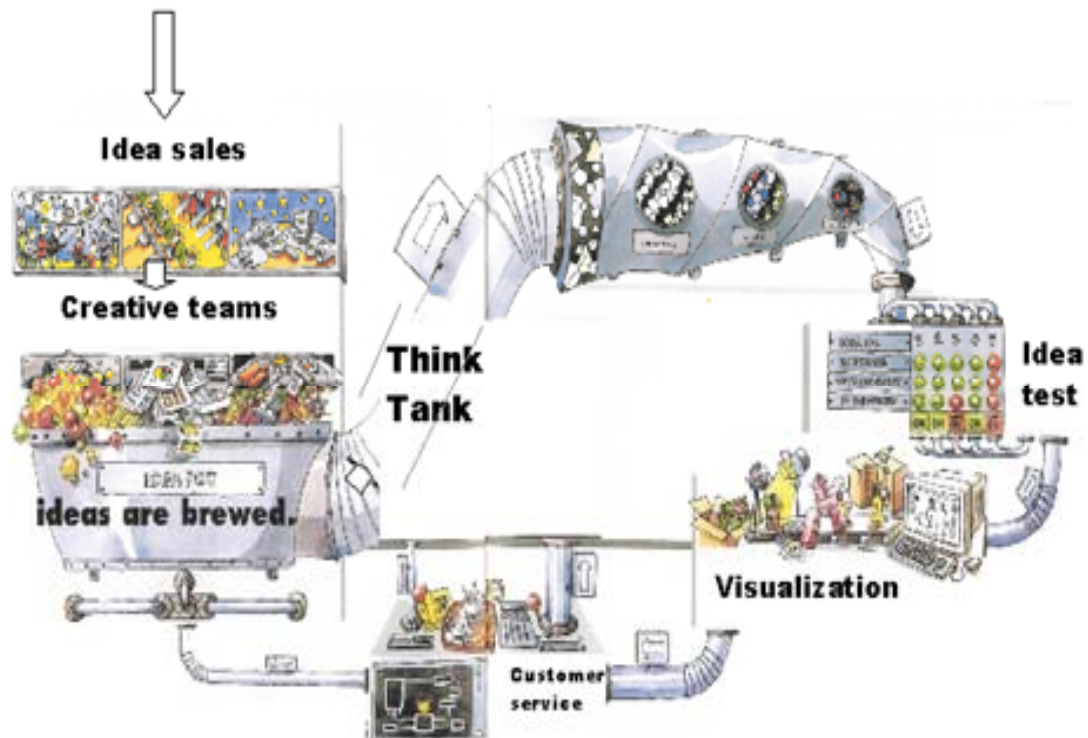


**Figure 2.10:** The big group room, with black post-wagon table, used for “the idea boost phase.”



**Figure 2.11:** The blue mini-labs next to the big black post wagon table, allowing members to break out into small groups.





**Figure 2.12:** A metaphorical illustration of “the idea factory”-based creative problem-solving process at BrainStore (Brainstore promotional brochure, pp. 8-9)



## 2.4 Narrative analysis

After the data collection was completed, the taped interview data was transcribed verbatim to ensure accuracy. The archival data complemented the interview data and included on-site observations, reviewing publications on the firm and their projects, and their official Web site. The transcribed data was then sorted into major categories. These categories were further grouped, regrouped over several edits to encode the themes arising from them. The themes then began to reveal the hidden story behind the words and pictures. The primary objective was to create a well-structured narrative, rich in details that offered insights into the relationship between the physical environment and creative problem-solving process at BrainStore. Through the narrative, the researchers endeavor to recreate a clear sequencing of events that surfaced for a particular project, with its inherent tensions and its ultimate resolution.

Most researchers treat narratives as individually complete entities, rather than placing them within the framework of the issue in study (Reissman, 1993). Researchers also agree that a narrative necessarily requires a sequence in time or theme. The narrative presented in this research can be categorized as a “topic centered narrative,” thematically linked personal, verbal recollection (Reissman, 1993, p.18) or a “natural narrative,” which is a first-person account of an individual’s experience. Labov (1972), and Labov and Waletzky (1967) treat narratives as stories about specific past events that have formal properties and functions. These narratives are linked temporally, and have causes with clear beginnings and endings that help to understand the narrator’s framework of their personal experiences. Labov’s six-point framework (Figure 2.13) was chosen specifically for its emphasis on defined structural properties which help to simplify analysis.

1. Abstract- summarizes the plot line of the narrative.
2. Story orientation - introduces the characters, place, time, and context of the narrative.
3. Complicating action - shows the sequence of events within the narrative, often delineating tension points and key issues
4. Evaluation- moves from description to analysis. Reveals the attitude of the narrator or the assumptions, values, or decisions found in the narrative.
5. Resolution - examines the outcome of the narrative.
6. Coda - brings the narrative back into the present by concluding simply.

**Figure 2.13: Labov’s six-point framework for narrative analysis (Labov 1972).**

The narrative threads are woven together with researcher evaluations, which give the narrative a focused intensity. According to Attanucci (1991), “evaluation infuses the account with values and meaning” (p. 323). The researcher cites the narrators as proof of their argument to offer factual information, as one might do for quantitative evidence. In this study the researcher quotes from interview transcripts to further strengthen stated arguments. As Mishler (1991) noted, “How we arrange and rearrange the [interview] text in light of our discoveries is a process of testing, clarifying and deepening our understanding of what is happening in the discourse” (p. 277). Focused and repeated listening to the transcripts leads to insights that in turn shape how we choose to represent an interview narrative in our text (Reissman, 1993).

