

Organizational Office Space in the Virtual Age:
The Role of Shared Space in Communication

by

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Dedication

I grew up with a constant questioning and value for education having two grandparents who were teachers and a grandfather who never got an education but made sure it was available to his children. Our home was full of graduate students of my uncle's and their friends as well as many foreign students and teachers throughout my childhood. I was fortunate to marry a man who was raised to value education more than wealth and personal satisfaction more than prestige. For all of this, I am grateful to my parents, Frank and Sheila Gobes, my uncle Richard Kehoe, Ph.D. my husband Jeffrey Ryan Ph.D. and Jeff's parents Joe and Judy Ryan.

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ABSTRACT

This thesis takes a phenomenological approach to the examination of the organizational need for shared office space. Questions are developed in a reflexive narrative that introduces challenges to the assumption that space is a given in organizations. The narrative also uses the process of questioning this basis assumption to develop a new understanding of the role of space in organizations in supporting the development of common language needed for the creation of organizational knowledge. Key ideas from systems theory, autopoiesis, organizational theory, semiotics, and psychology are utilized as resources developing the ideas.

Chapter One

Introduction and Theoretical Basis

The Question and its Importance

Why do business organizations still need shared office space?

Throughout human history, people have been gathering as groups in shared spaces to accomplish different objectives - safety, accessing food supplies, and religious worship among others. In this thesis, I will discuss a type of gathering, an organization, which is “a group of people identified by shared interests or purpose...” (Encarta, 1999, electronic) and, in this case, a business organization, which “buys and sell goods, makes products, or provides services” (Encarta, 1999, electronic). Although it is possible that the thesis I am going to present is applicable to any organization’s office space, my experiences are specific to businesses. To avoid the confusion of the adjectival form of business, I will however, in the rest of this document, refer to the space as organizational space while specifically referring to its use by businesses. By office space I mean a place where “...business or professional activities take place...” (Encarta, 1999). It is indoors, and often involves seated activities. It may be an entire work environment, or part of one. Other types of work environments exist, such as factories, laboratories, operating rooms, sports fields, and construction sites. The importance of “shared” is to make clear that people are physically working in

the same place. I contrast this to working in different physical spaces where communication is done through technologies such as the telephone, video conferencing, or computers. The people involved with these connections do not have direct physical contact, but those that are mediated by the use of a technology, the types of connections that are often referred to as “virtual”. (The term virtual is most often used when referring to computer-based connections, however, in this thesis I will use it to refer to any connection of people that does not involve those people being physically together.) This is important because no matter where we work, we are working in a physical environment yet, being in an environment together provides benefits. Until recently, our understanding of these benefits has been tacit because space was the only option to support organizations. In order to prove the importance of shared offices to organizations, it is now necessary to make the unique benefits of space explicit.

The amount of shared office space in the United States has been increasing since the industrial revolution started moving work from the farm to the city. By 2002, U.S. businesses occupied 3,472,200,000 square feet of office space (Kelly, 2003). Yet, recent changes in business processes, products, and technology advancements have called into question the importance of shared office environments for organizations. Technology advances, which first made possible large centralized work environments, now appear to be offering opportunities to do away with shared office space (O’Mara, 1999).

As organizations have worked to integrate new management approaches and technology tools into their processes, there has been a tendency to view

office space as a resource with a high price tag and little value, a relic of the way business used to be. An approach often taken by organizations is to focus on reducing the investment in shared office space as a discrete cost. This approach isolates issues of office space utilization from the incorporation of new management approaches and technological advances into business processes. Separating evaluation and planning of shared office space from the organizational system it should support, while saving short-term costs, casts such office space in the role of a problem to be eliminated, rather than as a part of a new solution.

Research and practice in the area of information technology have sought to make collaborative human use of technological advances the solution to all organizational needs (Brown and Duguid, 2000). By contrast, research in the field of architecture and design has traditionally focused on the issue of how to create better office work environments by focusing on the physiological and psychological needs of individuals working in them. These valuable pursuits, however, do not necessarily address the issue of why organizations need shared office space. There is a developing body of work addressing space and technology based on the stated needs of new organizational management models, particularly in the areas of systems theory and socio-technical systems (Horgen et al., 1999; Duffy and Hutton, 1998; Duffy et al., 1998), and the teaming requirements of knowledge workers (Augustin, 2001; McCoy, 2001; McCoy, 1999; Smith and Kearny, 1994). This work takes an important step toward

examining the way space can support different processes, but still does not question the basic need for shared office space.

In order to get at the actual needs organizations now have for shared office space, it is necessary to find a way to examine what an organization needs to accomplish without considering the limitations under which they are functioning now, and then to step back and see from that perspective what unique value, if any, space provides. Design professionals I have talked to largely see questioning organization's need for shared office space as heretical -- we all know at a gut level that organizations need shared office space, so why ask such an elementary question? My answer is two-fold: 1) as the producers of communication technology are claiming we can accomplish ever wider ranges of organizational functions virtually, it is time for the design profession to be able to show in a rigorous way what is provided to an organization as a result of having shared office space, and 2) organizations make decisions based on evaluation of relevant data. As organizations have become increasingly challenged to justify every cost, data that demonstrate the value of shared office space from a productivity and financial perspective are becoming essential. As designers have provided no data to support the need for space, organizations have started to experiment, often unsuccessfully, with reduced, minimized office environments. Chiat Day is one example of an organization that committed to reduced office space through extreme and mandatory hoteling, where there were only enough desks to seat the number of people expected in the office daily, with the desks being allocated daily and not belonging to any one person. The organization

ended up moving back to a more traditional territorial space utilization four years later (Anderton, 1998). This example is one that illustrate why it is time that the design profession helps organizations explore why they need the space we help them build.

Method of Examination

“In the varied topography of professional practice, there is a high, hard ground overlooking a swamp. On the high ground, manageable problems lend themselves to solution through the application of research-based theory and technique. In the swampy lowland, messy, confusing problems defy technical solution. The irony of this situation is that the problems of the high ground tend to be relatively unimportant to individuals or society at large, however great their technical interest may be, while in the swamp lie the problems of greatest human concern. The practitioner must choose. Shall he remain on the high ground where he can solve relatively unimportant problems according to prevailing standards of rigor, or shall he descend to the swamp of important problems and nonrigorous [i.e. non-quantitative] inquiry?” (Schön, 1987, p 3).

The question of the relevance of office space to organizations is one that requires an examination of several complex issues including: what “place” does

for humans in social units, and an understanding of what organizational units do in order to function as units. This is not a question that seeks to measure, or tries to establish divisions, or which results in formulas. It is a question that looks to understand; thus, it is a question that requires a qualitative approach to data analysis through a holistic or systemic structure (Loseke, 2000). Using this approach, this question will lead to possibilities that will in turn, systemically lead to more questions (Steier and Ostrenko, 2000) rather than definitive or measured answers. The type of question I am asking suggests a certain perspective and approach that are based in a belief in the importance of considering complexity in framing a question and the realization that cognition is not "...the manipulation of knowledge of an objective world..." (Winograd and Flores 1986). An important part of considering complexity is realized through an understanding of the assumptions that are made to get to the question being asked, and suggests a postmodern approach, which acknowledges the role of the researcher in framing the question as based in his or her own experience (Loseke, 2000; Steier and Ostrenko, 2000). One way to accomplish this is with reflexive narrative, a form of inquiry "not directed toward self," (Conle, 2000, p 190) that uses "experiential stories ... [to] reorganize ...personal practical knowledge" (Conle, 2000, p 190). The narrative is used as the starting point for a phenomenological approach, which focuses on, "philosophical examination of the foundation of experience and action" (Winograd and Flores, 1986, p 9). In this way, the literature used to explore the question refines the meaning of the question as it is explored.

An interdisciplinary approach makes it possible to ask this question in a new way by utilizing the bodies of knowledge in different areas of study that are typically viewed in isolation. These bodies of knowledge often help to reinforce each other's ideas as well as to continue the ideas at different levels. The incorporation of theories in the fields of architecture, communication, environmental psychology, industrial organizational psychology, and information technology into a unified concept is what makes it possible to put forward this thesis.

Theoretical Basis

To understand the role of space for organizations, I must start not with an examination of the potential of space, but with an understanding of how organizations are realized through the people that participate in them. The importance of complexity to this issue, as discussed previously, is best represented through a process that allows for a holistic approach, rather than a linear causal approach. This is best accomplished using systems theory.

Communication must take place in a shared physical space to be complete communication, i.e., communication in shared space utilizes explicit and implicit communication that requires the affordances that space provides. The full range of communication affordances available only when participants are in shared space makes it an irreplaceable support for certain kinds of organizational communication. The bodies of theory and research that I will draw on to support this view are from systems theory, autopoiesis and

communication theory, organizational theory, information technology, ecological psychology, and semiotics.

Systems Theory

Shared office space and technological advances are tools that all aim to support organizations. Yet, organizations tend to separate the evaluation of the use of these tools from organizational process and from each other, evaluating them as separate cost centers. In order to examine the question of why organizations need shared office space, it is necessary to simultaneously examine the organization and its support tools. Systems theory offers a means to do so, as it is based on the concept that the whole cannot be understood by examining its parts in isolation but must be understood through the interconnection among the parts (Capra, 1996).

Autopoiesis and Social Systems Theory

Autopoiesis, originally conceived as a means for characterizing living entities, and social systems theory provide biologically rooted explanations for our ability to think as individuals, and our ability to create social units. The theory also defines the relationship of a living system to its surroundings, and describes observing as what distinguishes the system, not its actual production (Capra, 1996). Through their extension of autopoiesis and social systems theory, Maturana and Varela (1998) offer an explanation of the development of knowledge both for individuals and for groups of people. An additional benefit of

these approaches is that organizations, the ultimate end users in this case, based on my experiences, tend to respect and be more comfortable with arguments founded in the hard sciences.

Communication Theory

The transmutation of knowledge from the individual to the group is the aspect of organizational interactions where shared office space is most important. In order to understand what actually occurs during this process the clarification of communication offered by Niklas Luhmann is essential. Luhmann defines a communication act as being what is between people involving a sender, an utterance, and a receiver (Luhmann, 1992). This concept provides a clear way to see that there is a difference in what is in our own mind, an utterance, and the meaning that is made in the mind of another. By doing this Luhmann also shows that it is the circular use of the communication act that provides common understanding for groups of people. Said another way, it is the recursivity of this social act that enables the creation of language and meaning. Luhmann's work then provides the basis for an understanding that organizational knowledge exists and how it is created.

