

FRAMING STRATEGIC TRADE OFFS BETWEEN TRADITIONAL AND VIRTUAL ENTERPRISES AND WORKPLACES

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Abstract: The definition, history, enablers, motivations, and forces of virtual enterprises are addressed in this paper. The huge impacts of information and communication technologies on different aspects of virtual enterprises are discussed. These trends are contrasted with traditional corporate real estate strategies. A human centric strategic decision making context is presented that enables enterprises to think about their required spaces – both traditional and virtual. Several models of work are suggested to address tradeoffs and to assess the economic value of workspace alternatives based on cost and benefit attributes of spaces in traditional and virtual enterprises. *Copyright © 2004 IFAC*

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1. INTRODUCTION

The concept of virtual enterprises has been around for a while; however many aspects of virtual enterprises have yet to be explored. Of particular importance, information and communication technology have massively changed the way enterprises now look at their own assets; people, activities, and spaces. This paper considers how enterprises should look strategically, not operationally, to their space needs and their real estate assets.

A human centric strategic decision making context is presented to enable enterprises to think about their required spaces – both traditional and virtual. Also costs and benefits of spaces in both traditional and virtual enterprises are summarized to frame the strategic trade offs between traditional and virtual organizations and workspaces. Several models of work are suggested to address tradeoffs and to assess economic value of workspace alternatives.

2. VIRTUAL ENTERPRISES & ORGANIZATIONS

Virtual organizations first appeared around twenty years ago right at the time of the

information explosion (Olson, 1984). Terms such as “Virtual Office” (Giuliano, 1982), “Virtual Classroom” (Hiltz, 1986), “Virtual Corporation” (Davidow & Malone, 1992), “Virtual Team” (Hammer & Champy, 1993), and “Virtual Community” (Rheingold, 1993) have been invoked when discussing the topic of the virtual organization. For human enterprises, Shao et al. (2000) described “Virtually” as structural changes (constraint breaking) in one or more of the dimensions of space, time, asset usage, or large status in order to achieve a new unity.

There are many definitions in the literature about the virtual organization, e.g. The International Association of Virtual Organizations (IAVO) (1999), Byrne (1993) and Thorelli (1986), and Goldman et al. (1986). The perspective of virtual enterprises is as a network-centric structure whose space, and time are not bound by four walls and traditional nine to five work schedules. Also the virtualization of enterprises affects the organization of work, e.g. conceptual or logical models of organizations, such as business processes and the organization of production and service delivery (Ortner & Stary, 1999).

Information and Communication Technology (ICT) has been the most important enabler of the transformation of the traditional organization into the virtual organization. In addition primary motivations of enterprises to “go virtual” can be summarized as follows: reduce costs and enhance productivity (Apgar, 1998; Davenport & Pearlson, 1998), increased satisfaction, closer teamwork, greater flexibility, and retention of valued employees (Rouse, 1999). Basically the notion of virtual organizations emerged to respond to the complex, competitive, and uncertain markets of the 1990’s (Baskerville & Smithson, 1994; Cravens et al., 1994; Davidow & Malone, 1992; Hedberg et al., 1994; Morton, 1996, etc.). Globalization and internationalization are also important forces in moving traditional organizations to virtual models.

Real estate expenses and costly time-consuming trips have been other factors influencing enterprises to go virtual. Thus outsourcing, telecommuting, virtual teams, remote working, and hoteling are some examples of new “go virtual” way of business.

2.1 Impacts on corporate real estate

An enormous amount of corporate wealth is tied up in real estate, on average, twenty to twenty five percent of total assets. Occupancy costs rank as most firms’ second-largest expense, trailing only salaries. Typically, corporate real estate costs comprises five to ten percent of a company's expenses. Also words like downsizing, restructuring, and right sizing have become well-worn parts of the corporate vernacular. So enterprises have realized the importance of real estate as the fifth asset of the enterprise in addition to people, capital, information, and technology (Lyne, 1995a).

Decision making about corporate real estate used to be very supply driven, made by the broker based upon the available listed places. The space required by enterprise used to be calculated easily based on standard square feet figures per each category of employees. Consequently, real estate department was inefficiently decentralized and at the operational level for different business units. This has changed dramatically into more centralized strategic corporate real estate decision-making. Human considerations have come to be at the center of enterprise workplace decision-making and workplace decisions

support strategic business needs of enterprises (Lyne, 1995b).