## **2.5 Building validity and reliability**

An interview situation raises questions about accuracy because of “lapses of time, social desirability of responses, interviewer’s presence, and the underlying motives of the interviewee” (Howe, 1988). However, according to Yin (1994), these

problems are similar to those encountered in any other research and can be avoided by triangulation. Yin identifies four major kinds of triangulation: “methodical triangulation,” or the use of multiple methods of data collection or analysis; “theory triangulation,” or the use of differing perspectives or world views in investigation; “data triangulation,” or the use of a variety of data; and “investigator triangulation,” or the use of several different researchers (pp. 91–93).

Methodical triangulation was achieved in this study through the use of multiple methods to collect the data including interviews, archival documents and a direct - observation data collection strategy, which involved not only recording the verbal interview but also examining non-verbal behavior and its context and validating it. Data triangulation was also achieved through the various voices of the employers, clients, and employees interviewed. Two investigators scanned the transcripts independently for various themes, ensuring investigator triangulation.

Potential limitations of the case study method are the issues of representativeness and generalization. However, in the sciences, many theories are formulated from a single case; and, even a single case can draw attention and contribute significantly to theory building and can guide future investigations (Yin, 1994; Reissman, 1993). Researchers suggest that comparison may be a more useful approach than generalization because theories should be able to replicate the same phenomenon under different conditions (McCormick, 1996; Yin, 1994).

The validity of the narrative itself is ensured by use of the Greene (1994) method cited in Danko (2000), which emphasizes credibility, dependability, conformability, and transferability. This study used three of the four components of Greene. Dependability centers on the methods used to collect the raw interview data. Conformability relies on the ability to trace aspects of the narrative to the raw interview data. Transferability refers to the thick description within a narrative.

After ensuring the validity and reliability of the collected materials, the following story, “*The Tacit Dimension*” evolved from the major themes in the collected data and interview transcripts.

## CHAPTER THREE

### RESULTS

#### 3.1 Introduction

“The Federal Democratic Party (FDP) is the major political party in Switzerland. “The FDP has been in power without interruption since 1848 and is, by that measure, one of the world’s most successful political parties.” (Australian government, Department of foreign affairs and trade (2003), Country information, Switzerland: political, para. 5). In May 2000, one year before the party’s state elections, the FDP was challenged with a unique problem: it needed an innovative way to attract younger voters in order to expand its party representation in the State government for the upcoming elections. To help with this challenge, the election committee decided to hire BrainStore, Ltd. of Biel, Switzerland. BrainStore is a 12-year-old self-proclaimed “Idea factory” with a mission statement that says “Fresh Ideas. For just about anything. Now.” (BrainStore promotional brochure, (2000) p.1).

Through the narrative “The Tacit Dimension” we try to understand why the major political party, whose members and voters were very conservative, agreed to use BrainStore as consultants and embrace the non-traditional solution they developed. This narrative takes us through the emotional experience of the clients, Teresa Degoumois, the president of the FDP party election committee for the state elections, and Theodore Fessler, the senior opinion leader and member of the committee, as they experienced the creative problem-solving process at BrainStore. We try to understand how the problem solution was created and influenced by BrainStore’s physical environment.

### 3.1.1 Narrative: “The Tacit Dimension”

Fessler recalled, “We needed more votes to expand the party representation in the state government. But where would we get these additional votes? From the previous election analysis we had found that the sections of the population who vote for us are mostly elderly and the economically well situated. So we thought of targeting a new segment of the population - the younger voters now. But in Switzerland the younger voters all tend to vote to the left.” Degoumois agreed, “It was quite difficult to get these younger people to vote for the FDP party, because their interests are totally different. Normally these young people have other interests and are not interested in politics at all. So we wanted to attract these people who were not decided on any party or not likely to vote at all, and try to get them to vote for FDP.”

But as the FDP party thought of ways to attract these new voters, members became increasingly aware of the high risks involved in doing so. “There was this danger that if we target the younger generation with a new campaign, we could lose our existing voters.” Fessler ruminated. Degoumois agreed, “Then we wouldn’t get the younger voters *and* we lose the older ones and then we would be left with *nothing*.”

Fessler added, “Our election campaign seemed destined to be the same as always.” Degoumois also recalled, “That year’s campaign was no different. The Cantons had given us the examples on how to lead and provided us with the slogans. These slogans were the same for everybody in the district. We felt these repeatedly-used visuals and slogans were without any imagination and were very boring.”

FDP party leaders such as Degoumois and Fessler realized that this older form of campaigning was going to be of no help to the party now, and that it must be changed. They felt the need for a campaign that was targeted and sensitive to both the older and younger sections. Realizing that it was not possible to develop solutions on

their own, they decided to seek expert advice. Degoumois recalled that one day at a committee meeting, Mr. Fessler said, “I have an idea!”

Fessler saw some hope in BrainStore and suggested that they hire them for the job. “I had known BrainStore and Markus Mettler, the founder of BrainStore for a few years. And I knew more or less what they did and how they did it. So, I thought let’s go to the other extreme and create an exciting and creative campaign.” Fessler hoped that BrainStore could provide them with just such a very creative solution.

But this process was not as easy an idea as it sounded, because Fessler had to convince the committee members. He asked them: “ ‘What do you know about BrainStore?’ One third said ‘I’ve heard the name.’ The other two thirds of the members didn’t know who or what BrainStore was. Fortunately, Fessler had an article from a newspaper about BrainStore. So he made copies and gave it to everyone, and suggested we go to BrainStore.” Fessler created an opportunity for the FDP party, a very non-traditional opportunity.