Organizational Theory

Organizational theories support this thesis in two ways; first, through historical examination, they provide input for why organizations approach the use of space as they do, and second, they provide a current perspective on how we

view organizational processes as the basis for looking at the need for space in contemporary organizations. This is because these theories are descriptors, not of organizations as they are, but of what new opportunities for improving organizations are available at a particular time. The improvements that make possible the theories I will utilize are based largely in technological advances and the challenges and possibilities they offer organizations.

Semiotics

The organizational process that office space should support is defined in semiotics, which is the basis for how people realize an organization through creating common understanding, or languaging. Semiotics does this by providing the structure for understanding how we socially create meaning through languaging and the symbol systems we create. Semiotics provides the understanding of how, as humans, we enact this process, and describes the tools we use to work with—communication channels. It also provides the important recognition of the complexity through its recognition that languaging is both implicit and explicit, and that we do not do all of our languaging verbally or at the conscious level (Leeds-Hurwitz, 1989).

Media Richness Theory

After establishing the importance of communication to organizations, it is necessary to establish the capacity of different media to carry communication, that is, to what extent the media currently available can access auditory, visual,

and proximity cues as well as the time factor (immediacy or not) of the communication. What is unique about common physical space as regards communication is its ability to access all available channels of communication for languaging. Media richness theory provides a scale of “richness” of media based on factors including channels of communication, and feedback (time immediacy of the communication) (Daft et al., 1987). This provides the basis for differentiating the inherent capacity of office space and other specific communication technologies to support creation of languaging.

Ecological Psychology

Ecological Psychology suggests that there is a reciprocal relationship between “the environment” – “the surroundings of those organisms that perceive and behave, that is to say animals,” (Gibson, 1979, p 7), in this case people, that is dependent on how characteristics of each relate to the other. As an example, it means that for a certain size person, with perhaps certain mobility a door is “closable” while to an infant it is not. For this relationship to exist, the animal must have certain characteristics – they can stand upright, they can hold a handle, and it assumes some things about the environment as well – the door is a certain weight, moves in a certain way etc. In the case of an organization trying to accomplish something, there are characteristics of their activity that make enable it to function as an organization. Space affords us the opportunity to do certain things, such as share a handshake, an activity that is based on the

characteristics of the people involved and capacity of the environment to support it (Lombardo, 1987).

Summary of Chapter One

Organizational systems are being challenged to respond to changes in the business climate, their environment. One of the structural changes that they can make to support their process is to change their use of space or eliminate it entirely. Although generally, shared office space in organizations is not examined as part of a functioning system, if we are going to have an understanding of the value this space provides it must be understood as part of an organizational system. Although I am presenting this document in a linear format, I recognize the importance of a systemic approach through structuring this document as a systemic argument: observer, environment and system. I will first examine my own perspective as an observer in order to recognize how and why I frame the question as I do. Next, I will examine the “environment,” the U.S. economy, in order to recognize the perturbations it makes on the system, and how the perturbations it has made in the past provide a perspective for today’s business system observers. Finally, I will look at the production of the business system knowledge, to understand the structural options for producing it.

Chapter Two

The Observer – the Experiences that Led Me to the Question

“Every reflection brings forth a world” (Maturana and Varela, 1998, 26).

The perspective of the observer determines the framing of a question and the possibilities available for an answer. Keeney states “...what one perceives and knows is largely due to the distinctions one draws” (Keeney, 1983, p 24). I cannot divorce myself from my experiences, nor can I remove them from how I will see. This chapter is a reflexive narrative, which uses my personal and practice experiences as a way to examine my perspective in the development and examination of this research question. For the reader it presents the belief structure from which I see this question. Perhaps through sharing these stories I can also share my perspective on the question and acknowledge “... the descriptor is in the description, the observer in the observed...” (Keeney, 1983, p23).

Early Experiences

I am ten years old and riding in the back seat of a car looking out over what used to be the crossroads of a rural dairy farming area. There used to

be a small town center that was made of several converted houses. In its place is a strip shopping center, ugly, sparse, impersonal, the latest addition to the constantly sprawling suburbs in which I am growing up. It is the first time I can remember thinking people deserve better places than this and that I should be involved in providing that “better place.” At that point, for me, “better” meant nicer to be in. It did not seem a complicated idea. Yet, over the years, I have come to understand that “better” design is hard to get people to agree on and therefore even harder to get them to see as something of importance rather than as a luxury.

I studied architecture with the goal of making “better” places for people. As I have had the opportunity to interact with design schools, I have come to understand that people who occupy and use buildings are not the focus of architectural education. I was, however, lucky enough in my own education to have access to faculty with interests in human factors and the built environment. Most influential in that group was Henry Sanoff, who taught participatory design practices. In his class, we learned by doing - we involved people in the design process so that we could not only understand the importance of the user in the design process, but that we could (and should) actively involve them in programming their own spaces. This process clarified several things for me. First, people who do not design spaces for a living rarely think about what space can be. Their ranges of possibility are limited typically by the spaces they have experienced. Therefore, our goal was to get the community involved to move away from

thinking about the finished space, and move toward thinking about what they needed to accomplish, and how. To do this we provided gaming tools, which Sanoff had developed. The gaming tools allow the users to 'see' and work with their space as a way to start a dialogue about what kind of space would meet their needs (Sanoff, 1979). Second, the users of the space often have neither thought about their space needs in terms of their own work process, nor about optimizing those spaces. If, as a designer, I do not make the effort to help them focus on their needs, I will create spaces that will not meet their needs as fully or as well as I should. My first role, therefore, is a dual one -- that of facilitator and resource who is part of their process of creating a new space. Third, the users of the space have often not talked to others involved in their organizational processes to see if everyone understands the process in the same way. The benefit of creating dialog may be an enhanced work process through the creation of a shared group understanding of the organizational pattern rather than many differing individual ones (Horgen et. al., 1999; Ferguson, 2002). This early experience working with Sanoff in architecture school reinforced my belief that space should be about the people using it. This belief system has led to continued questions and challenges, as I started working and discovered that the profession did not function the way I expected. The segmented practice approach I was to experience rarely allowed for me to utilize the skills needed to access space user needs, always leaving me feeling that spaces were less than adequate for the users.

Work Experiences

I have worked for twenty years creating workspaces for business organizations. My practice experience has not been a straight path, but has included tours through the construction process in the roles of architectural designer, interior designer, end user's architectural staff, subcontractor, contractor, and real estate consultant. In addition, while performing some of these roles, I have been a space user in the organizations for which I created space. This wide perspective has enabled me to see how the segmentation of the design process adversely affects the creation of office space that supports the needs of the users of the space. Opportunities to see space being used and to receive feedback from users have confirmed a view that we often are challenging them to get their jobs done in the spaces we create, rather than supporting their work processes.

As I worked in the many roles in the design and construction process, I became aware that each role had languages, goals, challenges, and reward systems that were often at odds with one another, and with the overall process. The levels of education in these professions varied greatly and focused on different skill sets. More importantly, most people involved in the design and construction process were so segregated into one part of the process that they did not understand how they influence the larger process and what the values and motivations of the other people in that larger process are. Each profession has skills they try to make valuable and blind spots as regards what they think is unimportant to the process. The

resulting projects are often a disconnect of skills that are not followed through to the benefit of the project, and a bringing forward of the blind spots to the detriment of the project.

Architecture, as an example, focuses in its educational process, its publications, and its awards on three-dimensional aesthetics (proportion, volume, and balance), and solving complex spatial issues. The language they speak is about space; the rewards they get are based in aesthetic achievement. Architects do not typically control the construction budget, nor do they usually deal with the maintenance costs or practical facilities management issues. They have no concern as to who owns the building, when it will be sold, how long the lease is. They do not understand the long-term financial issues their client may be facing, whether or not there are leadership changes on the horizon, or how such changes will affect the organization of the company. They do not understand the strengths and limitations of technology, or the realities of trying to incorporate technology into, or in the place of, buildings. They also sometimes know nothing about the people who will occupy the spaces they create. This narrow professional scope of practicing architects is what points many of them toward the wrong questions. On the other hand, a skill not often recognized by architects, but certainly present in their education, is the ability to solve a problem in three dimensions. This skill when utilized to its fullest makes an architect particularly valuable to organizations, as a facilitator of communication to create agreement, perhaps for space as its initial purpose,

but with the added benefit of helping the organization define and understand itself throughout (Ferguson, 2002; Horgen et al., 1999; Duffy et al., 1998). (There is great variance in what different architectural practices do. Some firms work hard to have a wider perspective represented in their design solutions by trying to incorporate the knowledge and skill traditionally brought to a project by other professions, for example the firms of Collman and Karsky, and the Washington D.C. office of Gensler.)

Table 1 - Perspectives in the Creation of Organizational Space

Role	Educational focus	Scope of project involvement*
Commercial Realtor		
Determine and procure the best space based on financial, size, & locational criteria	Finance, contracts, regulations	Through procuring space
In house RE architect		
Provide value to the organization through management of their space	Varies	Varies from design to construction sometimes through occupancy
Architect		
Creation of three dimensional space, determination of form, volume and external detailing	Aesthetics of form, proportion, balance in the sculptural sense,	Design through contractor selection, sometimes through construction to pre or early occupancy
Interior Designer		
Finishes, color, surface texture and arrangement of furnishings	Aesthetics of the interior based on color, texture, light and the relationships of objects in the space	After volume is created through installation of furnishing to pre or early occupancy photographs
Contractor		
Build the project in budget and on time	Project Management, legal issues, building technology	From bid or negotiation through construction completion and acceptance by client
Sub-contractor		
Complete the installation of the materials in their area of expertise	Wide range from engineering to installation expertise to 'by the seat of the pants', material and installation expertise, sometimes contractual and project management expertise	Occasionally during design, usually from the bid through the product warranty period

* The roles described here can vary widely.

