IDEA GROUP PUBLISHING

701 E. Chocolate Avenue, Suite 200, Hershey PA 17033-1240, USA
Tel: 717/533-8845; Fax 717/533-8661; URL-http://www.idea-group.com

ITP5031

The Virtual Organization Matrix: Studying Virtual Organizations through Classification

Jinyoul Lee
Assistant Professor of MIS, School of Management, State University of New York at Binghamton, Binghamton, NY 13902-6015, Phone: 607-777-2440, Fax: 607-777-4422, Email: jylee@binghamton.edu

Jordan Shapiro
School of Management, Binghamton University, State University of New York, Binghamton, NY 13902-6014, Phone: 607-355-9271, Email: Shapiro@binghamton.edu

INTRODUCTION

Virtual organization has been well documented as both a tool for organizations to seek further profitability through the removal of traditional barriers as well as a method to extend the provision of services to clientele in a manner previously achievable by only large, multi-national corporations. The widespread implementation of information technology and its many applications in modern business have moved the act of management towards a virtual focus, where managers are able to complete tasks through the use of teams in varying physical locations, with members that may or may not be employees of that firm, sharing a wide variety of data and information.

With so many companies now employing virtual organization techniques, referring to a company as "virtual" or to its components as possessing "virtuality" lacks the clarity and specificity needed when using these firms as examples for others. The variety of methods through which a firm can achieve virtuality represents a span nearly as wide as the business community itself.

The purpose of this paper is to provide a more universally applicable method of comparing multiple virtually organized corporations. This work extends the principle of a "virtuality degree" in providing a guideline for classifying virtual organizations based on their virtual dimensions. The virtual organization matrix, presented below, contains categories which firms can be placed into according to their maturity in that area. In order to further the refinement of the virtual management structure, a measure of progress should be applied both in practice and academic study. Without a scheme for assessment, organizations may find themselves lacking guidance for improvement into virtuality.

BACKGROUNDS

The earliest definitions of a virtual organization appeared when the concept of *virtuality* was applied to studies of management, before information technology existed in a refined state to support the theory. Giuliano saw that with the addition of telecommunications and networking technology, there was little need for work teams to assemble at the same time or even a contiguous location (Giuliano 1982).

Structured concept of virtual organization was formed by Abbe Mowshowitz (1994). He defined a virtual organization in previous work as a group of employees communicating and being managed electronically through *metamanagement*. This concept defines the way in which a *virtual task* is managed and further categorizes a virtual organization as a series of virtual tasks, completed by virtual teams in strategic global locations. As each team has a certain commitment to the parent organization, the similarity in purpose and communication style allows for clear distribution of work across multiple groups of organizational members.

The virtually organized culture embodies certain *virtuality*, deemed crucial to metaphors by Schultze and Orlikowski (2001). Virtuality is affected by metaphors including platform, space, bits, community, and network. However, that paper only showed the unique natures of virtual organization and was not extended to explain how virtual organization is organized. Hence, this study adopted the Giddens's theory of modernity (1990), explained in the next section, as separation of organization from its space and time. 17 articles were selected to classify critical components of virtual organization framework (article lists are available upon request due to paper limitation). Criteria for article selection are 1) years 1992 through 2002, and 2) major contributions for virtual organization components and framework. 34 components are identified and further incorporated into Giddens's theory of modernity. Thus, virtuality is explained as the levels of abstraction in three dimensions; organizational contents, process, and members' commitment, which traditionally founded in geographical location, business processes, and communications methods.

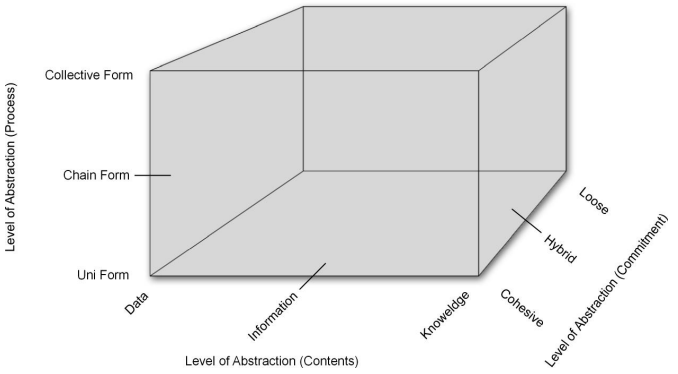
The combination of these three dimensions provides the observer with a measure of refinement regarding an organization's degree of virtuality. Prior research identifies a virtual organization as possessing these components by definition. Their universal nature and easily identifiable traits make their inclusion in a generally applicable measurement practical.