“We should try it.” Degoumois was the first to grab on to the opportunity for change that Fessler had suggested, “At least it was a new direction and I was very pleased about it.”

After his initial suggestion, Fessler handed the project over to Degoumois. The committee was resistant to change; it was difficult even to gain consensus to initiate a contact with BrainStore. Degoumois recalls the rigidity of the situation, “I had to discuss it with the other members of the committee at length. It took over two hours to get them to agree that we should *at least check BrainStore out.*” But they finally did. Degoumois was delighted. To get these conservative members to even agree to try something new was progress, perhaps they could, after all, initiate a new way of campaigning. But achieving this was still a difficult task. She recalled, “The first struggle was to start the process.”

So the committee set up an appointment with BrainStore, to find out what BrainStore could offer them. Few were familiar with what BrainStore did or how exactly they worked. Fessler knew BrainStore was not the traditional office environment the members were used to, therefore, in spite of his eagerness to work with BrainStore, Fessler felt anxious about having these people actually walk into BrainStore's physical environment. "I didn't know the people in the FDP party committee very well, I didn't know how they would react, but I knew they were conservative, they probably will be shocked when they walk into BrainStore."

Fessler worried that once the committee set foot in BrainStore they might refuse to try anything more. But he was determined to go. "I told myself, 'Whether the committee liked it or not, we have to go.' When they walked in the door that day the committee members were very quiet. The reception space of BrainStore was not a traditional office lobby with guest chairs and a corporate logo on the wall. This was an entry that defied explanation. They were keenly observing all the strange materials and forms and noticing the unusual things around them." As expected, the members were trying to understand what this place really was all about.

The outrageous environment actually surprised and excited Degoumois. "When I walked into the lobby, I thought "fantastic!" There were palm trees in the room and the floor was covered with wood chips. There was a table, that was actually a bathtub with goldfish in it. I was excited by it. I looked at my colleagues, but I couldn't tell from the look on their faces what they were thinking." Positive or negative, the members did not seem to show their judgments. They all seemed to wonder what each other was thinking about the place. Maybe such a non-traditional environment provoked and excited them or may be undermined their confidence in BrainStore. Whichever reaction they had, they began the creative process by experiencing a space that clearly challenged their preconceptions.



The committee met with Marcus Mettler, CEO of BrainStore, and laid out their problem. They told him what the FDP party goals were, how the FDP party worked and so on. Mettler, in return, explained how the creative problem-solving process at BrainStore worked. As part of presentation, he walked them around the office, intentionally modeled after a factory. Degoumois's positive first impression disappeared. "I think all of us were a bit shocked when we saw the offices. We had not expected it. It was not just that they were not typical offices, the place looked a little bit poor, kind of rundown." However they listened to Marcus's presentation, and became quite sure that BrainStore could really help them. "BrainStore had to sell themselves to the committee and they did. After the meeting, she remembers many excited, positive comments like, 'That was really something.' 'That was a great process.' 'That was interesting.' "

After the first visit the committee was ready to place the order, but they still had an economic block to overcome. "We waited until Mr. Mettler sent us the cost proposal and that was when most of the members found it too expensive," recollected Degoumois. "It was not that it was expensive, but it was expensive for a political party, which is mostly funded by public donations. In the end, the committee voted to go ahead with the project and set up another appointment to begin the process - an "idea session" at BrainStore.

Fessler recalled, "BrainStore told us, 'You come with your people, and we will bring ours for stage 1: idea session.' We didn't know who they would bring. When we came in for the Idea session, we were shocked to find thirty to forty people in a big room sitting around a huge black table on industrial wheels." Fessler thought, "My goodness! How will this work?"

Degoumois was surprised, too. "It was very interesting to me because I had no idea the group would be so huge, nor did I know what was going to happen. There

were these young people between 15 and 22 years of age who we didn't know. I felt a little bit uncomfortable. While I have two sons, 15 and 18 years old, and feel comfortable with them, working in this big group with young people I didn't know, made me uncomfortable.”

Degoumois recollected her amusement at the start of the process, “First, Mr. Mettler gathered all these young people who had come for the idea session around a big table and asked them to suggest specific types of people we (the FDP party) wanted to attract as voters. He told them that the party wanted to expand its base of voters. The committee members were asked to just sit and listen this time. Marcus instructed the youth's that it didn't matter if their idea was something stupid. So the young people just shouted out everything that was in their mind. ‘Skeletons. Outcasts. Handicapped people. Pickpockets etc.’ When we heard them shout all those names, we were laughing, and we couldn't really imagine how such *ridiculous* suggestions, could help us.”

The FDP committee members were definitely not prepared for this kind of idea session with the teenagers, and the goals of the session confused them. Fessler recalled that the members of the committee became very critical. “They were worried about what sense the BrainStore people would make of all the *nonsense* the committee had heard. Many felt this session was not leading to anything that we had wanted to achieve. The committee asked, what will BrainStore do with the information collected in the session? Will this idea session bring any results?” Fessler calmed them down. He told the committee, “Let's see. It might be a part of the process.”

As the process continued Marcus said, ‘You have to get in touch with a pickpocket. How do you find him?’ And we were shocked. ‘Why does Marcus ask these kinds of questions?’ But you see the question really was, how will the FDP party get in touch with people—the voters with whom we have no contact with, and we do

not know where they are? The pickpocket was a good example of the “un-reached” voter. And that’s what we had to do—attract more voters. ‘So I thought, that’s an excellent question, but my Goodness! I don’t know how.’ And then, you know what one kid said? ‘Make a note, and leave it in your pocket.’ The pickpocket will snatch it.’ I thought, that’s really amazing. BrainStore had a solution for everything. BrainStore was trying to ask the questions that no one had ever thought of before and to draw parallels to the present problem.