A specific example where I was involved as a designer hired by a real estate group of an organization shows how our focus on the goal of our client to reduce the cost of real estate caused us to lose sight of why the organization had office space. Because it had been determined that, as a general work practice, many people in the organization were out of the office on a regular basis, we designed the space utilizing a hoteling concept; such that there were significantly fewer desks in the office than employees. To make the 'hoteling' easier to manage, we also reduced and standardized the types of office space. Therefore, space within the office was assigned daily to all users in the office, on a first come, first-served basis. Spaces could not be reserved for groups to be located adjacent to one another, unless adjacent spaces were available as each person arrived. The physical environment provided was an open office layout that had neither privacy, nor significant or long-term storage. We designed one open office layout that would be used for everyone but senior executives, who received small, enclosed offices. Working within this office space was a group of litigators, who handled cases with high financial stakes. They came together as needed for a case and worked together for the duration of the case. The effort involved a high level of teamwork and sharing of many confidential documents. The large space they needed to work as a team was only available as conference room space, which was in limited supply and had to be reserved for limited blocks of time and without significant security. Security was only available for the litigators' documentation if they split the

documents among the one or two file cabinet drawers assigned to each person in the core of the building. What the group did in response was to go out under cover of night, buy heavy-duty door locks, install them on the doors of office conference room spaces, and take them over for the term of their project. By breaking the "rules" in this significant way, the group assured themselves of the ability to do their work, as they needed to. We had reduced costs significantly, but in turn had created a workplace unable to meet the needs of the people working in it.

The reason the organization had office space was for the litigators and others to accomplish their work. If we, as designers, were getting in the way of work being accomplished, then the cost of real estate to the organization actually increased to include the amount of time wasted by the workers unable to get their work done effectively. Unfortunately, this decision making process had been isolated from the organizational process, seeing people only as quantities of "butts in seats". We had no connection back to what people were trying to accomplish with the space. We were solving the wrong problem.

How did we get so focused on "cost savings" as the issue, to the exclusion of functions of the people in space? If designers and architects are to bring their many varied skills into the design and construction process, it is time to back up to the big picture, to reflect on the actual value of space to an organization, and then to refocus on how to better utilize our skills and knowledge to provide it.

Back to School

When I returned to school, it was with a frustration at the way my profession was practiced. I felt there was so much more knowledge available than we were applying to the projects we were producing. My goal, at the start, was to learn more about the materials and methods at my disposal to construct better spaces. By this I mean to understand the materials and spatial properties, such as acoustics, temperature control, and lighting, that can be used in the design and building of office space. There were however, several occurrences during my graduate work that made me refocus on what was the real challenge was for me.

The first occurrence was when I wrote the first draft of my thesis proposal and two faculty members challenged my subject in very different ways. It is perhaps important here to note that I was interested in considering the importance of privacy in office spaces. The first challenge was to ask me what I brought to the question that was new, and the second challenge was did I have the expertise to examine the question as needed. A former professor stated that there was nothing new in what I was proposing and that the work had been done many times over. Both challenges brought up questions for which I had no good answer. I felt the question I was asking required physiological research, an area in which I was not trained or being trained.

What came up in its place was a semester of more challenges and an approach to thinking about questions that changed the structure of what I

thought was important to ask. The second occurrence was precipitated by a classmate, who had run an organization of her own for years, first with office space and then virtually. She declared there was nothing that could not be accomplished virtually -- a claim I believed at a gut level was ridiculous. However, while she was able to cite examples of work of many kinds being done virtually, I could provide no cases on why organizations needed to have space. The third occurrence was an assignment that eventually provided the basis for my thesis. We were to take or find a picture of a system and describe it. I decided to describe a workplace (utilizing pictures that were taken professionally of existing office spaces.) The assignment started with a list of all of the reasons I could think of why organizations had workplaces, including:

- A place an organization has to house employees
- The second largest cost most organizations have, that should be minimized as much as possible
- The canvas an organization used to let clients and potential clients know how successful they are
- A place where workers can be watched to assure that the company is getting their money's worth (in time).
- A place where an organizations can define itself, as well as determining who are its customers and its employees
- A place that reflects an organization's attitude about its employees
- A place that supports the work process of an organization

- One of the tools for establishing connection among the people participating in an organization
- A place to get tasks done
- A place to think (Smith and Kearny, 1994)
- A tool to aid creation and evolution of ideas through thinking and interaction

When I finished the assignment, it was clear that the organization and not the workplace was the system. In addition, when I thought about this list, I started on a mental checklist to see if I thought any of the reasons for workplaces could be achieved virtually, cheaper. Yet this approach was not systemic, I needed to look at the process of the organization and understand how, where and when space could best support it and perhaps acknowledge that there were some ways that virtual approaches might, in fact, support organizations more effectively.

Summary of Chapter Two

The process of being in school and in some ways the process of being a professional have been a “test’ [of] the frame within which [I] was operating,” at a tacit level (Steier and Ostrenko, 2000, p 48). I have spent years frustrated by the question of what “better space” is for organizations and have been recently motivated to focus on understanding the answer because of the challenges presented by my practice and school experiences.

First, I have seen organizations focus on reducing the cost of space to the point of making it a work obstacle instead of a work support and I was the person forcing people into that unworkable space. Even with this challenge, “better space” was still a physical answer to me. It was not until the second challenge by a business-owning classmate saying that space was not needed at all that I finally had to look for a different frame in which to see the question (Senge, 1994). I was not looking for a physical solution for space; I was looking for a way to use space to enhance business processes. Most amazing, this has brought me back to the importance of the design process I learned as an undergraduate (Sanoff, 1979) as a tool to get to the right question. If we look at what an organization is doing, including in our consideration all of their support resources (Horgen et al. 1999) we will solve a different problem than if we match numbers of butts to allocations of square feet.

My return to school was based on the desire to provide my clients with proof that space can be important to the function of their organizations, and to be able to show them how. My studies have provided the basis for understanding how to ask the question and the tools for forming an answer.

Chapter Three

Environmental Perturbation of an Organizational System

Utilizing a systemic approach to examining a question brings the importance of environment to the forefront. We often describe organizations as responding to an external stimulus or their "environment." Maturana and Varela (1998) explain that although systems are perturbed by the environment their own response to that perturbation is structural, and internally determined. The system reacts to perturbation from the environment as a way to maintain its own "configuration of relationships that determine its essential characteristics," (Capra, 1996, p161). It does this by changing its own structure, the "physical embodiment" of the essential characteristic's relationships (Capra, 1996, p161). This occurrence Maturana and Varela (1998) call "social coupling" is important because it sets up the relationship of the environment to the system as a type of "structural coupling" that involves recursive perturbative behavior in the domain of languaging. Ultimately, activity of the environment may prompt the system to need to respond but importantly does not determine how (or if). For an organizational system, this means that it is important to understand not only the perturbations from the environment but also why the system responded as it did, historically, and what choices it might make currently.

In the case of organizations in the United States, the environment is the larger business environment, or “economy,” in which the organizations must survive. The structural change I am addressing involves the use of shared office space by organizations and the perturbation that I believe is important is the development and utilization of technology.

Technology has made possible and prompted the use of large shared office spaces by organizations. By examining the historical perturbations in the form of technology changes, I will establish why and how organizations, through their use of shared office space, responded to these perturbations. This is critical in that how organizations have historically used shared office space has established the basis of our current approach to designing and utilizing shared office space. I will then describe the contemporary perturbations of technology advances in order to examine why shared office space as a structural element in organizations is still important.

History

“The office of today is, for the most part, a descendant of the farm workplace of the 1700s and the factory workplace of the 1800s. In both cases, employers had no choice but to bring all the workers to one workplace and to require them to be there at the same time.” (Gordon, 1998)

Prior to the industrial revolution, businesses were customarily family run, predominately agriculturally based, and generally located in the same structure as the home (Zelinsky, 1998). However, due to the advances in

technology during the industrial revolution, the business environment changed significantly. Farming, technology, and power source improvements provided a need for, and made possible, large production facilities (WGBH Boston, 1990). Improved farming methods increased wealth, and then population. By reducing the labor needed for agriculture, this labor became available for other work. Technology provided access to raw materials and improved power sources, and promoted faster production through the utilization of increasingly complex and expensive mechanization. Power sources supported use of more machinery, while at the same time making it necessary to locate machinery in the same place in order to fully utilize the power source (WGBH Boston, 1990). Although the machinery was expensive, people produced products much faster than they could by hand (Smith, 2001, Shafritz and Ott, 2001). The expense involved in procuring, powering, and housing equipment soon became a limiting factor in the number of people who had the wealth to run an organization (Shafritz and Ott, 2001). Further, quicker production did not remove people from the work processes. It was still necessary for the people to be physically involved.

Technology also improved construction methods and building infrastructures, which made it possible for increasingly large groups of people to work together. Construction materials and the knowledge of how to better utilize them continued to evolve. For example, larger floor plates became possible because of technology and construction methods that disconnected

a building's structure from its exterior shell. Starting in 1817 the ability to mass-produce nails made it possible to move wood construction from post and beam to studs and planks, a much lighter construction method (Tunnard and Reed, 1956; Fitch, 1975). This was followed by the use of cast iron for structural systems in the United States in 1848 (although the use of cast iron in England started as far back as the 1790's) (Tunnard and Reed, 1956). In addition, the advent of artificial light enabled people and their tasks to be located away from daylight sources, and possibly without daylight at all. "...a machine (unlike a slave or a horse) is most economically operated when it runs all of the time" (Fitch, 1975). Up until this time work hours were largely determined by available daylight. Technology then could physically locate people together in ways that had not been possible in the past. Office buildings, as we have come to know them, were a technology advancement of the industrial revolution.

Workers moved into offices as organizations expanded, increasing the need for tracking and management of the organization (Zelinsky, 1998). In the office, also there was a progression of technology that required users to be in organizational space because of the initial cost of the equipment and the physical nature of input and output. These machines included telephones, typewriters, calculators, fax machines, and computers (Zelinsky, 1998).

What organizations appear to have focused on was the physical connection of manual tasks. This can be seen in the evolution of

organizational theories of the time, where the ability to improve an organization is focused on the improved efficiency of the physical tasks (Shafritz and Ott, 2001, Smith, 2001; Taylor, 2001). Additionally, from an organizational perspective, there was a distinction between those that think and those that do – mental and manual labor (Fayol, 2001, Taylor 2001). This distinction between thinking and doing has given rise to a belief system that people doing manual work do not need to think or do not have a knowledge component to their work, which continues to some extent in the business world today (Brown and Duguid, 2000). With the focus of organizational theory being on manual work, physical connections in work places became key in organizational performance improvement attempts.