VIRTUAL ORGANIZATION MATRIX

This section aims to improve and elucidate on the concept of a virtual organization matrix. Before we discuss the virtual organization matrix, it is necessary define what a virtual organization is and how it forms, leading us to question the nature of virtuality in organizational science. Many researchers do not have formal definitions of virtuality and sometimes interpret virtual reality as one of its facets. Hence, we set the definition of virtuality in this study. Virtuality is conceptualization in virtual space and time. Virtual space and time are referring computing systems and communication networks. Thus, virtuality is the process of forming and implementing concepts in computing systems and communication networks. Any information system has a certain level of virtuality as concepts of business behaviors are embedded in modern information systems. Business behaviors are business *process* and *data* (data as broad meaning including data, information, and knowledge in this paper) performed by organization *members*. Given their intangible qualities, how is conceptualization in virtual time and space possible?

As Giddens discussed about the emptying of knowledge in his book (1990), the virtuality measure of virtual organization can be seen as the "emptying of organization" where the emptying of information and knowledge has occurred in current information technology (Giddens 1990). IT (or information systems) generate and store information that helps in the emptying (separation) of information from organizations. Knowledge, a supposedly higher format of information, is managed by Knowledge Management Systems (KMS), another evidence of the

Figure 1: Graphical representation of VO Matrix



emptying of knowledge from organizations. Because data, information and knowledge of organizations are emptying from their organizations (can be stored and manipulated in information systems), the separation of the organization from its four dimensional entity (time factor and three location factors - latitude, longitude, altitude) can be achieved in the form of virtual organization. To establish perfect virtuality on communication network, three dimensions must be implemented as the form of virtual organization as we discussed in the previous paragraph; contents, process, and commitment (Figure 1).

To represent the contents, process and commitment in virtual space, these three dimensions must be abstracted in virtual organization. In other words, abstracted interface of contents, process, and commitment is open to clients/requesters and details of those three dimensions are hidden in virtual space. To implement these three dimensions, an organization should decide what level of abstraction it represents in each. This concept is discussed below in further detail. The first author named this theory of virtuality as the "virtual organization matrix" because 1) it involves three dimensions in organizational settings and 2) each dimensional factor is dynamic. We will elucidate on this in the next section.

The Virtual Organization Matrix classifies an organization based on three dimensions of virtuality as we discussed above. The contents dimension encapsulates what is shared amongst members in a virtual organization and the refinement of what is contained within those transactions. The process dimension describes the order which work moves through the members of a virtual organization. While some projects are completed by a single organization, many require the work of separate organizations, either concurrently or sequentially. Finally, organizations can be defined through the members' commitment dimension. Virtual teams can be non-local groups of company employees or individual corporations forming temporary alliances for meta-managed single projects. (Mowshowitz, 1999)

The Levels of Abstraction in Contents Dimension

a) ***Data:*** Data Abstraction refers to information stored in a completely unprocessed form. No post processing is performed, therefore what is accessible to members of the organizations represents information collected from filed tests, lab studies or previous observations. This represents the most basic level of abstraction. Immature organizations may begin at the data level while continuously refining their information storage methods to move towards a more complex reference system.

b) ***Information:*** Data that is processed and provides answers to questions like "who", "what", "when" etc. is termed information. When data is processed into information, the raw figures become a format more akin to interpretation and use in practical applications. While data might be of use to a member of a similar field, information can be used by unrelated personnel. Information will include the significance or pattern of the data, perhaps in correlation to other gathered data. Appropriate representation would be the organization of data into a logical form such as a chart or a graph.

c) ***Knowledge:*** Application of data and information combined that answer "how" and "why" questions are known as knowledge. This is the most sophisticated form of abstraction. It provides the means to conduct complex operations and research. Data and information can be combined with experience reports, case studies, lab explanations, study interpretations and other high levels of information processing move beyond mere collection and organization of data to become refined knowledge. Whereas data and information can be useful when performing a specific task, knowledge contains the means to complete processes and replicate them in another setting, as well as the basis for improvement of older techniques and research.

The Levels of Abstraction in Process Dimension

a) ***Uni Form:*** Uniform processes are observed in organizations that are only beginning to reorganize their operations based on virtuality. While management may occur through virtual means, teams or organizations are independent of each other. They may rely on central management and servers but have no contact with other teams or organizations and in no way rely on them to complete their tasks.

b) ***Chain Form:*** In this form, each virtual organization depends on the other to complete a project. Virtual organizations rely on each other in the same fashion as links in a supply chain in the Chain Form level of process. Most often, this is the result of a project being broken down into distinct tasks which must be completed prior to the next organization's work beginning. The project moves in this symbiotic relationship along the chain until its completion. The lines of progress are clear and distinct and skipping a step or disrupting the work of one organization will affect the entire project.

c) ***Collective form:*** The highly virtual organization will utilize the Collective Form of process, where all organizations are interrelated in a mesh of networks and communications, while the workflow freely moves between entities, being amended and developed by perhaps more than one team at a time and in no specific order or pattern. The truly virtual organization will use this form to its advantage as efficiency and effectiveness are soared with organization boundaries are blurred becoming more flexible and dynamic to form in ways not possible with the Uni or Chain forms.