At that prompt the committee got interested and began to delve deeper into the questions that were being asked. The process created awe and excitement. What Fessler liked about the process was that it was very time sensitive and fast. BrainStore didn’t leave people time to think. Fessler recalled, “During the idea session Marcus once asked his teenager team, ‘What do you think about politics? No pondering. You have 20 seconds. You give me an answer, or if you have no answer, then you have no answer.’ That was new for me, because usually if I discuss anything with you, I like to see that you think about it, because I will get the best out of you. But here they said, ‘No thinking. You just give an answer.’ But I realized that’s what the committee wanted to know. ‘What does this young generation think about politics? Not from their head, but from their heart! Not rationally, but emotionally. You need to capture them, in their heart.’ *Excellent!* You couldn’t do it better without the time pressure.”

Degoumois recalled the rest of the process in detail, “During the process while young people shouted names, there was one person who wrote down on huge posters what everyone said and posted them all over the room. It was like a competition. There were papers on every inch of the wall listing all kinds of people we would like to attract. Very visual and very exciting. housewives, economic decision-makers, preachers, pastors, rich people, etc., and also some bizarre ones. And then, each person had to write down why the people listed might be interesting to the FDP.

Fessler continued, “The next part of the session in the afternoon, was the “Idea Test.” It was just the committee, without any kids. BrainStore gave us ten possible solutions and also some statements about each of the solutions. They wanted to know what we thought about the statements. We had to write down some words and answers in a very short time. The committee members thought, ‘What’s this for?’

After BrainStore had generated a large number of ideas, it was necessary to select the options for the solution to the FDP problem, so BrainStore asked the committee members to rate the solutions according to their suitability with respect to the FDP solution criterion.

While the committee knew that this Idea test was not the end of the process, they were confused about the end result. Individual members felt differently about the Idea Test phase, some positive and some negative. Fessler was curious and confident. “The BrainStore people didn’t say that we have the solution. They told us that we’re taking one step at a time to reach our goal. It was well choreographed, well organized. It was not just a huge chaotic crowd as it seemed at first. We realized that there is a process going on and became more confident about BrainStore. When the half-day idea session was over, they sent us away without any result. I needed to know, ‘what is next? Will something actually come out of this?’ ” Degoumois was unsure too, “When we left that day, I was unsure of our decision to hire Brainstore. But I knew that this was not the end.”

“Markus then sent us a summary in the mail which we went through at our committee meeting. We just looked through it, and we told them what we liked and disliked, and sent it back to BrainStore.”

Based on the feedback from the booklet that BrainStore had sent to the committee, BrainStore evolved a great solution. Degoumois recalled the solution with excitement. “BrainStore proposed that FDP members , also known as Burgermeisters,

should set up *hamburger stands* around the city and *flip burgers* to attract voters. Having attracted the voters to the hamburger stand, the members would then distribute a little pamphlet that explained the party stand and agenda on different issues.”

Degoumois went on to describe BrainStore’s idea. “The burger and the pamphlet would be specifically designed to target different sections of the population. In the last elections the construction industry was a huge source of concern, so BrainStore suggested a burger targeted for the construction industry that was shaped like a *brick*. Then there was the *women’s vegetarian burger* to promote women’s issues and greater representation of women in the party. The environmental *fish burger* could be designed for someone trying to save a lake. Marcus explained that any number of different burgers could be created to address any number of different issues. This strategy was a great spoof on the party name too. ‘BurgerMeister’ in German means ‘bourgeois party’ and it translates into English as “burgers”. Thus BrainStore had made use of these connections to come up with this creative solution that reached out beyond our “bourgeois” roots to the people.”

Degoumois added, “At one point in his presentation, Marcus announced ‘Dinner is ready.’ We all moved out to the dinner area where there was a *hamburger stand with four people flipping and serving burgers for the committee members*. It was absolutely fantastic. Everybody was amazed. I could see it in their eyes. I could hear it in their laughter. They talked very positively and excitedly about the solution and its implementation. There was no doubt about BrainStore anymore.”

Fessler reflected on his experience, “I liked the BrainStore innovative environment from the beginning. When I entered the BrainStore environment, I knew I was in an atmosphere where people work and think differently. I went to BrainStore because it was supposed to be different. A customer looks for a new partner because

they are looking for something different. The physical environment drew us into the process. I knew BrainStore was very serious about its culture and working process.”

Ms. Degoumois agreed that they could not have undergone the creative process in any other office. “It’s too sterile in our office. It’s small. It’s furnished. It’s clean. It’s nice with thick carpets on the floor. It’s very comfortable, but it does not help to generate ideas. It’s not the right *Ompa* [German - the whole atmosphere] to create ideas. So, it was good for us to go away from our offices and experience the BrainStore environment.”

Although the problem-solving process at BrainStore was initially not very clear to FDP members, the symbolic messages and physical layout of the environment helped them adopt a mindset that challenged norms and supported a large group think process to achieve a creative solution. Although committee members were uncomfortable with the physical environment in the beginning because it didn’t match their preexisting notions of office work, the environment helped them to understand that BrainStore was not a traditional company, and would employ non-traditional methods. The physical environment at BrainStore helped its employees function creatively. Instead of writing down intangibles qualities that related to their process of creative problem-solving, competence, and culture on a brochure and giving them to their clients, BrainStore wanted them to experience these through the physical environment. This physical environment acted as a “*Tacit Dimension*” that helped transform mindsets and methods into tangible realities.