Technology Perturbations of the Economy Today

Technological advances are creating change in a significantly different way again today (Shafritz and Ott, 2001). Technologies have advanced from simple mechanical support of physical processes to include electronic support of mental and communication processes (Judy and D'Amico, 1997). These technologies have eliminated many of the simple mental tasks previously present in office work while expanding the need for jobs requiring highly skilled and knowledgeable workers (Judy and D'Amico, 1997; Perlow, 1997). In addition, the value of previously unrecognized mental components of 'manual work' is now being recognized as significant by organizations (Brown and Duguid, 2000). Products that are applied knowledge -- intangible

“knowledge services” (i.e., consultants) -- are the economy’s most significant growth area (Judy and D’Amico, 1997) and provide the most significant value (Birchard, 1999, Stewart 1999). Now increased organizational productivity is based in the ability to increase the quality and speed of knowledge rather than manual labor. This knowledge is facilitated by technology but is not what technology provides.

In addition, major technological advances in areas of communication & computers are affecting the movement, storage, and retrieval of information (Judy and D’Amico, 1997). Technology advances have provided several benefits to communication: 1) reducing the cost of communication (Friedman, 2000, Judy and D’Amico, 1997), 2) providing easier access and, 3) making it faster (Friedman, 2000). Computing capacities have increased dramatically in both capabilities and volume (Judy and D’Amico, 1997), while the hardware has shrunk in size, weight and cost (Stewart, 1999). Ultimately, what electronic technology is doing is enabling the rapid, cost effective transmission, storage, and manipulation of information as data while simultaneously reducing the factors of transmission time and distance.

Summary of Chapter Three

Organizations have always accomplished their objectives with a combination of physical and mental resources. Technologies have been developed over the years that support and eliminate many of the physical and simple mental tasks that were needed by organizations, resulting in

more time becoming available for the more complex mental aspect of organizations, the generation of ideas. In his article on accounting for intangible assets, Birchard states, "Instead of plants and equipment, companies today compete on ideas and relationships. Assets come in the form of patents, knowledge, and people" (Birchard, 1999, p318). Therefore, as the environment for U.S. organizations continues to change, technology offers more opportunities than ever before, including lower expenses, elimination of time barriers, and geographical expansion of business markets. Increasingly large portions of the economy are now based on knowledge work. What becomes the challenge then for organizations is to determine where knowledge resides in their organizational processes and what they can do structurally to support and enhance those processes of knowledge creation.

Chapter Four

The system

“Full membership in a verbal community involves inextricably intertwined nonverbal and verbal circumstances and processes” (Juliá, 2000, p 776).

“It is no surprise, really, that cyberspace has become famous for “identity experiments” and con games. The world of information is often so thin, the cues and clues so few, that in many cases it’s easy to pose, even as an ex-Indian Army soldier now working as a billiard marker, and get away with it. In the tight restrictions of the information channel, without the corroboration that broader context offers (or refuses), the powerful detective skills that everyone relies on have little room to work.” (Brown and Duguid, 2000, p2)

Changes in the environment have triggered organizational systems to recognize the growing importance of “knowledge” to their pattern of organization. Increasingly, organizational priorities are based on intangible production, which no longer needs space to physically connect it. The challenge, then for organizations is how to identify the process of knowledge creation and how to

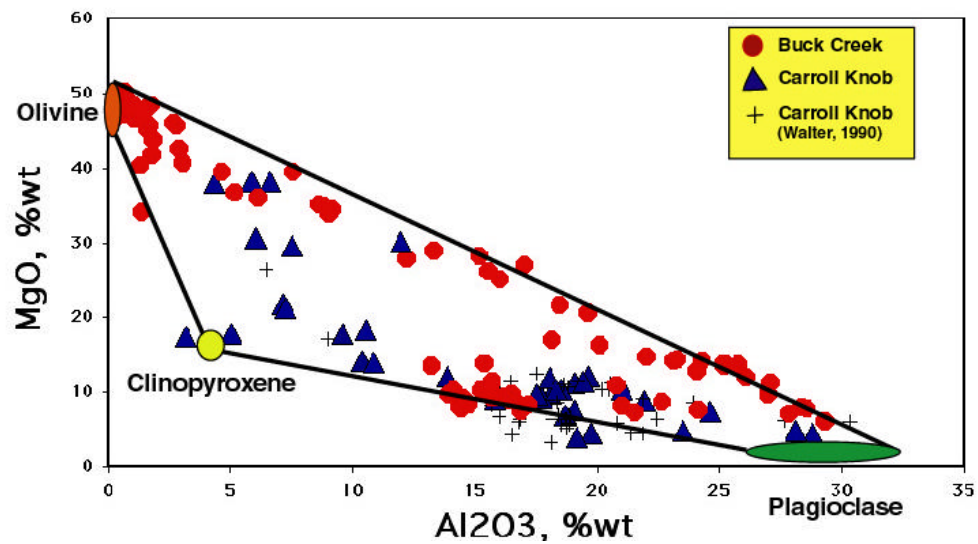
structure their organization to support it. This chapter will identify what organizational knowledge is and how it is created. Then, the affordances space provides to create organizational knowledge will be presented as a unique and essential support of that knowledge creation.

Distinguishing Knowledge and Information

The word '*information*' is often used to describe the era in which we find ourselves (Brown and Duguid, 2000). It is a term I will use to represent data that is without connection to the people who generated it. Information will be couched as language reduced to its explicit part that can be documented, stored, and/or transferred in a particular format without a social context. The meaning of the information is dependent on the user and the extent to which he or she has the specific and necessary socially-developed "forms of expression" (Encarta, 1999, electronic) or 'language' in common with the creator. In our culture, we often confuse data on a computer with organizational knowledge even though the usefulness of each to an organization is significantly different. An example of information can be found in the graphs that my husband, a geochemist, puts together. The graphs tell a story on the origins of the rocks in an area of the Appalachian Mountains, as the abundances of certain chemical elements or compounds represented on the graphs reveal the geologic evolution of the region (see figure 1.). Located on the Internet where they can be accessed without interaction with their creator, the graphs contain all of the data that geochemists need to understand the story they tell. Although the information is in the graph,

for a non-geologist it has no meaning. Ultimately, for information to be useful there is a user prerequisite that he or she shares an existing language with the creator. The shared language is a critical component, in order to be able to share knowledge or to decipher information.

Figure 1 – Geochemistry of the Buck Creek and Carroll Knob
Mafic/Ultramafic Complexes



Knowledge is the term I will use for the pattern that an organizational system must maximize in order to survive and thrive. Knowledge is a challenging term because it is used to cover both knowledge as individual cognition and knowledge created by social systems -- one existing in human nervous systems, the other existing in human social systems. There is a distinct difference

between coming to “know” something as an individual and “knowing “within an organizational system.

Cognition, which in its usual interpretation exists within an individual, and is, biologically speaking the pattern of the neural system (Maturana and Varela, 1998). It is the “I know” or “light bulb” moment that results from the structural coupling of a human nervous system and the environment. Because it develops as we come to know, cognition is unique to each of us and our own neural system pattern. The challenge comes when we want to take that knowledge outside of ourselves, as it is not possible to ‘sync’ our nervous systems the way we can ‘sync’ PDA’s (personal digital assistants). I cannot give another person my neural patterns, nor can I experience theirs. So how can I know that they know what I know? The use of this one word – knowledge-- to cover two such diverse occurrences, misses the difficulty of the transmutation that exists between the two forms of knowledge.

Knowledge in Organizations

"Organizational *knowing*" is based in the ability of the organization as people to support commonality between people (Cook and Yarrow, 2001; Wenger, 2000). Three bodies of work each approach the concept very differently; yet end up with the same general idea -- that the common expression that groups create is where organizational knowing exists. The concept of human social systems, from autopoiesis, addresses the concept from the direction of the environment of living entities and how they exist as social groups.

The Communities of practice concept, from organizational theory, examine the pattern within the social system of an organization needed to create knowledge. The concept of Interaction communities, from semiotics, examines the structure within the organizational system that supports the pattern of knowing. Although the three present a differing view of organizational knowing, all offer insight into the capacity people have to create the common expression necessary to create knowledge.

A human social system is the human form of ‘structural coupling’, of entities whose existence is independent but that perturbate each other recursively, appearing to an observer to be causing responses in each other. In such a system, the components have “maximum autonomy, i.e., components with many dimensions of independent existence” (Maturana and Varela, 1998, p. 198). Unlike other systems and metasystems, the components of human social systems – people - exist as part of multiple independent systems. Maturana states that the “operational requirement for membership in a human society is the involvement of the autopoiesis of the human participants in the realization of the explicit and implicit rules of behavior that define it.” (Maturana, 1980, p. 17) Human social systems, through their interactions, set up the conscious and unconscious rules by which they operate. Thus, there is a production of common behavior by the social unit, which is what produces the system. Maturana makes clear that he does not consider a worker in a capitalistic economy a member of the organization for which he works because there is “no employment with respect to his abilities, and ...he has not other independent means of survival”

(Maturana, 1980, p18). Yet, I believe that organizations recognizing the value of the knowledge residing collectively in their people may be bring them more in line with Maturana's outline of what is needed for a true human social system, a "respect to his abilities". This follows on the ideas of Teilhard de Chardin, that mankind is evolving toward a higher level of being (Teilhard de Chardin, 1964) and Varela's discussion on ethics as being "a moment-to-moment awareness of the virtual nature of our selves (Varela, 1999, p 75). This description Varela gives of ethics is connected to Maturana's view of human social systems as maximizing people's minds as a resource. Perhaps human organizations can become true human social systems, and part of the evolution of mankind (Teilhard de Chardin, 1964).

"Communities of practice" are "communities that accumulate collective learning into social practices" (Wenger, 2000, p. 4). Brown and Duguid describe the knowledge that communities of practice develop as, "Know-how embraces the ability to put know-what into practice" (Brown and Duguid, 1998, p 95). Just as Maturana distinguishes less recursive interactions as different from social systems, Wenger distinguishes communities of practice from project teams because "communities of practice must grow organically as their learning unfolds" (Wenger, 2000, p 9). He further describes the needs of these groups as

"a sense of joint enterprise... members must have enough opportunities to interact with one another in joint activities to build relationships, trust, and personal identities. This ongoing mutual engagement makes the community real as an experience and weaves the social fabric necessary to support

joint learning... members must develop a shared repertoire of concepts, tools, language, stories and sensitivities that will embody the distinctive knowledge of the community and become a unique resource for further learning“ (Wenger, 2000, p. 10).