The Level of Abstraction in Commitment Dimension: Members of a virtual organization need to understand the changes from a traditional organization. Each member would have to adapt to a different style of operating, the levels of formality, proximity etc. The medium of communication would play a vital role in the success of such an organization. Virtual organization capitalizes on the fact that it can overcome barriers of space and time which cannot be done in traditional, physical organizations where each member needs to be present in the same time zone and location.

a) ***Cohesive:*** Member relationship between other members and business processes are mainly based on traditional means such as face-to-face contacts. This commitment often occurs when the abstraction levels of data and uni form formats of dimensions in organization contents and process. These are basic levels of abstraction thus provides lower levels of abstraction. This requires more and traditional levels of commitment from organizational members.

b) ***Hybrid:*** Hybrid members' level of commitment varies between cohesive and loose commitment dimensions, for example, the use of email communication. Most late 90s and early 2000s companies with information technologies fall into this category. Parts of work are performed by cohesive commitment while others can be achieved by loose commitment. This stage is parallel phase and organization members are experiencing the transition from cohesive to loose relationships.

c) ***Loose:*** All business logics and resources can be accessed without traditional means of member commitment. Existence of other members can be recognized but not necessarily communicated. In the levels of knowledge and collective form of contents and process dimensions, loose commitment is commonly happened. Most business data and process are embedded and automated in virtual organizations, meaning less contact of the other ends of business.

Dynamics in Virtual Organization

Virtual Organizations consist of many unique technological and social components that exist in patterns easily linked to the matrix classification they fall under. By categorizing organizations, we benefit in two areas. Primarily, they assist us in identifying ambiguous organizations. If dimensions present in the company are specific to one segment of the matrix, a strong possibility emerges for that organization's classification. Secondarily, they provide guidelines for companies with developing virtuality. Incorporating dimensions that are more virtual shortens the process to complete virtuality and allows an organization to realize those benefits faster.

Figure 2 illustrates the dynamics in virtual organization. Based on the contents and process dimensions, virtuality of organizations can be determined – shown as 9 cells in Figure 2. The last dimension, commitment, is dynamically described with arrows. Each cell includes levels of commitment in contents and process dimensions. For example, cell (knowledge, collective form) shows loose commitment in contents and loose commitment in process. Two different types of arrows are utilized in this figure. Bold and diagonal arrows show the moving direction of virtuality with its three dimensions. This is a natural and ideal path from cohesive organization (data, uni form) through hybrid organization (information, chain form) to loose organization (knowledge, collective form). Thin and straight arrows indicate the general direction based on each dimension from lower to higher abstraction. The core of this dynamic in virtual organization explains that traditional business concepts are abstracted and embedded into virtual space and time.

CASES

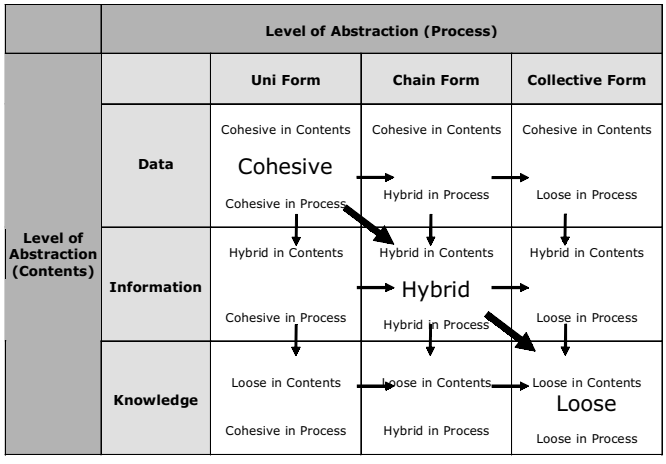
The Virtual Organization Matrix is a tool which can aid the study of existing organizations by creating a common level to compare and contrast. While in practice, organizations tend to pool in certain segments of the matrix, each one can be used as the most accurate classification for an organization. The following case studies by the second author represent three corporations that fit within the guidelines of three matrix segments.

Knowledge/Uni Form – Loose in Contents & Cohesive in Process

First Virtual Corporation

The First Virtual Corporation provides virtual communications solutions to companies that require a real-time collaborative tool to grow. As a consulting firm, they provide hybrid network and video conferencing systems using existing global networks to achieve a low-cost solution. While they enable companies to achieve the first stages of virtuality, First Virtual uses their own systems to network offices in California, the United Kingdom and Korea.

