

Fundamental Modeling of Virtual Organization (VO) Implementation for Digital Edge Business Needs

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Abstract:

Mowshowitz used the term Virtual Organization for the first time in 1986. Since then, there has been a lot of research on this type of networked organizations and how they will revolutionize the way we work in the 21st Century. There are numerous definitions of a VO because many authors and research groups use their own definition for their work. In the book "The Virtual Corporation", (Davidow & Malone, 1992) presented one of the first extensive approaches to the subject. The focus for their conception of a Virtual Corporation relates to the concept of a Virtual Product. The ideal virtual product according to them was a product or service that "is produced instantaneously and customized in response to customer demand." Throughout this paper we had presented different approaches to the subject based on the literature, and try to give an overview of the modeling of a Virtual Organization. In the literature, there exist various synonyms to the term Virtual Organization: Virtual Corporation (VC), Virtual Enterprise (VE) and Virtual Company (VCo) are all related to the same concept of co-operation between different organizations or individuals.

Keywords:

Virtual Organization, Virtual Corporation, Virtual Company, VO Modeling, VO Designing, E-Business, VOD, VCM

1. Introduction

1.1. Where New Organizational Forms Come from?

Driving forces of organizational development: The development of theoretical concepts as 'virtual organization' is related to developing technologies and new organizational practices in a cyclical manner [2, 7, 8]. A model (Figure 1 below) describes quite well driving forces behind various forms of virtual organizations. The driving force may be a new business practice, e.g., a globalized business is not possible with a local organization, a new technology, e.g., mobile and wireless information and communication technology (ICT) creates possibilities to work in any

time and place, and even a new strategic thought, e.g., of developing a virtual community[1,2,4,7,8,15].

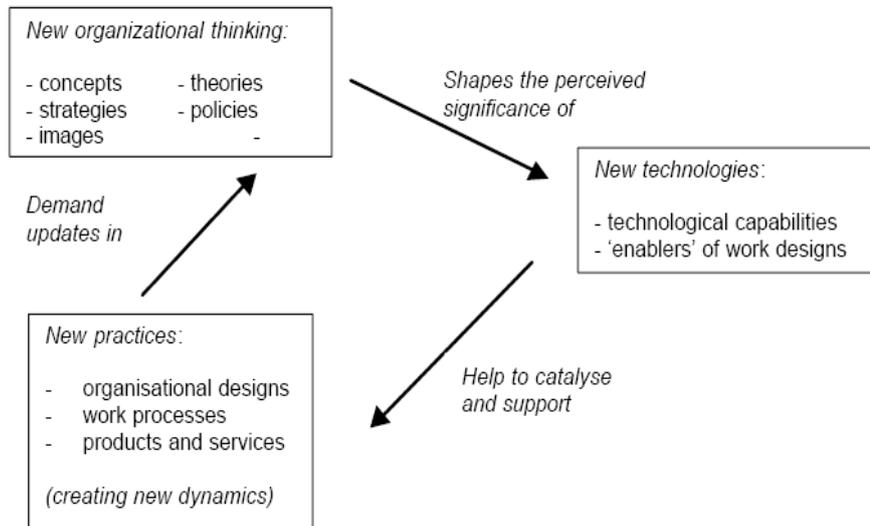


Figure 1. *New organizational thinking, technologies and practices (Jackson 1999, 5)*

As is understandable, virtual organizations are needed for several purposes and are justified by several reasons. New products, the globalization and internalization of businesses create new kinds of challenges for the management of work processes and practices. The globalization of economies and businesses increases the number of boundary less enterprises creating multi-site working in cross-cultural contexts. In order to take full advantage of these changes business must organize itself along radical new lines[5,9,12,14,19]. For example, small and medium-sized companies are networking to uphold their position in the marketplace. The business environment is turbulent and evolving requiring flexible and fast responses. At the same time, new information and communication technologies are introduced to facilitate the ongoing change. ICT is often considered to be the main driving force of the societal change into knowledge society. Fast progress of information and communication technologies provides technical bases for the globalization. The ICT has enabled a decentralization of work. Evolving technologies also create pressures for new organizational structures and job contents. Future mobile and wireless technologies will revolutionize the working life totally by increasing possibilities to work whenever in any place. It is clear that organizations in both the private and public sector have to redesign themselves to utilize fully these new technologies if they are to survive in the dawning spatially and temporally compressed world. Therefore, the number of virtual organizations increases[19,20,22]