Maturana’s rules for membership in a human social system are similar to Brown and Duguid’s ‘evidence’ and ‘endorsements,’ i.e.:

“Communities develop their own distinct criteria for what counts as evidence and what provides ‘warrants’ - the endorsements of knowledge that encourage people to rely on it and hence make it actionable” (Brown and Duguid, 1998, p 99).

Semiotics discusses this same concept as an *interaction community* and a *speech community*. Leeds-Hurwitz defines an interaction community as,

“...a group of people holding the same ways of interaction in common ...Just as speech community involves the group having a language in common, an interaction community can be described as the group having the same rules for the use not only of the language but of other communicative systems as well” (Leeds-Hurwitz, 1989, p 57).

For the purposes of this discussion, language is defined in a broader sense, to include the other ‘communicative systems’. Leeds-Hurwitz also lays out the three components for a speech community:

“(a) the group of people must have at least one language in common, (b) they must have particular norms for use of the language in common, and (c) they

must spend time together so that they continue to have the same language and norms for use of the language, instead of growing apart. “ (Leeds-Hurwitz, 1989, p. 56)

What is important then in all of these bodies of thought is the idea that there is an aspect of being together as humans that requires creating a common language in order to have a common understanding. The commonality that groups of people create is a necessary starting point for the "actionability" of knowledge. Thus, the knowledge within an organization is connected to the language created and shared by groups of people. When information is extracted from that knowledge, it lacks the support of that commonality. Information then is something different and less useful than knowledge. Brown and Duguid have noted that, “The locally embedded nature of these practices and warrants can make knowledge extremely ‘sticky ‘to use...” (Brown and Duguid, 1998, pp 99). In order to maximize the creation on knowledge within an organization, organizations must understand how groups create common languages, which occurs through communication.

Communication Creating Knowledge

The pattern that allows human beings to connect individual knowing to group knowing is reciprocal communication acts. The unit of this process - the communication act - can be defined as,

“a synthesis of three different selections, namely, selection of *information*, selection of the *utterance* of this information, and a selective *understanding*

or *misunderstanding* of this utterance and its information” (Luhmann, 1992, p. 252).

Mingers further detailed this explanation of the communicative act:

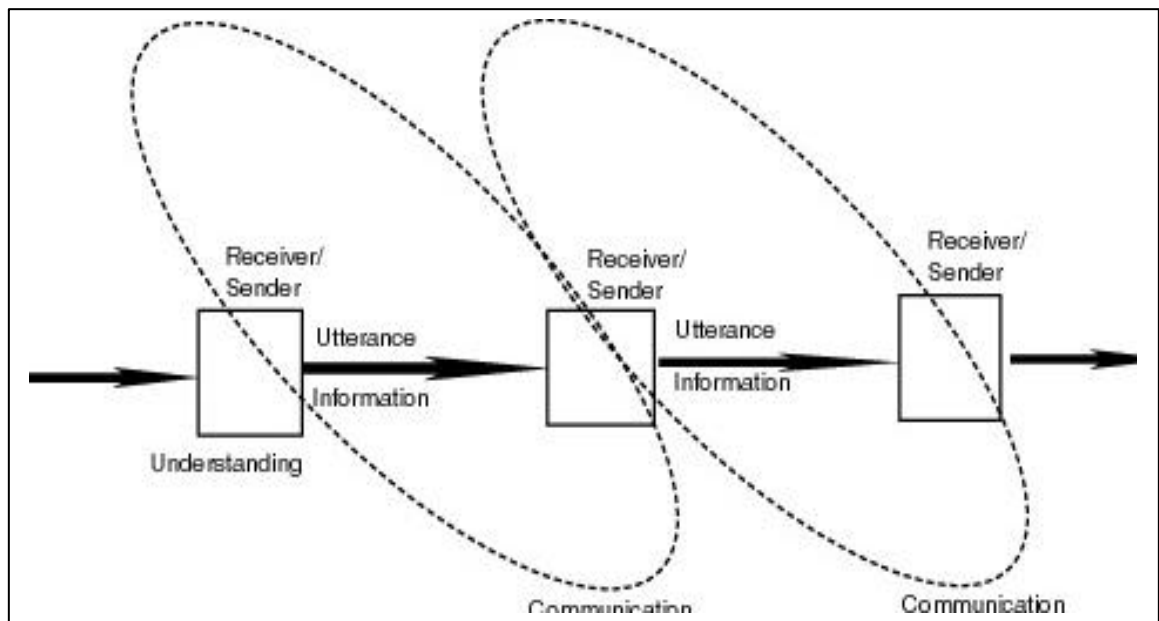
“...information is what the message is about...Utterance is the form in which it is produced - how? By whom? When? And understanding is the sense or meaning that it generates (which can include misunderstandings) in the receiver” (Mingers, 1995, p142).

Luhmann contends: “Therefore communication occurs only when a difference of utterance and information is understood. This distinguishes it from the mere perception of the behavior of others” (Luhmann, 1992, p. 252). He further identified communicative acts as the elements of social systems that are not individual knowing (Mingers, 1995). For my purposes, there is one important change I will make to Luhmann’s description, and that is to replace *utterance*, a word rooted in spoken language, with *expression*, a word that accepts many other channels for conveyance of information between people. The distinction of communication as an act that is between people requiring expression by one person and understanding by another person illustrates the act that humans use recursively to transmute individual knowing to social knowing. Organizational knowing cannot access the neural systems of its employees. Organizational knowledge must be created; it is not just a summation of the knowledge held by individuals in the organization. This is the challenge that organizations face when trying to support the development of communication to create knowledge.

The concept that Luhmann presents distinguishes the communication domain as not in the physical domain. Mingers, however, points out a concern with the construction of Luhmann's theory, which claims human social systems are autopoietic in the domain of communication, indicating that communication does not exist in a physical domain. "It is one thing to say analytically that communications generate communications, but operationally they require people to undertake specific actions and make specific choices" (Mingers, 1995, pp 149 – 150).

The how of the "utterance" (or as I would say "expression") of communication, requires the sender to act physically to create the information separate from the knowing of his neural system. This may challenge the ability to call a human social system autopoietic, rather than a "third order structural coupling," but it does leave Luhmann's clear indication of the act of communication as occurring between people and it is this latter aspect that is important to this thesis.

Figure 2 – Communicative Acts



(Mingers, 1995, p. 144)

Recursive communicative acts are termed language – “...behavior that stands for or represents something other than itself” (Mingers 1995, p74). Von Krogh and Roos recognize that, “...there are several systems of language used by human beings over time, e.g. olfaction, touch, gesture, facial expression, posture, pheromones, vocal intonation and text...” (von Krogh and Roos, 1995, p 96) yet they, along with others, focus on spoken language:

“To utter recognizable statements is not sufficient for communication. What computers lack is the human body’s other language systems, like gestures, and activity to form speech which is as meaningful as human speech...” (von Krogh and Roos, 1995, p 96).

If the goal is to create the most meaningful commonality for knowledge, then it is essential to consider languaging in this broader sense, as it is the only way to acknowledge complete communication. Leeds-Hurwitz identifies the many channels through which communication is practiced by people, including verbal and nonverbal modes of communication, specifically “Paralanguage (how things are said), kinesics (what we do with our bodies), proxemics (use of space), touch, taste, smell, and objects” (Leeds-Hurwitz, 1989, p 102). For a fuller definition of these terms, see the following table.

Table 2 – Channels of Communication

Channels of Communication

Language: The words we say, which are then combined into utterances, and utterances into various forms of discourse. *Discourse* is the common term for any extended presentation of workds, including everything from conversations to public speeches.

Paralanguage: Vocall behavior which is not verbal. This is, everythng which is produced by the vocal tract except words. This includes four main aspects: vocie quality (how your voice sounds: hoarse, raspy, etc.), vocal qualifiers (how you say thngs: stress, pitch, length, etc.), vocal characterizers (non-speech noises: laugh, cry, ect.). and vocial segregates (sounds which function like workd: uh, huh, shh, etc.). Sometimes pauses and silences are studied as well; other times, these are studied as part of the use of language.

Kinesics: Everything we do with our bodies, from posture to facial expressions, to were we look with our eyes (sometimes studied separately as *eye gaze phenomena*). This is divided into three main aspects: prekinesics (physiological basis of movement), microkinesics (isolation of individual movements), and social kinesics (motion related to social performance). It is the level of social kinesics that is the most often studied.

Proxemics: Use of space. There are two main aspects. The first is use of space between people, that is, how close or far people stand from one another while interacting. The second is environmental influences: that is , the effects of such things as architecture and location of furniture on interaction.

Touch: This includes who touches who, where, for how long, in what way. There has only recently been much interest in the social use of touching.

Taste and Smell: Although these are rarely studied, it is generally agreed that they are an important part of many interactions.

Objects: Use of objects in communication is again often overlooked, but can be critical. This includes everything from clothing to type of furniture or presence of plants, from smoking cigarettes to carrying a briefcase.

(Leeds-Hurwitz, 1989, p 105)

The ability to utilize the channels of communication to create information is dependent on a reciprocal relationship with the environment, into which the information is put, i.e., the environment selected must afford the opportunity for expressions to be made. Different environments that can be used for communication afford different opportunities for expression.

Perception is the cognitive result of what we as individuals are capable of distinguishing from the environment around us through the perturbation of our senses, i.e., we see within the limits of our biological systems and our expectations a representation of a part of the environment around us. Maturana and Varela use the example of a human blind spot. In the eyes of each person there is a blind spot that is not perceived because, our nervous system knows that what we see is continuous and compensates for it (Maturana and Varela, 1998). Gibson recognizes that the environment, which can include animate objects, also provides the potential for what we perceive. Gibson goes further to recognize that environmental potential is relative to what is perceiving it. “The *affordances* of the environment are what it *offers* the animal, what it *provides* or *furnishes*...It implies the complementarity of the animal and the environment” (Gibson, 1979, p 127). Perception, in addition to involving our cognitive systems in what we see, also involves the potential of the environment in which we are perceiving. In this case, the media through which we communicate provide differing potentials for communication, differing “affordances” (Lombardo, 1987).