## **CHAPTER FOUR**

### **DISCUSSION**

#### **4.1 Research findings**

The story “The Tacit Dimension” in combination with the case study reveals that at BrainStore, the physical environment is an integral part of the creative problem-solving process. The narrative highlights a process in which the physical environment, organizational structure and creative problem-solving are all interwoven. The story reveals that not only did the CEOs and employees of BrainStore view the physical environment as an integral part and strategic tool for communicating and implementing the creative problem-solving process but after experiencing the process, so do the clients.

By using the narrative case methodology to study the specific case of BrainStore, the researchers were able to utilize the data from the case study method specifically to understand the evolution and interaction of the creative problem solving process and physical environments at BrainStore. The data included interviews of employees, senior management and clients, on-site observations, photographs, published material and official website. The narrative enquiry used the Labov’s narrative analysis framework. This narrative analysis helped to understand from varied personal perspectives, how and why the physical environment affected the clients’ and employees’ understanding and acceptance of the problem solving process and helped them move into a creative exploration needed for the process.

In the next part of the discussion, we examine the important themes that arise from the narrative: knowledge management, symbolic communication, and functional support aided through flexibility and how these influence the creative problem-solving

process at BrainStore by providing inspiration, creating excitement, and emotionally engaging the clients and employees in the process.

#### 4.1.1 Creative problem-solving environments as externalized cognition (knowledge management)

The concept of knowledge management through physical space, inter-linking the physical space and cognitive space, has been observed as far back as the Roman times and even in the monasteries of the Middle Ages (Carruthers, 1992; Huang, 2001). Researchers agree that thought processes depend on the structure of the outside environment. When the physical environment can internalize and externalize cognitive mental models, thought and action become complementary (Davenport & Bruce, 2002). Nadja Schnetzler, BrainStore CEO commented, “It is always important for us to show the process of idea finding in space.” Marcus Mettler, CEO, added, “Essentially you need a tool which communicates what needs to be done and for me that is ‘know-how’ transfer. One role of the physical environment is that the work process should be self explanatory.”

This holistic integration of knowledge creation, organizational structure, and physical environment is found in the Japanese concept of “Ba” (Nonaka & Konno, 1998). “Ba can be thought of as a shared space for emerging relationships. This space can be physical (e.g., office, dispersed business space), virtual (e.g., e-mail, teleconference), mental (e.g., shared experiences, ideas, ideals), or any combination of them” (p. 40). “Ba” serves as a foundation for knowledge creation. This tacit knowledge requires “externalization,” that is, the articulation of tacit knowledge into explicit knowledge. During externalization the individual’s objectives and ideas become integrated as the group’s, as happened during the “Idea boost” sessions at BrainStore using comprehensible forms such as words, concepts, figurative language



(such as metaphors, analogies, or narratives), visuals, and dialogue. A quote from Mettler ties this concept to BrainStore, “We spend a long time asking how do we get this production process (idea generation process) aligned so that you can walk through the premises with a client and you can explain what happens where. . . . It is a spatial transformational process where our process becomes more precise and comprehensible to the third person.”

“Interacting Ba” is the physical environment where externalization takes place. As in the case of BrainStore, the organizational workings are first made explicit through verbal and visual metaphors that describe the whole environment as “The Idea Factory”(Marcus Mettler, CEO, BrainStore) (see Figure 2.12) and the creative problem-solving process as “Machine line production- on time, on demand and un-copyrighted.” For example, at BrainStore clients can come and buy ideas at the “Idea counter” in the entrance lobby (see Figure 2.4), implying that ideas can be bought easily, “over the counter.”

These metaphors can be viewed as the basic building blocks for the creation and dissipation of knowledge (Nonaka & Konno, 1998; Hill & Levenhagen, 1995). According to Hill & Levenhagen, “Entrepreneurs make extensive use of metaphors both in developing a vision or mental model of their environment (sense making) and articulating that vision to others (sense giving)” (p. 1058). When problems are undefined and information is ambiguous and overwhelming, the use of metaphors allows continuous reinterpretation to aid creativity. Metaphors help to align the organization’s actions toward a single purpose so that individuals can understand, remember, and communicate on a common platform. Verbal and visual metaphors such as “The Idea factory,” and “Machine line production- on time, on demand, and un-copyrighted” describe BrainStore’s mission statement and help its employees to understand the organizational workings, environment and goals and thus help predict

and control the outcome. These metaphors also help clients, who come on site for the process and who are unaware of BrainStore's workings, to interpret, respond, and become initiated into it (Hill & Levenhagen, 1995). It would have been very difficult to communicate or even understand this working approach through words alone; hence, BrainStore uses physical environment as a form of nonverbal language to complement the use of verbal metaphors. The industrial aesthetics in the BrainStore's physical environment communicates BrainStore's industrial process of working.

This knowledge creation from verbal and visual metaphors probably activates "Schemata" (DiMaggio, 1997). Schemata can be generated by any verbal or visual information, such as that gathered during a chat or while looking at the physical environment. According to DiMaggio, schemata not only process the information received, they also represent the knowledge hence created. Albert Mehrabian as cited in Prince (1980) found that non-verbal communication, which according to him also includes the physical environment, accounts for 55% of face-to-face communication.