New workplace strategies have been developed in enterprises to support people, as the most valuable asset of the enterprise, e.g. shared office spaces (the just-in-time office, hoteling, the non-territorial office), telecommuting (home offices, satellite facilities, working from everywhere like hotels, airports, etc), videoconferencing, and team workspaces. Of course, corporate real estate decisions should support people’s social and psychological needs, e.g. job satisfaction, in addition to the enterprise’ economic concerns.

3. THE STRATEGIC SPACE DECISION MAKING CONTEXT

Enterprises should look strategically, not operationally, to their spaces needs – both traditional and virtual - and their real estate assets. Figure 1 summarizes the strategic context. People, space, and information technology are three important interrelated assets of the virtual enterprise. Of course, enterprises conduct various kinds of activities. Each of these activities has different requirements in terms of people, space, and information technology. Furthermore there are relationships among people, space, information technology, and activities.

As it is shown in Figure 1, space, information technology, and activities compose a triangle that provides the context for strategic decision-making regarding the enterprise. With respect to the dynamic nature of strategic planning, this triangular context evolves over the time and is influenced by the external factors related to markets and the environment. Finally, since people are the most important assets of any virtual enterprise, the decision-making framework must be human-centric. The important roles of people in decision-making are shown by three different interrelated layers of the triangular context: economic, social, and psychological.

4. TRADING OFF TRADITIONAL AND VIRTUAL

There have been efforts to develop decision support systems for corporate real estate assets (e.g. French, 2001). Most of these efforts considered real estate decision making as the selection of real estate, as an asset, based on several criteria, e.g. commonly, its marginal contribution to the production of a mean-

variance efficient multi-asset portfolio, subject to the investor's objectives and capital rationing

constraints.

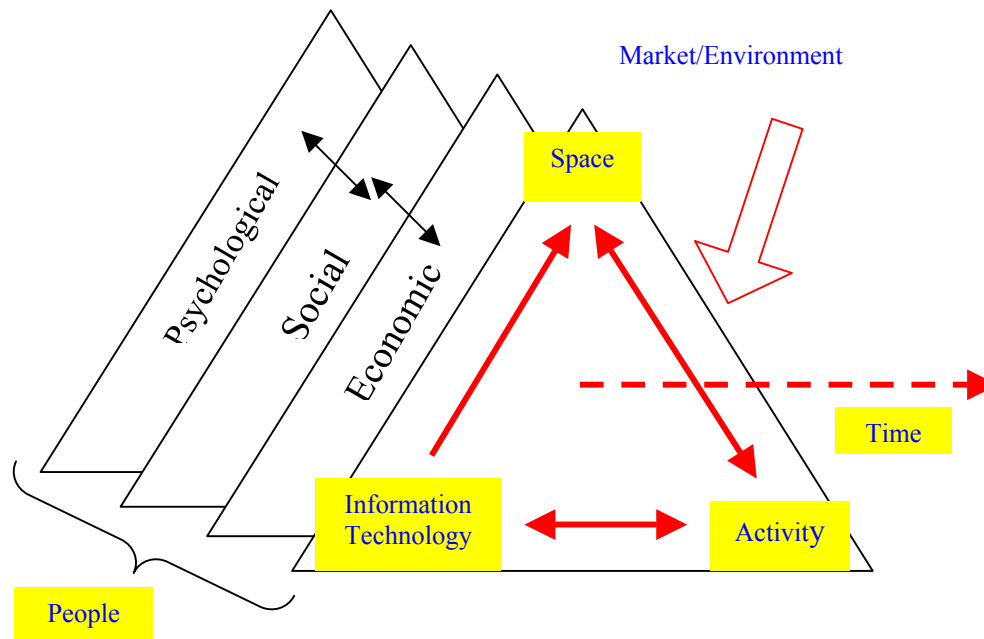


Fig. 1. Strategic decision making context for enterprises and workspaces

However most of research efforts to form a platform for corporate real estate decision-making have been solely focused on cost issues, e.g. investment and occupancy costs. Invariably, not only initial capital and long term operating costs, but the effect of the real estate decision on the firm's ability to attract and retain staff, and the ability to work productively, must be considered (Becker & Pearce, 2003). The Cornell Balanced Real Estate Assessment Model (COBRA[®]) has been developed to analyze the true costs and benefits of large-scale real estate decisions. This tool addresses human resource and productivity issues to assess the financial implications of large-scale real estate decisions.