The media that afford the potential for communication to occur have been identified within the field of information technology as media channels. Daft, Lengel, and Trevino (1987) define media channels as “high or low in ‘richness’ based on their capacity to facilitate shared meaning.” They go on to define richness as being based on four criteria:

“Feedback—Instant feedback allows question to be asked and correction to be made.

Multiple cues—An array of cues may be part of the message, including physical presence, voice inflection, body gestures, words, numbers, and graphic symbols...

Language variety—Language variety is the range of meaning that can be conveyed with language symbols. Numbers convey greater precision of meaning than does natural language. Natural language can be used to convey understanding of a broader set of concepts and ideas

Personal focus—A message will be conveyed more fully when personal feelings and emotions infuse the communication. Some messages can be tailored to the frame of reference, need, and current situation of the receiver” (Daft et al., 1987, p 358).

They then rank the media richness of four media types: face-to-face is the richest medium, telephone and written addressed documents are next respectively, and unaddressed documents are the least rich (Daft et al., 1987). As the focus of this theoretical area is on specific instances of use and user preference, no further detail can be found, only statements such as:

“...communication media vary in their capacity to convey the “richness” of verbal and nonverbal cues. A medium is “rich” if it allows senders to transmit, and receivers to access the subtlety, nuance, connotation and meta-messages inherent in interpersonal communication. Based on this premise face-to-face and telephone are richer media than written communication or e-mail” (Sussman et al., 2002).

Merging this literature with my work experience with space and communication technologies allows for a personal examination of the richness of the following familiar media.

Table 3 – Channels of Communication by Office Technology

Channels of Communication by Office Technology						
	Media					
	Common Space	Telephone	Conference Call	Video Conference	Email	IM Chat
Channels of Communication						
Language						
Spoken	Y	Y	Y	Y	N	N
written	Y	N	N	Y	Y	Y
Paralanguage						
Voice Quality	Y	M*	Y	Y	N	N
Vocal Characterizers	Y	Y	Y	Y	N	N
Vocal Qualifiers	Y	Y	Y	Y	N	N
Vocal Segregates	Y	Y	M**	Y	N	N
Pauses and Silences	Y	Y	M**	Y	N	N
Kinesics						
Prekinesics		N	N		N	N
Micror kinesics	Y	N	N	S	N	N
Social Kinesics	Y	N	N	S	N	N
Proxemics						
Space Between People	Y	N	N	S	N	N
Environmental influences on Interaction	Y	N	N	S	N	N
Touch						
Who	Y	N	N	S	N	N
Where	Y	N	N	S	N	N
How long	Y	N	N	S	N	N
How	Y	N	N	S	N	N
Taste and Smell						
Taste	Y	N	N	N	N	N
Smell****	Y	N	N	N	N	N
Objects						
Personal Clothing & Accessories	Y	N	N	Y	M***	N
Furniture & Furnishings	Y	N	N	Y	N	N
Personal Props	Y	N	N	Y	N	N

Y - Yes, N - No, M - Maybe

* "This isn't a simple yes or no. Quality is lost over electronic channels from common space" (Mittleman, 2003).

** This "depends on whether it is half or full duplex. Most Calls are duplex, so you will lose this data" (Mittleman, 2003).

*** This "depends on camera angle and zoom" (Mittleman, 2003).

**** "There are virtual smell technologies, but they are rarely employed" (Mittleman, 2003)

This table was developed in collaboration with Dr. D. Mittleman April 25, 2003

People learn complex communication starting at birth (Leeds-Hurwitz, 1989), including both tacit and explicit ways to communicate through interaction with others with whom they share physical space. Shared physical space is a human's first media channel; it is also the one that affords people the opportunity to utilize most of these channels (Daft et al, 1987; Sussman et al., 2002).

What we recognize in the end is that media affects what can be perceived and that this affects the ability of humans to create the languages to create knowledge. Although the quality of the media and the skill of the people using it may affect the value of the media, various media afford different degrees of communication richness, and therefore have different capacities for communication and information transport. These differences become important when we examine the system over time because we cannot examine and understand the value of different media without understanding the full range of communication that is involved in creating a group's common language. Here is where the affordances of shared office space are unique and valuable for organizations.

Summary of Chapter Four

Organizations have increasingly recognized the importance of the creation of organizational knowledge to be successful. Although many organizations try to reduce this knowledge into data that can be stored, shared and transferred, without the need for people, information is not the same as organizational knowledge. The knowledge that an organization develops is rooted in the

common language that people develop while working together. This shared language exists among various groups of people and is developed through the use of many channels of communication that involve language, paralanguage, kinesics, proxemics, touch, taste, smell and other objects. Until recently, shared space was the only widely used communication medium used within organizations. With other media now available, the ability to understand the richness of each medium, which is its ability to carry various communication channels, becomes important to the successful creation of organizational knowledge. As the richest communication occurs via the greatest variety of sensory exchanges, physical proximity between the communicants (i.e., the workers in an organization) is the ideal situation for successful knowledge generation. Thus, while lower-level activities can be supported by less intimate, technologically mediated communication paths (like email, FAX, telephone, etc.), high-level knowledge generation requires people in a shared space, creating a common language toward transmuting data into something with relevance and value.

Chapter Five

Conclusions and Research Agenda

Why do business organizations still need shared office space? Shared office space affords organizations access to the greatest number of available communication channels to support the creation of the common language required for knowledge creation. The question itself suggests that a systemic interdisciplinary approach is warranted to understand the relationship between organizational systems and their office space. To take a systemic approach means understanding the system, its structure, its pattern of relationships, and its environment, as well as the observer's perspective in framing and examining the system.

This question, the starting point of this thesis, evolved through interdisciplinary work and educational experiences: it is a question that started with looking for very practical answers (i.e., better acoustic separation) as to why office space was becoming ineffective for the organizations. Examples of my work experiences presented in this thesis indicate that the types of office spaces that I was involved in creating were not effective for the organizational users of those spaces. My examination of this issue has made it clear that this question cannot be approached merely as a design problem; the patterns of the organizational system also have to be examined.

Large open office spaces were both a result of and necessity for the persistence of the industrial revolution's technological advances. In the past organizational space provided the physical connection between the human resources of organizations and the organizations' other resources (machinery and materials). The importance of the physical connection provided by space was reflected in the focus of organizational theory that stresses the physical processes of organizational tasks, in theories such as the division of labor and scientific management (Shafritz and Ott, 2001, Smith, 2001; Taylor, 2001).

As new technologies have developed, the needs for physical connection of human resources to equipment and products have become a far less significant part of the need for organizational office space. These technologies have reduced the need for human involvement in many manual tasks, and in simple mental tasks, providing the opportunity for a greater focus on knowledge work. In addition, recent technological advances offer ways to connect work processes and the people involved without having people in the same physical environment, seemingly offering a way to avoid having shared office space at all. Recent directions in organizational theory now focus more on the need to create knowledge within organizations as opposed to the physical processes of production.

Systems theory, organizational theory, and semiotics all look at the way that organizations create knowledge, working within the concepts of social systems, communities of practice, and interaction communities. These bodies of work all look to the common role of creating a shared language in the ability of

organizations to create knowledge. Clarifying the definition of organizational knowledge is rooted in understanding the differences between human cognition, organizational knowledge, and information. Organizational knowledge, which is actionable, is not the same as either human knowing or the information stored on a computer. The distinction lies in the creation of a shared organizational language, which is necessary for transmuting human knowledge and information into actionable organizational knowledge.

The creation of that shared language is accomplished through communication. This transmutation is described by Luhmann in his description of the communicative act as sender, utterance (or my word – expression), and receiver. The shared knowing that happens as we create a common language is possible through recursive cycles of communicative acts that each provide a movement toward common understandings.

The communicative act however has more dimension than the word utterance might suggest. Luhmann in locating “utterance” in a sender and receiver relationship leaves room for a broader understanding. Communication is sensorial (involves all of the senses), requires a relationship to the environment and other people (proxemics), and is both tacit and explicit. Leeds-Hurwitz specifies the varied channels through which communication occurs (Leeds-Hurwitz, 1989). Prior to new communication technologies, there were few other options besides communicating face-to-face, therefore the connection of access to channels and richness of communication was not an issue. Based on

media richness theory, shared environments access the most channels of any of the media examined, thus providing the richest communication possible.

Conclusions

Shared office space affords organizations access to the most communication channels available to support creation of a common language needed for knowledge creation. Being in space together affords access to the most complete range of communication channels. Perhaps most important are the more tacit parts of communication, such as body language and proxemics

Where communication is complex, shared office space allows for the most detailed and rich communication. Put in the most straightforward terms: where communication is complex – i.e., where participants may not have a history of communicating, or where the topic on which they are communicating is new – shared office space allows for the most detailed and rich communication. On the other hand, where communication is simple, i.e., where I know and am comfortable with the person(s) with whom I am communicating, and/or the communication is more at the data transfer level, then other media may afford adequate communication channels and shared office space may not be needed. Specific daily tasks in organizational environments, such as establishing teams, organizing projects, brainstorming, group reviews of project status, can benefit from a communication-rich joint physical environment, while, transfer of data results from surveys or calculations may not.

The affordances of all technology-created tools need to be understood by employees so that they can determine when each is needed. Organizational space is uniquely qualified to serve organizations at certain times in their processes. Unlike mechanical processes, where the processes can be timed, measured, and determined from outside, organizational patterns are inexact social processes. The people involved in the process are the ones that know where they are in the process, and are the ones best suited to determine if the process requires the benefit of shared space. For an organization, then, it is important that employees 1) understand the benefit of space to their work pattern, and 2) are empowered to utilize it to support their pattern.

Organizations and those in them involved with providing and maintaining space must allow shared space and other technologies to be utilized to support the work process. Organizations and their facilities management groups also need to learn what their organizational system is actually producing, and stop allowing the tail (i.e., cost savings on a support tool) to wag the dog.

Organizations must start to integrate their approach to shared space and other technologies into their strategic planning, rather than separating them into different areas for planning. Often organizational real estate, human resources, and information technology are three isolated planning units in an organization, as best ignoring the others, at worst vying for limited organizational funds. Before each can be utilized the way they can best support the organization, technology and organizational space must be viewed as supporting people. Further, organizations should incorporate outcomes assessment in their strategic

plans to ensure that technology and space are seen from a supporting organizational perspective.