Figure 2. Dynamics in Virtual Organization



While the company's headquarters are in the United States, each office is an independent operation and handles contracts relevant to its geographical region. Each office is a cohesive member of the First Virtual organization and performs all of its work for the company. Frequent communication is still necessary between headquarters and satellite offices, however, as they set organizational policy and develop new products to be offered internationally. Weekly multi-point videoconference calls between sites are held to train new engineers and service support personnel. More frequently, informal calls are held to gather input and suggestions from employees at other locations.

Contracts are fulfilled exclusively by each First Virtual branch office, but a certain degree of knowledge sharing takes place if necessary. The sharing that occurs allows for a more customized product solution to be delivered to the customer since additional skills can be applied to it. The informal communication process and wide availability of assistance from other offices create a strong corporate identity and raise the output quality significantly through the introduction of multiple approaches to problem solving.

Data/Chain Form – Cohesive in Contents & Hybrid in Process

The Gung-Ho Company

The Gung-Ho Company, a manufacturer and distributor of custom print and media products, was founded with a virtual business model in order to provide potential clients with the widest range of customizable services possible. Through their own "Best-of-Breed" certification program, Gung-Ho adds members to its global supplier network based on present and future demand. Member companies are independent firms that submit applications to perform work, under contract, for Gung-Ho. This represents a clear example of the advantage of loose member commitment and the ability to expand the range of services offered by a company that results from this type of organization.

When Gung-Ho is contracted to complete a media distribution project, member suppliers are assigned to work on the project, in part or whole, based on their geographic location and area of expertise. Work can either be performed concurrently or in chain-form, based on its nature. Despite the advanced nature of this collaboration, it is limited to the sharing of data only. The parent, Gung-Ho, disseminates specifications regarding the finished product yet provides no assistance in its completion. The process is entirely the member's responsibility.

The chain form introduces better flexibility to the components exhibited in this classification. Because many members are available to fulfill the needs of a specific project, a problem with one allows the organization to easily substitute another member to complete the task. Similarly, if a task is too large to be handled by another member, resources can be shared between multiple members, eliminating delays. Truly temporary alliances exist since members are only part of the organization through the completion of their delegated task and removed after.

Knowledge/Collective Form – Loose in Contents & Loose in Process

Dennis Beese Architecture

Dennis Beese is an independent contractor, consultant and licensed architect. He provides services for corporations of all sizes across the United States, primarily designing large office structures and corporate environments using CAD software. In 1997, his work reached a level of popularity that he found himself having to turn away jobs being offered as he didn't have the time to complete the work himself and travel to job sites to survey and meet with those who were employing him.

In order to balance the demand for his personal time and attention with the ability to accept the widest number projects, Beese developed his own virtual corporation using temporary, loosely-commited members and meta-management to complete work across the continent.

Searching for and personally selecting independent firms guarantee him that the finished product will accurately represent his original plan and be of a high quality that his customers expect.

Instead of personally traveling to meet with customers, Beese assigns each large project a virtual manager, usually an executive at the primary contractor for each construction. Through this contact, Beese provides specific instructions on how his plans should be translated into tangible objects. This ensures that his many personal styles are reflected in the finished project even when Beese and his personal contracting team are unavailable to oversee the work. The result of this close monitoring process is an authentic Beese-designed property despite being constructed with a slightly less personal process.

CONCLUDING REMARKS

This study provides the virtual organization matrix. The matrix consists of three dimensions; contents, process, and commitment. This is a 3-D model (Figure 1) but can be shown in 2-D model with it tendency of commitment (Figure 2). Dynamics in Figure 2 explains the movement of virtuality and researchers and practitioners can get benefits of position and directing concurrent organizations. Because there are 9 cells in Figure 2, this model provides a business organization's current position and shows what levels or abstractions in different dimensions are needed to be virtualized.

This model will be further extended, incorporating the components affecting in each cell of Figure 2 in the future. With this addition, researchers and practitioners can have more specific analysis guidelines to position an organization and build solid strategies to move onto the next stage of its virtuality.

REFERENCES

Giddens, A. (1990). The Consequences of Modernity. Stanford, CA: Stanford University Press.

V. E. Giuliano. (1982) The Mechanization of Office Work. Scientific American, 247, no. 3, September 1982: 125-134.

A. Mowshowitz. (1994) Virtual Organization: A Vision of Management in the Information Age. The Information Society. Vol 10, pp. 267-288.

A. Mowshowitz. (1999). The Switching Principle in Virtual Organization. Electronic Journal of Organizational Virtualness. Vol. 1, No. 1, 6-18.

Schultze, U. and Orlikowski, W. J. (2001). Metaphors of virtuality: shaping an emergent reality. Information and Organization. 11 (1). 45-77.