On the other hand there has been little research to distinguish corporate real estate decision-making for traditional vs. virtual enterprises. However it is widely accepted that corporate real estate decision-making is complex and not just a simple investment decision. Workplace decisions should support overall enterprise strategies and work processes. Built spaces also have other value for the enterprise, e.g. Hampton (2002) discusses flexibility, cost control, and employee retention as some attributes which a corporate campus can deliver to the enterprise, regardless of economic conditions.

To frame corporate real estate decision making in traditional vs. virtual enterprises it is first necessary to address major costs and benefits of built space for either traditional or virtual enterprises. Table 1 summarizes costs and benefit attributes of spaces and the relevance of these attributes to traditional vs. virtual space.

The costs side is divided to two broad categories: investment and recurring costs, each has six attributes (attributes 1-12). The benefits side is divided into four major categories: work, social, image, and asset benefits, collectively covering attributes 12-28.

It would appear that virtual workspaces must be less expensive if the startup costs can be amortized across a sufficient time. This is due to the likely greater costs of distributing technologies (i.e., servers, printers, etc., as well as IT support) across many distributed sites. It is important to note, however, that cost savings for virtual workspaces depend on avoiding facilities costs by having people work from high-density office "hotels" or perhaps their own homes.

Given these assumptions, one might argue that virtual workspace should dominate. However, this is clearly not the case, despite trends in that direction. There are benefits to traditional space that virtual space cannot provide. Social, image, and asset benefits (attributes 21-28) clearly favor

traditional workspaces. The remaining social benefits (attributes 19-20) can be argued for

either alternative workspace. If any of these attributes represent “must haves,” the overall

Table 1. Costs and benefits of spaces in the relative merits of traditional

Item	Category	Description	Measure	Traditional	Virtual
1	Investment Costs	Land Acquisition & Permit Cost	Dollars	*	
2		Initial Construction Cost	Dollars	*	
3		Parking & Amenity Expenses	Dollars	*	
4		Renovation Cost	Dollars	*	
5		Moving Expenses	Dollars	*	
6		Equipment Expenses (Investment)	Dollars	*	*
7	Recurring Costs	Leasing Cost	Dollars/Year	*	
8		Occupancy Expenses	Dollars/Year	*	
9		Occupancy Costs of Underutilized Spaces	Dollars/Year	*	
10		Operation Expenses	Dollars/Year	*	*
11		Info. and Comm. Technology Expenses (Recurring)	Dollars/Year	*	*
12		Government Tax Expenses	Dollars/Year	*	
13	Work Benefits	Facilitate Physical Access Among Teams	Time Until Meeting	*	
14		Connect Horizontally Across Organization	Time Until Communication	*	*
15		Support Leaner Processes & Organization	Time & Dollars Saved		*
16		Respond Quickly To Market Anywhere	Time to Market		*
17		Access Least Expensive Skillful Employees	Dollars/Hour		*
18		Perform Place-Specific Processes	Yes/No	*	
19	Social Benefits	Social Interactions and Informal Meetings	Subjective Scale	*	
20		Social Freedom In The Workplace	Subjective Scale		*
21		A Means To Solidify A Corporate Culture	Subjective Scale	*	
22		A Means To Solidify Organizational Hierarchy	Subjective Scale	*	
23	Image Benefits	Create & Enhance Brand Image	Subjective Scale	*	
24		A Source of Pride for Local Residents	Subjective Scale	*	
25	Asset Benefits	Support Recruiting Processes	Percent Success	*	*
26		Amenities for The Attraction And Retention of Labor	Percent Success	*	
27	Asset Benefits	Financial Flexibility Due to Owning the Land	Net Option Value	*	
28		Potential Revenue from Under-Utilized Spaces	Net Option Value	*	

solution will likely emphasize traditional, perhaps with some elements of virtual. For example, it has been widely observed that big enterprises often choose high rise fancy buildings in specific areas in order to show the power of their brand and to have a positive impact on neighbors. Moreover government entities prefer physical spaces to support cultural practices of the organization. So basically in these circumstances traditional workplace benefits overcome costs attributes in trade off.