Architects and designers must develop methods for facilitating a process where an organization can better understand itself. They must also reframe their design process to consider the contribution of technologies other than space and be able to integrate an understanding of how all these tools support the creation of organizational knowledge. This need for the integration of information technology and space to support organizational strategy underlines the importance of design approaches such as “process architecture” (Horgen et al. 1999), where the work process is socially constructed to resemble what the organization wants to be, and is not approached as a series of unrelated, nonintegrated solutions. If we are going to create space that can support social language-creating processes, we must start by bringing together people involved in the production of the organization to imagine what that production can be. Only then can we determine how space and other media can best be utilized to support that production. Involving organizational members in a participatory process also gives them the tools to examine their own organizational system, including recognition of those affordances provided by each medium.

Driven by the recognition by many organizations of the importance of teams, designers and design researchers have started to examine the importance of teaming, creativity, and knowledge creation as objectives of space usage (Schermer et al, 2002; Augustin, 2001; Barnes, 2001, McCoy, 2001; McCoy, 1999; Duffy et al. 1998). Yet, we often still approach space without much

consideration of what new technologies really can do for organizations. Approaches that integrate all media will be the best way to use all media most effectively (Horgen et. al., 1999). Support systems for organizations are often approached in a segmented way, where each support resource is structured individually to support all organizational needs. Finally, with the important role that shared office space as a communication medium plays in language creation, it is worth questioning if the typical focus on individuals when designing workspaces affords organizations the needed space benefits.

An Emergent Research Agenda

“It is clear (and has been widely recognized) that one cannot understand a technology without having a *functional* understanding of how it is used. Furthermore, that understanding must incorporate a *holistic* view of the network of technologies and activities into which it fits, rather than treating the technological devices in isolation. But this is still not enough. ... As the use of a new technology changes human practices, our ways of speaking about that technology change or language and our understanding. This new way of speaking in turn creates changes in the world we construct” (Winograd and Flores, 1986, p 6).

This thesis used an interdisciplinary approach to put forth the hypothesis that shared office space is important to organizations because it affords the most support possible to support the development of a shared language from which organizational knowledge is created. Although this potential has always existed

in shared space, this challenge evolved because of the potential opportunities new media offer to create organizational knowledge. It is possible with this type of challenge to take an all or nothing approach and say either shared space or communication technology is the best to meet organizational needs or to better understand the advantages these technologies offer organizations. Although organizations may use multiple technologies, they tend to obtain information on how to use these applications from the vendors. Vendors, particularly of computers and shared spaces, have stayed isolated with their products and continued to show how each is the potential solution to all organizational needs (Brown and Duguid, 2000). (When designers hear about integrating technology and office space, the assumption is generally made that the issue is where the wiring for the computers goes in the office space.)

What remains to be answered after this hypothesis is raised is how to integrate shared office space as an organizational resource, with other organizational resources, - into the structure of the organization in a way that is best for the individual organization. The question fall into three general areas: 1) how can we study office space within an organizational system to understand its uses by people; 2) how we determine the need for office space and how to create it; and 3) how we think about office space within an organization. These questions, just as this thesis, require an interdisciplinary approach to investigate.

Studying Office Space as Part of an Organizational System

Office space is part of a system that operates at some level of effectiveness based on the interaction of many complex elements. In order to understand the effectiveness of the space, it is necessary to develop methods for examining space that are inclusive of the multiple elements in these systems and the interactions they have. In addition, methods must be used that allow for various levels of perturbation to be happening in the system, by utilizing research and theories from different fields.

As an example, I put both flexible open office spaces and new types of group interaction spaces in an office. Open office furniture could be configured for individual work spaces or as group meeting spaces of several different sizes. The group interaction spaces included perching spaces near the coffee machines, areas with lounge chairs that had tablet arms and wireless capabilities, and central teaming rooms isolated from the open office areas but without full height partitions. The feedback was that the desks were not moved and the spaces were left empty; this organizational system was not using them. How do we understand why these spaces were not being used? Christopher Budd raised the important question of the impact of corporate culture on the use of flexible furniture (Budd, 2000). If the answer lies outside of the more traditional areas of space research (i.e. acoustics or privacy) and into areas of corporate culture who looks at understanding those issues? As this is a new type of space for an organization, does anyone follow the organization to see how people make meaning of the space? How would we do that effectively? How do individuals

make meaning of space in their organizations? How do we study organizational space across disciplines? Or to look at the question more appropriately for the system, how do designers get involved in organizational research to incorporate the role of space into understanding the effectiveness of organizations? What does space that is about the people's needs first look like? Can it be standardized? How flexible should it be? If employees were to be guaranteed the space they needed to do their jobs when they needed it, how would space management look be done (if the dog wagged its tail)?

Systemic Methods for Determining Space Needs and Designing Space

The role of space in organizations needs to be studied further vis à vis the other resources and technologies within organizations. If space is only one resource there needs to be a way to facilitate an organization's strategic vision and evaluate existing tools to understand what it needs from each, by evaluating them within a systemic framework. This facilitator role can be filled by many people (Horgen et. al., 1999); however, the question should be asked if an architectural education provides the necessary skills to make architects well suited for such a role? If yes, then an architect must be able to think of a solution in another way – not as a building but as an organizational system. How does this really work and what kind of technology and organizational understanding is needed by a facilitator for this process? How can such a process be done on a less than grand scale, where sweeping organizational changes are not

underway? What is the process that needs to go on after occupancy of new space, or, for that matter, an introduction of a new or updated technology?

Design processes that are inclusive of the many factors that are involved with the usability of an organization's shared office space are being worked on by forward thinking design professionals (Horgen et. al, 1999; Sanoff, 2003; Duffy 2003). Design processes that incorporate a vertical cross-section of the organizations' employees in visioning their future in space also have other benefits to offer organizations (Ferguson, 2002). The benefits of this type of process need to be evaluated, documented, expressed to designers, and presented to organizational leaders.

Effective Organizational Space from within the Organization

The most challenging question, however, may be internal in organizations with architectural, real estate, and/or facilities management groups. The cost-driven approach discussed in chapter 2 is not uncommon (Duffy, 2003). If these professionals in an organization do not evaluate their success in terms of cost cutting or cost controlling, what are they accomplishing for their organization? Duffy suggests that the professionals who support organizational office space need to focus their cost savings in the area where on average 65% of all organizational cost resides – employees - not on the 10% that is spent on real estate (Duffy, 2003). But how is that done, and how is it documented? BOSTI tried several methods for documenting this approach almost two decades ago (Brill et. al. 1984). Their documentation focused on employee productivity

through human resource personnel (Smith and Kearny, 1994). Today, however, productivity measures now focus on knowledge work, with much current research done in the field of accounting (Birchard, 1999). Understanding and integrating new methods for organizational evaluation into arguments that support the use of a more integrative process for organizational space needs to be examined as new accounting procedures are developed. What role should facilities managers, real estate staff, and architects play in a system where the objective is to support people resources – especially their knowledge? How do you evaluate such a person?

A Final Thought

The challenge of thinking of space as part of an organization, of planning, designing, using, maintaining and evaluating space as part of a system is a very different, more complex and less exact process than receiving a program and designing for the numbers. Yet it is herein this challenge, as Schön points out, that the important problems lie (Schön, 1987).

References

Anderton, Frances. "‘Virtual Officeing’ Comes in from the Cold, New York Times, Dec. 17, 1998.

Augustin, Sally. "Impact of the Physical Environment on Knowledge Worker Performance." Workplace Performance and Productivity Session. EDRA 32. Edinburgh, Scotland. July, 2001.

Barnes, Janice. "Flexible Workplace Alternatives and Situated Cognition." Symposium: Evaluation of Intelligent Office Buildings in the Cross-Cultural Context. EDRA 32. Edinburgh, Scotland. 6 May, 2001.

Birchard, Bill. "Intangible Assets + Hard Numbers = Soft Finance." *Fast Company*. Oct. 1999: 316-336.

Brill, Michael, Stephen T. Margulis, Ellen Konar, and BOSTI. *Using Office Design to Increase Productivity*. Vol. 1. Buffalo, New York: Workplace Design and Productivity, 1984.

Brown, John Seely and Paul Duguid. *The Social Life of Information*. Boston, Massachusetts: Harvard Business School Press, 2000.

Brown, John Seely and Paul Duguid. "Organizing Knowledge." *California Management Review* 40, 3 (1998) 90-111.

Budd, Christopher, Personal Communication, 24 January 2000.

Capra, Fritjof. *The Web of Life*. New York: Anchor Books, 1996.

- Conle, Carola. "Thesis as Narrative or 'What is the Inquiry in Narrative Inquiry?'" *Curriculum Inquiry*. 30, 2 (2000): 189-214.
- Cook, Scott D. and Dvora Yarrow. "Culture and Organizational Learning." 1993 *Classics of Organization Theory*. ed. Jay M. Shafritz and J. Steven Ott. 5th ed. Fort Worth: Harcourt College Publishers. 2001.
- Daft, Richard L., Robert H. Lengel, and Linda Klebe Trevino. "Message Equivocality, Media Selection, and Performance: Implications for Information Systems." *MIS Quarterly*. 11, 3 (1987): 355-366.
- Duffy, Francis. "Design for the Knowledge Economy". Keynote Address. EDRA 34. Minneapolis Minn. 21 May, 2003.
- Duffy, Francis and Les Hutton. *Architectural Knowledge: The Idea of a Profession*. London: E&FN Spon, 1998.
- Duffy, Francis, Stephen Greenberg, Jeremy Myerson, Kenneth Powell, Tony Thomson, and John Worthington. *Design for Change: The Architecture of DEGW*. Boston: Birkhäuser Verlag, 1998.
- Encarta World English Dictionary*. Ed. Microsoft Corporation. 1999.
- Fayol, Henri. "General Principles of Management." 1916 *Trans. Constance Storrs 1949. Classics_of Organization Theory*. ed. Jay M. Shafritz and J. Steven Ott. 5th ed. Fort Worth: Harcourt College Publishers. 2001.
- Ferguson, Brian. Personal Communications. 2002.
- Friedman, Thomas L. *The Lexus and the Olive Tree*. New York: Anchor Books, 2000.