1.2. The Concept of Virtual

According to Oxford Concise Dictionary the term “virtual” is defined as: “that is such for practical purposes, though not in name or according to a strict definition.” Related to this definition, (Fairchild, 2004) says that “an organization may be thought of as a number of individuals systematically united for some end or work”. He proposes that a virtual organization may be viewed as “a number of individuals united with a practical purpose, or a practical purpose for the 21st century”. (Bultje & van Wijk, 1998) claim that the different definitions of a VO partly

depend on the view the authors have on the concept of "virtual". Table 3 presents four different views that describe the meaning of “virtual”[17,24].

Table 1. The concept of Virtualization

View of Virtual	Interpretation (Bultje & van Wijik, 1998)	Example (Frank, 2000)
Unreal, looking	Originated from optics. Discrimination between a real picture and virtual picture. Both pictures look the same, but as opposed to a real picture, a virtual picture can't be caught on photographic paper.	Virtual reality
Immaterial supported by ICT	Used in expression like virtual library, virtual classroom, etc. in this view, functions that are often performed by the people Are replaced by the use of ICT.	Virtual shopping mall
Potentially present	Only active if a certain opportunity comes along. It can directly unfold new activities if a new project is initiated.	Virtual memory
Existing, but changing	Something exists, but the composition is temporary and is possibly changing everyday.	Virtual corporation

(Bultje & van Wijk, 1998) analyzed different definitions of a VO, and concluded that all four views on virtuality presented in Table 3 could be found among the definitions. The examples given by Franke on the different views of the term virtual are based on a model presented in (Scholz, 1997) of virtual objects. Figure 1 shows how Scholz divides a virtual organization into an intra- and inter-organizational perspective, where the concept Virtual Corporation is considered inter-organizational.

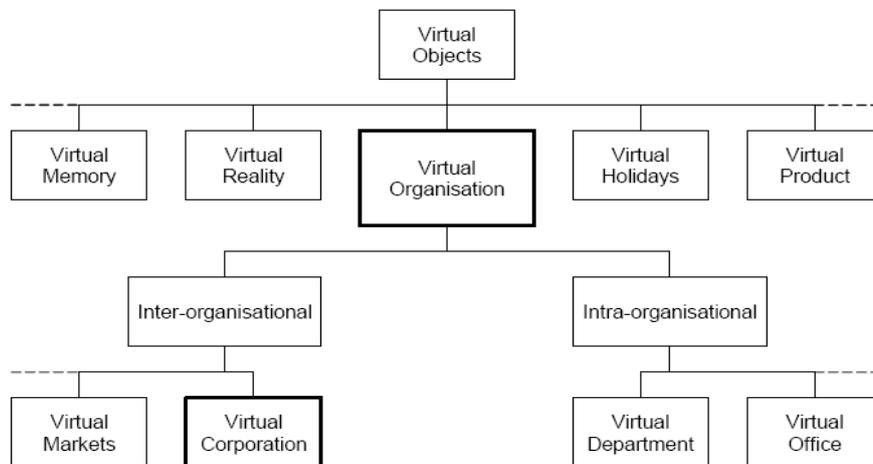


Figure 2. Hierarchy of virtualization

The term virtualness was introduced by (Venkatraman & Henderson, 1996) and related to what the concept of virtuality mean for organizations. They proposed that:

“Virtualness is the ability of the organization to consistently obtain and coordinate critical competencies through its design of value-adding business processes and governance mechanisms involving external and internal constituencies to deliver differential, superior value in the market place.”

This emphasizes that an organization does not become virtual simply by using ICT and nominating themselves as a VO, but as a result of how the organization is managed.

1.3. The Concept of Virtual Organization

Virtual organizations are given attention by researchers within a wide range of fields, from social anthropology and organizational theory to computer science. They have not yet agreed on a mutual definition of the concept, and there is no theoretical framework available to give a better understanding of the concept. There are a lot of different contributions to the subject, and many of them are related to functional aspects, such as the role of information technology in VOs, legal issues, socio-economic issues, and so on. Other authors relate the concept to business concepts such as knowledge management, flexible or dynamic networking, agile competition, business process redesign and supply webs [8].