In creating knowledge about itself, BrainStore seems to merge this verbal and the visual connection. It makes use not only of verbal metaphors, but also of the physical environment as a non-verbal communicator—visual metaphor to portray itself. It accomplishes this by creating symbols in the physical environment which become visual metaphors for the tacit knowledge they represent. Physical features such as one of the "bath tubs" used at BrainStore as a meeting table allow BrainStore employees to associate the "bath tub" (Figure 2.7) with the act of relaxing. In conclusion, information is processed better when presented through both visual and verbal mediums as opposed to just through one medium. Tacit knowledge, when translated into its visual and verbal components, complements knowledge management and makes it significant for both clients and employees.

However, in spite of BrainStore's tacit communication, at certain points during the process FDP members seem to be confused about the problem-solving process. It is not determinable if and to what extent the physical environment contributed to this confusion. The cognitive differences between the BrainStore CEOs and employees and their clients could possibly be attributed to the expertise of the designers and relatively little experience in the field on the part of the clients (Gifford, Hine, Muller-Clemm, Reynolds, Jr., & Shaw, 2000). This mismatched cognition at certain parts of the process could be specific to this group of clients, as they represent a very conservative political party. Nevertheless, the uncertainty during this part of the process needs to be studied further.

#### 4.1.2 Creative problem-solving environments as visual metaphors (symbolic communication)

Knowledge transfer of the creative problem-solving process is translated into the physical environment through the use of symbolism. Speaking of one such symbol, the centrally located radio wave controlled clock (Figure 2.6), Romeo Burkhalter (Interior Designer, BrainStore) explains, "Time is a very important part of the creative problem-solving process. So we needed a clock to keep everybody on same time. This clock then became the focal point and now serves as a symbol of a time conscious organization." According to Nagai & Noguchi (2002), transforming abstract concepts such as time into physically manifested visual images such as the "clock mode" forms the creative thinking process of designers. Similarly, Goldschmidt (1994), who studied creativity in architects, suggested that while coming up with a design architects try to connect concepts with effective visual images. Hence, signs, symbols, and artifacts can be understood as the physically manifested visual images that externalize the tacit

knowledge of any organizational working and creative problem-solving process, including BrainStore's.

The physical environment, embodied by signs, symbols, and artifacts, becomes the "visual metaphor" (Bitner, 1992) for BrainStore's organizational workings and creative problem-solving process. The signs, symbols, and artifacts individually and collectively help the user understand the environment. While signage is an explicit communicator, symbols and artifacts are more implicit and include "emotion-laden physical objects, knowledge and cultural icons and playful objects" (Leonard & Swap, 1999, p.157). These "intentional and unintentional signs of life" (Farbstein, 1978, p. 63) serve as a cognitive aid to the creation of knowledge and are integral to the process. The colors, form, placements, and even the sounds and smells in the environment help to define the creative expectations and actions of the clients and employees in an organization (Davis, 1984; Farbstein, 1978; Leonard & Swap, 1999). Commenting on the shocking magenta colored wall at the entrance of the current office (Figures 2.4 and 2.5), Nadja Schnetzier, CEO, BrainStore says, "The color is aggressive to make a statement that the environment is not ordinary. It actually makes a big impression on people. People get the energy to work creatively."

Researchers suggest that such organizational identity is most clearly expressed in the exterior spaces of the office that are directly visible and accessible to the public (Becker, 1981; Danko, 2000; Farbstein, 1978; Nguyen & Leblanc, 2002; Sundstrom & Sundstrom, 1986). Such public expression also helps users to predict the kind of ideas and products to be found within. Some FDP members were pleased with BrainStore's lobby. The physical environment, with its blue colored walls, wooden chips on the floor, goldfish in the tub. etc., provoked FDP members and provided the nonverbal information that they needed in order to identify and categorize BrainStore as "non-traditional." This symbolic display of function and status was important, as the clients

relied on it to decide whether BrainStore was a legitimate partner for exchange and to gain their trust (Altman & Sundstrom, 1989; Bitner, 1992; Nyugen and Leblanc, 2002). According to Becker (1981) and Davis (1984), some corporations built their image as informal and innovative because their clients appreciate visiting offices that differ from their own uniform, predictable spaces. These creative offices are also designed to enhance comfort and stimulate imagination.

As in the case of BrainStore, the color-coding of different spaces in the factory area signifies different phases of the “idea generation” process. The glass-topped industrial washbasins that serve as lunch tables (Figure 2.8) recall the social gathering of animals at the pond for a drink. The goldfish meeting table, the green turf in executive offices, and commuter bikes offer an unconstrained setting in terms of what is acceptable—stimulating images, ideas, and information. The idea generation room has material available for employees to build prototypes to follow through with ideas. The offices that are one step higher than the circulation path, control pedestrian traffic and drop-ins, and the blue mini-labs (Figure 2.11) that serve as team break out areas serve to minimize distractions and interruptions. According to researchers, such conditions encourage creativity by providing creative cues to relax and hence the wide range of experiences necessary to realize full intellectual and emotional potential (Becker & Steele, 1995; Steele, 1973). This emphasis on freedom and individuality helps to increase employee motivation, which can translate into stronger problem-solving abilities (Becker & Steele, 1995; Leonard & Swap, 1999; Sundstrom & Sundstrom, 1986; Vithayathawornwong, Danko, & Tolbert, 2003).

BrainStore’s success lies in their ability to change their physical environment as required for their work processes. In the time that the FDP members visited BrainStore and this research was conducted, BrainStore had already changed some of its physical environments, although the concepts of designing remain the same. Hence

some of the elements such as the palm trees, that the FDP members experience, were different than what was documented in the case study pictures but the symbolism and the function of the new space were very similar to the space that the FDP members experienced. Figures (2.4 - 2.11).