There are essential forces, which may move enterprises to choose the traditional workplace, e.g. place-specific processes (attribute 18) may dictate a traditional workspace. People simply cannot assemble airplanes in their homes, for example. While not noted in this tabulation, there also may be process that cannot be place-specific. Call centers are obvious examples – these are undoubtedly best done virtually, at least for the customers.

5. MODELS OF WORK

Eliminating the work that must be performed in traditional workplaces, or clearly should be done in virtual workspaces, leaves the work that, in principle at least, could be accomplished in

either type of workspace. Work benefit attributes 13-17 provide the key tradeoffs between costs and benefits while social, image, and asset benefits may be viewed as enterprise constraints or secondary benefits. These work-related attributes can be characterized in terms of time and money to execute tasks and processes.

Tasks such as holding meetings and communicating information can be characterized in terms of time until success. Physical meetings are easier when people are in the same location and information communication is usually easier when people are networked. Leaner processes can be executed more quickly and less expensively. More efficient meetings, faster communications, and leaner processes should decrease time to market. Less expensive, but suitably skilled, employees should decrease the costs of tasks and processes.

To do trade offs between work benefits and cost attributes, the enterprise first needs to recognize the nature of work done in the enterprise, e.g. tasks, processes, communications, and etc. Thus, we have to represent the nature of work in order to translate time and costs savings into productivity and economic returns. This requires a model of the work domain of interest.

One possibility is a queuing network model of flows of information, people, and things. Such models provide good representations of the time required for movement, processing, waiting, and so on. Smith and Rouse (1979), for example, employed such formulations to evaluate alternatives floor plans for libraries.

Several more specialized models are available. For instance, Carley (2004) characterizes the organization as a set of nested networks connecting entities such as people, knowledge, resources, tasks, and groups. These networks are represented using the meta-matrix conceptual framework. The meta-matrix can be thought of as a conceptual description of the organization and as an ontology for characterizing key organizational entities and the relations among them.

The meta-matrix organizational model provides a means to represent organizational flows and analyze costs-benefits trade offs in making decisions about traditional vs. virtual workplace strategies. The flows of interest involve information, people, and things both within and across enterprise processes. The nature of flows may depend on the workspace concept. For example, physical flows of people may be replaceable by virtual meetings, e.g., video teleconferences. Thus, a virtual solution may involve changes of a traditional solution by converting a physical flow to an information flow.

Handley and Levis (2001) provides an alternative approach based on colored Petri nets. With this representation, flow occurs via tokens that are passed among network nodes, enabling and disabling processes. This enables adding a level of logic to the flow rather than simply assuming continuous flow. Of course, it also adds complexity to the representation and the task of formulating such models.

5.1 Representing Alternative Workspaces

Based on the some form of organizational model, one needs to characterize alternative workspaces in terms of the means to support flows. Information technology will, obviously, be central, and also not very sensitive to location. On the other hand, physical movement of people and things are likely to be very sensitive to location. Thus, the flow times and costs will be significantly affected by traditional vs. virtual solutions.

Once the network of connections and the means for flows along these connections are formulated, one needs to characterizes the work flowing through the enterprise, i.e., sales calls, design meetings, products assembled, etc. This characterization and the volume of flows represented can provide the means to assess costs and work benefits of the alternatives, in terms of attributes in Table 1, which can then be translated into the economic value of the alternatives, with appropriate discounting for the time value of money.

5.2 Addressing Tradeoffs

The approach outlined above can be employed to determine the relative merits of a particular process, or set of work elements, being performed in a traditional vs. virtual workspace. At first glance, one might think that the choice should be the alternative with the best cost/benefit assessment. However, this is only the best choice if work processes and elements are independent of each other.

Such independence is unlikely. One simple reason is that individuals may be involved in multiple processes. They probably cannot be in a traditional workspace for one process and a virtual workspace for another process. Even if this is possible, it is likely that the traditional space will have to be designed differently to dovetail with the virtual space. Thus, suboptimization relative to each process may yield solutions that, collectively, are far from optimal.

Consequently, our organizational model will have to include higher-level representations of relationships among lower-level networks. The result may be a hierarchical optimization problem involving finding the globally optimal mix of locally optimal or near-optimal solutions. Our current efforts are focused on developing such a layered approach.

6. CONCLUSIONS

A variety of competitive forces are driving the emergence of virtual organizations that employ virtual workspaces. There is a wealth of recent publications describing and extolling the virtues of being virtual. This paper has summarized these arguments.