- Fitch, James Marston. *American Building 2: The Environmental Forces that Shape it*. 2nd ed. New York: Schocken Books, 1975.
- Gherardi, Silvia and Davide Nicolini. "to Transfer is to Transform: The Circulation of Safety Knowledge." *Organization* 7, 2 (2000) 329-348.
- Gibson, James J. *The Ecological Approach to Visual Perception*. Dallas, Texas: Houghton Mifflin, 1979.
- Gordon, Gil. Forward. *New Workplaces for New Workstyles*. by Marilyn Zelinsky. New York: McGraw-Hill, 1998. xiii-xv.
- Heft, Harry. "Gibson's Ecological Approach." *Advances in Environment, Behavior, and Design: Toward the Integration of Theory, Methods, Research, and Utilization*. Ed. Ervin H. Zube and Gary T. Moore. New York: Plenum Press, 1997.
- Horgen, Turid H, Michael L. Joroff, William L. Porter and Donald A Schön. *Excellence by Design*. New York: John Wiley and Sons, Inc. 1999.
- Hwang, Ahn-Sook. "Toward Fostering Systems Learning in Organizational Contexts." *Systems Practice and Action Research*. 13, (2000): 329-343.
- Judy, Richard W., and Carol D'Amico. *Workforce 2020: Work and Workers in the 21st Century*. Indianapolis, Indiana: Hudson Institute, 1997.
- Juliá, Pere. "Observer or self-observer in second-order cybernetics?". *Kybernetes*. 29, 5/6 (2000): 770-786.
- Keeney, Bradford P. *Aesthetics of Change*. New York: The Guilford Press, 1983.

- Kelly, Hugh F. *U.S. Office Market Review and Outlook*. Society of Industrial and Office Realtors. 2003. 3 April 2003.
<<http://www.sior.com/ecommerce/2003USOfficeMarketOverview.pdf>>.
- Leeds-Hurwitz, Wendy. *Communication In Everyday Life: A Social Interpretation*. Norwood, New Jersey: Ablex Publishing Corporation, 1989.
- Leydesdorff, Loet. "Luhmann, Habermas and the Theory of Communication" *Systems Research and Behavioral Science*. 17, (2000): 273-288.
- Lombardo, Thomas J. *The Reciprocity of Perceiver and Environment: The Evolution of James J. Gibson's Ecological Psychology*. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1987.
- Loseke, Donileen R. "The 'Great Divides' in Ways of Knowing." *Methods in Research* [class hand-out]. Tampa, Florida: University of South Florida, Department of Sociology, Fall 2000.
- Lombardo, Thomas. *The Reciprocity of Perceiver and Environment: The Evolution of James J. Gibson's Ecological Psychology*. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1987.
- Luhmann, Niklas. "What Communication?" *Communication Theory*. 2:3 (1992) 251-259.
- Maturana, Humberto R. "Man and Society." *Autopoiesis, Communication, and Society: the Theory of Autopoietic Systems in the Social Sciences*. ed Frank Benschler, Peter M. Hejl and Wolfram K. Köck. New York: Campus Verlag, 1980.

- Maturana, Humberto R. and Francisco J. Varela. *The Tree of Knowledge: The Biological Roots of Human Understanding*. Trans. Robert Paolucci, Rev. ed. Boston: Shambhala, 1998.
- McCoy, Janetta. "Making and Managing the Physical Environment for Creative Teamwork." Workplace Performance and Productivity Session. EDRA 32. Edinburgh, Scotland. July, 2001.
- McCoy, Janetta. "Can the Work Environment be Designed to Support Creativity in Organizational Teamwork?" Imaginative Thinking Needed: Where's the Power of Workplace Design Intensive Session. EDRA 30. Orlando, Florida. 2 June, 1999.
- Miller, Dwight. "A Work Environment for Sandia's Advances Concepts Group." ERDA International Conference. Edinburgh. July. 2001.
- Mingers, John. *Self-Producing Systems: Implications and Applications of Autopoiesis*. New York: Plenum Press, 1995.
- Perlow, Leslie. *Finding Time: How Corporations, Individuals, and Families Can Benefit from New Work Practices*. Ithaca, New York: ILR Press, 1997.
- O'Mara, Martha. *Strategy and Place: Managing Corporate Real Estate and Facilities for Competitive Advantage*. New York: The Free Press, 1999.
- Ouchi, William G. "The Z Organization." 1981 *Classics of Organization Theory*. ed. Jay M. Shafritz and J. Steven Ott. 5th ed. Fort Worth: Harcourt College Publishers. 2001.
- Sanoff, Henry. "Participatory Planning in Japan. Session: Work Environments Network Intensive Session. EDRA 34. Minneapolis Minn. 21 May, 2003.

- Sanoff, Henry. *Design Games*. Los Altos, California: W. Kaufmann, 1979.
- Schermer, Brian, Diaz Moore, Keith, Barnes, Janice, and Lyn Geboy.
Symposium: Place and Organizational Change: Emerging Approaches.
EDRA 33. Philadelphia, PA. 24 May, 2002.
- Schön, Donald A. *Educating the Reflective Practitioner*. San Francisco: Jossey-Bass, 1987.
- Senge, Peter. *The Fifth Discipline: The Art and Practice of the Learning Organization*. CD. BDD Audio, 1994.
- Shafritz Jay M. and J. Steven Ott. *Classics of Organization Theory*. 5th ed. Fort Worth: Harcourt College Publishers, 2001.
- Smith, Adam. "Of the Division of Labour." 1776. *Classics of Organization Theory*. ed. Jay M. Shafritz and J. Steven Ott. 5th ed. Fort Worth: Harcourt College Publishers. 2001.
- Smith, Phyl and Lynn Kearny. *Creating Workplaces Where People Can Think*. San Francisco: Jossey-Bass, 1994.
- Stewart, Thomas A. *Intellectual Capital: The New Wealth of Organizations*. New York: Doubleday, 1999.
- Steier, Frederick and Wit Ostrenko. "Taking Cybernetics Seriously at a Science Center: Reflection-In-Interaction and Second Order Organizational Learning." *Cybernetics and Human Knowing* 7 (2000): 47-69.
- Sussman, Lyle, Arthur J. Adams, Frank E. Kuzmits, Louis E. Raho.
"Organizational Politics: Tactics, Channels, and Hierarchical Roles."
Journal of Business Ethics. 40 (2002) 313-329.

- Taylor, Frederick Taylor. "The Principles of Scientific Management" 1916.
Classics of Organization Theory. ed. Jay M. Shafritz and J. Steven Ott. 5th
ed. Fort Worth: Harcourt College Publishers. 2001.
- Teilhard de Chardin, Pierre. *The Future of Man*. Trans. Norman Denny. New
York: Harper & Row, 1964.
- Tunnard, Christopher and Henry Hope Reed. *American Skyline*. New York: New
American Library, 1956.
- von Krogh, Georg and Johan Roos. *Organizational Epistemology*. New York: St.
Martin Press, 1995.
- Varela, Francisco J. *Ethical Know-How: Action, Wisdom, and Cognition*.
Stanford, California: Stanford University Press, 1999.
- WGBH Boston. *Race to Save the Planet: Program 1 the Environmental
Revolution*. Magnetic tape. Santa Barbara, CA: Intellimation, 1990.
- Wenger, Etienne. "Communities of Practice and Social Learning Systems."
Organization. 7,2 (2000) 225-246.
- Winograd, Terry and Fernando Flores. *Understanding Computers and Cognition:
A New Foundation for Design*. Boston: Addison-Wesley, 1986.
- Zelinsky, Marilyn. *New Workplaces for New Workstyles*. New York: McGraw-
Hill, 1998.

Bibliography

- Altman, Irwin and Barbara Rogoff. "World Views in Psychology: Trait, Interactional, Organismic, and Transactional Perspectives." Handbook of Environmental Psychology, (vol. 1). Stokols, Daniel and Irwind Altman eds. (John Wiley and Sons, 1987, New York). P 7-40.
- Augustin, Sally. "Impact of the Physical Environment on Knowledge worker Performance." International Conference, Edinburgh. July. 2001.
- Becker, Franklin. Workspace: Creating Environments in Organizations. New York: Praeger Publishers, 1981.
- Bell, Paul A., Thomas C. Greene, Jeffrey D. Fisher, and Andrew Baum. Environmental Psychology. 5th ed. Fort Worth: Harcourt College Publishers, 2001.
- Brill, Michael, Sue Weidemann and BOSTI Associates. Disproving Widespread Myths About Workplace Design. Jasper, Indiana: Kimball International, 2001.
- Fleischaker, Gail Raney. "Questions Concerning the Ontology of Autopoiesis and the Limits of Its Utility." International Journal of General Systems. 21, (1992): 131-141.
- Keable, Ellen. "Effects of Workplace Noise on Productivity and Job Satisfaction :New Officing Solution." International Conference, Edinburgh. July. 2001.

- Longworth, Dennis L. "Running with the Big Dogs." IFMA Suncoast Chapter Meeting, February 6, 2002.
- Maturana, Humberto. "The Organization of the Living: A Theory of the Living Organization." International Journal of Human-Computer Studies. 51, (1999) 149-168.
- Maturana, Humberto R. and Francisco J. Varela. Autopoiesis and Cognition: The Realization of the Living. Dordrecht, Holland: Reidel Publishing Company, 1972.
- McWhinney, Will. Of Paradigms and System Theories. ms. 1996.
- Mingers, John. "Systems Typologies in the Light of Autopoiesis: A Reconceptualization of Boulding's Hierarchy, and a Typology of Self-Referential Systems." Systems Research and Behavioral Science. 14, (1997): 303-313.
- Sproull, Lee and Sara Kiesler. Connections: New Ways of Working in the Networked Organization. Cambridge: MIT Press, 1991.
- Tetlow, Karin. The New Office: Designs for Corporations, People and Technology. Glen Cove, N.Y.: Rizzoli International Publishing, 1996.
- Vanderstraeten, Raf. "Autopoiesis and socialization: on Luhmann's Reconceptualization of Communication and Socialization" British Journal of Sociology. 51, (September 2000): 581-598.
- von Krogh, Georg, Johan Roos and Ken Slocum. "An Essay on Corporate Epistemology." Strategic Management Journal. 15, (1994) 53-71.

Wheatley, Margaret J. Leadership and the New Science: Discovering Order in a Chaotic World. San Francisco: Berrett-Koehler Publishers, 1999.