#### 4.1.3 Creative problem-solving environments as catalyst (functional support)

Ever since Vitruv, designers insist that functionality is a basic part of design. Functionality and symbolism work together at BrainStore to create the right physical and cognitive working environments. Eco (1980) illustrated the interrelationship of symbol and function. For example, an outsider looking at a metal-frame and curtain-glass office building sees only this contemporary symbol. However, to the users inside, this building skin's function—as a window to the outside world, admitting light and ventilation, and even causing thermal gain—matters more than anything else.

The designers at BrainStore have made great efforts to achieve this level of functionality. Marcus Mettler talks about the functionality of space in BrainStore, “We need to keep in mind how work flows and correspond this with the design of the physical space accordingly. This makes it easier for everyone to understand the process.” Nadja Schnetzler adds that the physical design of the space at BrainStore is *changed every year* to create novelty, keeping the space energetic. Mettler adds that this change in design also functions to represent the workflow in space. The spatial layout must aid the creative problem-solving process tasks. This functionality, although mostly important to employees, affects clients, too, as the design can be viewed as hostile or friendly and affects the organization's corporate image (Bitner, 1990; Nguyen & Leblanc, 2002).

According to Nguyen and Leblanc (2002), and Sundstrom and Sundstrom (1986), efficient workflow is achieved by optimizing the use of space and time

through appropriate proximity of work-units and optimized work pace. Specialized tasks require specialized physical spaces, depending on the unique equipment and working conditions required by those tasks. BrainStore CEOs and employees explain that the workflow in their physical environment is divided into different zones to emphasize different phases of BrainStore’s creative problem-solving process. It starts with the “Idea counter,” because this space must complement the overall BrainStore strategy that ideas can be bought as easily as over-the-counter items. The provocation and aggression of the magenta colored walls in the “entrance zone” challenges the client’s traditional mindsets and encourages a creative mood; however, the design also ensures that while working the employees do not face this magenta wall. The offices in the “idea production zone” have an open design to promote communication and accessibility; however, they are built four inches higher than the common corridor to demarcate public and private areas. This design limits unwarranted intrusion into the employees’ space as clients move through the “information technology zone” interlinks computers, technology, and electronic resources to facilitate fast and efficient brain maps, visualization, and communication. The acoustically-treated room, with its large number of telephones, provides quick access to conduct market research, to announce promotions and recent news, and to recruit for upcoming projects. The “stop zone” works as a casual discussion and lunch area, using community tables rebuilt from old industrial washbasins, and serves as one of the organization’s social hub.

Idea generation is the most important and space-consuming part of the process at BrainStore. This “idea generation zone” (Figure 2.10) can house 60–80 people working together (Sandro Morgan, project manager, BrainStore). The big black table—built from an old Swiss post wagon on wheels—and movable chairs provide seating for large groups of people. This table can also be broken down into smaller

tables for smaller groups of people, who can also use the blue mini-labs which surrounds the table space. The “think tank zone” houses a materials library, where employees can experiment with different materials when making prototypes, and a collection of ideas used for previous projects. The tables, painted with blackboard paint, are used for mind-maps—users can jot quick ideas and rework them. The “realization zone,” where the project team works to actualize ideas for clients, has space for printing and for organizing events.

Such a space which accommodates various group sizes, has lots of writing surfaces and graphic materials, and a materials library useful for inspiration, makes divergence and convergence easier and offers more opportunities for joint effort to increase production (Becker & Steele, 1995). Communication patterns, group performance, and productivity can be influenced by the arrangement of physical settings (Sundstrom & Sundstrom, 1986). Augustin and Brand (2001) insisted that face-to-face communication in a group requires a space with a sociopetal arrangement, and within the interpersonal distance. However, beyond the arrangement of the physical environment, symbols can also function as strategic tools to promote employees’ creative problem solving. Ciotta (1987) described the manner in which Rich Products Corporation placed abstract paintings, sculptures, and multimedia art in open offices which were usually without doors and divided by colorful acoustical panels “to evoke comment, controversy and divergent thinking.”

In another example of an idea factory in San Francisco, Leonard and Swap (1999) describe that all of the equipment and furniture in the seemingly bizarre space is arranged in temporary locations, able to be moved and re-arranged according to current requirements. The architecturally and structurally boundless space facilitated ideas, communication, and action.



Similarly, BrainStore's physical environments function efficiently because they are also flexible enough to adapt to and improvise in various situations; that is, they are amoebic environments. However, although it may seem desirable to make physical environments as flexible as possible to maximize their functionality, too much flexibility can also become unmanageable, disrupting the physical environment's very function and organization. Too much flexibility can also prove costly and unwise, as it may not suit other types of clients and projects. Thus, functionality and flexibility must be balanced carefully. Burkhalter, the designer, commented on the evolution of BrainStore's environment, "You have to always pry and you have to adapt, to step back, and to change." He rationalized, "Usually you cannot predict future needs, so you have to be very flexible." Marcus spoke of the versatility of the furniture at BrainStore used to create this flexibility, "It is not expensive furniture, but it is flexible. It is like playing with Legos."

Researchers have suggested new solutions, such as a "loose-fit approach" (Becker & Steele, 1995) and "changeability" (Steele, 1973) to build-in design flexibility. These concepts suggest quickly rearranging the same furniture and equipment to create varied spatial arrangements. The group room with the dividable black table with movable chairs and the adjacent blue mini-labs provides spaces for varied group sizes. The mini-labs have curtains that can be drawn off to control acoustics and to create privacy. BrainStore also changes the feel and décor in the mini-labs temporarily to suit a particular project. According to McCoy (2001), such opportunities for communication and group work that allow flexibility, and that regulate communication with other groups, encourage creativity.