However, decisions regarding virtual organizations and workspaces cannot be made in isolation from the full set of real estate decisions.

Both real estate and virtual estate interact to support work. The nature of the work to be done should determine the best mix of real and virtual. This paper has outlined an approach to finding this mix.

REFERENCES

- Apgar, M. IV (1998, May-June). The alternative workplace: changing where and how people work. *Harvard Business Review*, 121-136.
- Baskerville, R. and S. Smithson (1995). Information technology and new organizational forms. *European journal of information systems*, **4**, 66-73.
- Becker F. and A. Pearce (2000, January). *A balanced real estate and human resource model for assessing the financial implications of large scale real estate decisions*. International Workplace Studies Program, Cornell University, Ithaca, NY.
- Byrne, J. A., R. Brandt and O. Port (1993). The virtual corporation. *Business week*, Feb. 8, 97-103.
- Carley, K. M. (2004). Organizational design and assessment in cyber-space. In: *Organizational Simulation: From Modeling & Simulation to Games & Entertainment* (Rouse, W. B. and K. R. Boff). Wiley, New York.
- Cravens, D. W., S. H. Shipp and K.S. Cravens (1994). Reforming the traditional organization. *Business Horizons*, **37(4)**, 19-28.
- Davenport, T. H. and K. Pearlson (1998, Summer). Two cheers for the virtual office. *Sloan Management Review*, 51-65.
- Davidow, W.H. and M.S. Malone (1992). *The virtual corporation*. HarperCollins, New York.
- French, N. (2001). Decision theory and real estate investment: an analysis of the decision-making process of real estate investment fund managers. *Managerial and decision economics*, **22**, 399-410.
- Giuliano, V. E. (1982). The mechanization of office work. *Scientific Americans*, **247**, 149-164.
- Goldman, S.L., R. N. Nagel and K. Preiss (1995). *Agile competitors and virtual organizations – Strategies for enriching the customer*. Van Nostrand Reinhold, New York.
- Hammer, M. and J. Champy (1993). *Reengineering the corporation*. HarperCollins, New York.
- Hampton, B. E. (2002, January). Why corporate campuses make sense in all economic conditions. *Site Selection Magazine*.
- Handley H. A. H. and A. H. Levis. (2001). Incorporating heterogeneity in command center interactions. *Information Knowledge Systems Management*, **2(4)**, 297-309.
- Hedberg, B., G. Dahlgren, J. Hansson and N. G. Olve (1994). *Imaginare organisationer*. Liber-Hermods, Sweden.
- Hiltz, S.R. (1986). The virtual classroom: using computer-mediated communication for university teaching. *Journal of communications*, **36**, 95-104.
- IAVO (International Association of Virtual Organizations) (1999). <http://www.monumental.com/iavo/about.htm#anchor546359>.
- Lyne, J. (1995a, April). IDRC's real estate revolution: occupancy costs plummet, productivity crests. *Site Selection Magazine*.
- Lyne, J. (1995b, August). The info-age workplace: now at a location surrounding you. *Site Selection Magazine*.
- Morton, M.S. (1996). How information technologies can transform organizations. In: *Computerization and controversy* (Kling, R. (2)). Academic Press, New York.
- Olson, M. H. (1983). Remote office work: changing work patterns in space and time. *Communications of the ACM*, **26(3)**, 182-187.
- Ortner W. and C. Stary (1999). Virtualization of organizations: consequences for workflow modeling. *Proceeding of the 32nd Hawaii international conference on system sciences, HICSS-32 Conference*, IEEE.
- Rheingold, H. (1993). *The virtual community*. Addison-Wesley, Reading, MA.
- Rouse, W.B. (1999). Connectivity, creativity, and chaos, challenges of loosely-structured organizations. *Information Knowledge Systems Management*, **1(2)**, 117-131.
- Shao, Y. P., K. O. L. Matthew and S. Y. Liao (2000). Virtual organizations: the key dimensions. *Academia/Industry Working Conference on Research Challenges (AIWORC'00)*, Buffalo, New York.
- Smith, J. M. and W. B. Rouse (1979). Application of queuing network models to optimization of resource allocation within libraries. *Journal of the American society for information science*, **30(5)**, 250-263.
- Thorelli, H. B. (1986). Networks: between markets and hierarchies. *Strategic management journal*, 37-51.