Flexibility at the individual level can be built in by allowing personalization and participation in the organization. Personalization is the deliberate adornment and modification of the occupant's immediate environment to reflect their individuality;

participation involves greater control over the overall design of the workspace (Sundstrom & Sundstrom, 1986). Such freedom, when recognized and appreciated by the organization, encourages creativity (Farbstein, 1978; McCoy & Evans, 2001; Sundstrom & Sundstrom, 1986; Vithayathawornwong, Danko, & Tolbert, 2003). BrainStore employees can choose from a variety of work units based on their current mood, individual or group task, or creative problem-solving requirement. Employees work at their work units as well as in the sun-porch outside, by the lake, on the main street, and at the corner fast-food restaurant (Laurent Burst, employee). Individual spaces are designed as “hoteling” spaces, where an employee comes and uses whichever space is available. Group spaces are designed so that members have immediate access to required materials and equipment (Sandro Morgan, Nadja Schnetzler).

When the workplace provides functional spaces that promote divergence, incubation, and convergence, and provides flexibility through policies and norms for its unregulated use, employees experience the freedom and autonomy that encourages the creative process (Becker & Steele, 1995; Leonard & Swap, 1999). The challenge for workplace providers is to create innovative environments that motivate employees and achieve the employer’s objectives at the same time (Bradley & Osborne, 1999).

## **4.2 Limitations of the study**

Any investigation in environmental psychology is complex in nature, as is the study of creative problem-solving environments. The interaction of the physical environment and the creative problem-solving process is not a simplistic, unidirectional, cause-and-effect relationship. However, because of the limited time and scope of this study, it was not possible to consider the complex interplay of variables that might have been present. Although physical environment is studied as

the one important variable influencing creativity, the researcher acknowledges that other variables, such as employee creativity and affect, technology, and other ambient factors (light, music, color) could influence the process. It is also difficult to judge the interaction between culture and creative problem-solving environments.

Within the available time and resources, the study was conducted in a specific organization, with a specific creative problem-solving process, in a specific culture. Hence, generalizing the results to other organizations that differ from the present research organization's process, culture, and other aspects requires caution. Future situations to future results should be compared and contrasted with BrainStore to give more validity to the study.

Language and culture posed another limitation for the study. All of the subjects in the research spoke English only as a second language; therefore, nuances in representations of the concepts were often lost or unclear due to language differences. Although it was possible to understand what they were saying, they experienced some difficulty communicating their ideas in English. This made it difficult for the researcher to interpret at times. Also, because all interviews were conducted in a foreign culture, some cultural nuances and insights may have been lost in the process of translation.

The small sample size of employees and clients may have been a limitation, but every care was taken to obtain multiple voices, data from multiple sources, and multi-perspectives from theory in order to eliminate the threat to validity.

The creative "Burger" solution that was proposed had not yet been put into practice at the time of this study, so no discussion on its implementation was possible and although this is not a limitation per se, it would have been interesting to see public reaction to the marketing strategy.

### **4.3 Implications for future research**

To further the theory of how the physical environment supports creative problem-solving, the researchers suggest several considerations for further research. The first is to examine a cross-cultural comparison. This research was conducted in a European context. However, creativity and organizational culture in North American and in Asian cultures are different from those in European cultures; hence the physical environments for the creative problem-solving process in these cultures may differ. Cross-cultural comparisons may elicit interesting facts and engender further understanding of creative problem-solving environments.

In terms of data collection, future research design may also consider quantitative assessment techniques as an additional qualitative data collection method. This would allow researchers to compare the data, both subjectively and objectively, to identify similarities and differences in the data that can be probed further.

Future researchers might consider comparing diverse groups of creative organizations characterized by their varying degrees of creative problem-solving process (more successful, less successful) and their physical environments (more conducive, less conducive). This would allow us to understand to what extent a more conducive physical environment contributes to a more successful creative problem-solving process, and vice versa.

A study of creative organizations in different phases of evolution should also be made. It would help to chart the typical course a creative organization takes in achieving a balance between the creative problem-solving process and its environment. Such a study would also help researchers determine whether bigger creative organizations evolve differently than smaller organizations do.

Ambient conditions, an essential dimension of physical environments, could not be considered in this research due to the limited time and scope. Future research in this area should explore this dimension in-depth.

#### **4.4 Summary**

This study documents significant physical features and attributes required for each of the creative problem-solving phases at BrainStore. The basic requirements for group spaces, inspirational material, etc., remain common for most phases of the process. The research finds that a large part of BrainStore's physical environment is to facilitate knowledge management in its space. It was important for BrainStore to make its working structure apparent to the client, who in this case is an equal partner in the creative process and for transferring knowledge to its employees to make the process more efficient. BrainStore's physical environment is an effective metaphor that describes the organization's function through the symbolic communication in the organization to attract and educate its clients and employees. The study also shows that flexibility is a large part of the BrainStore's creative problem-solving environment for employees' working.

This study finds that in the case of BrainStore, the creative problem-solving environment is important to the creative problem-solving process and is, in fact, an integral part of that process. Creative problem-solving environments and the creative problem-solving process seem to grow organically with each other at BrainStore. The environment reinforces the existing creative problem-solving process. As the process and, employee's and client's needs change in the future the creative problem-solving environment will continue to adapt and evolve with their needs.

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