The focus on VOs can be divided into two main categories:

- Structure perspective.
- Process perspective.

Contributions from different authors are mainly within one of these categories. The structure perspective focuses on the building blocks of the VO and its properties, while the process perspective focuses on behavior and operation.

1.3.1. Definitions

Analysis of the definitions of a VO provided by authors and scholars is a reasonable way to determine the attributes of a VO. This section presents different views on what defines this type of organization.

"Virtual organizations are distributed 'business processes'. These processes may be 'owned' by one or more organizations acting in partnership. For a specific project, resources are assembled to perform a business process on behalf of the project owner(s), and then disassembled on completion of the contract." (Wolff, 1995)

"The key to understanding the virtual corporation is the profound effect that information technology has as it distorts traditional relationships of management and work to time and space." (Coates, 1994)

"The conjunctive grouping, based on the Net, of companies, individuals, and organizations to create a business." (Tapscott, 1996)

"Virtual Corporation consists of the company that faces the customer and a network of other companies that co-operate to achieve what none of them could achieve alone. This arrangement permits each participant to concentrate on what each does best and to limit its risks and investments to its core competencies." (Klein, 1994)

"The virtual corporation can be taken to be one with a relatively small headquarters operating with many different internal units, alliances and subcontractors. The largest of them will operate on a global scale." (Coates, 1994)

"A virtual corporation is a temporary network of independent companies - suppliers, customers, and even rivals - linked by information technology to share skills, costs, and access to one another's markets. This corporate model is fluid and flexible - a group of collaborators that quickly unite to exploit a specific opportunity. Once the

opportunity is met, the venture will, more often than not, disband. In the concept's purest form, each company that links up with others to create a virtual corporation contributes only what it regards as its core competencies. Technology plays a central role in the development of the virtual corporation. Teams of people in different companies work together, concurrently rather than sequentially, via computer networks in real time." (Byrne, 1993)

2. Characteristics

To answer the question "What is a Virtual Organization?" it is important to review the different characteristics of a VO. The selection of characteristics discussed in this section is based on the work of (Bultje & van Wijk, 1998). They performed an extensive literature research to map the different properties that constitute a VO. The characteristics in section 3.5.1 are, according to several authors, key factors of a VO. The characteristics described are a mix of proven properties of companies referred to as VOs in the literature and different author's view of a VO. Therefore, the list of characteristics has to be evaluated by performing further empirical studies, and can for the time being considered to be a sort of proposition.

2.1. Key Characteristics

The characteristics presented in this section are considered key factors for a VO by several authors.

2.1.1 KC1 Based on Core Competencies

Each partner in the VO contributes with its core competencies. The initiator determines the most suitable business process related to the complementary skills provided by the different companies in the VO. The synergy effect that is the result of combining all the core competencies enables the organization with a flexible way of meeting the customer demands. The goal is to produce a sort of all-star team.

2.1.2. KC2 Network of Independent Organizations

The designation of a VO as a network of independent organizations is widely accepted in the literature. This means that we focus on the VO from an inter-organizational perspective and that we discuss the concept Virtual Corporation when we talk about VOs according to the model provided by (Scholz, 1997).

2.1.3 KC3 One Identity

According to (Aken et al., 1998), the VO must have its own identity. If the identity of the partners remains visible in addition to the VOs identity, it is considered a "Soft VO". A "Hard VO" looks from the outside like one common organization.

2.1.4. KC4 Based on Information Technology

Different authors have their own view on Information and Communication Technology as a factor in VOs. (Mowshowitz, 1994) regards the advances in transportation, communication and computing as important for a VO. (Byrne, 1993) considers an information network as essential for companies to link up and work together. The vision of VOs presented by (Davidow & Malone, 1992) is strongly based on ICT.

2.1.5. KC5 No Hierarchy

The equality of the partners in a VO leads to an organization without hierarchy. It is called an egalitarian structure by (Sieber, 1998). Other authors also state that there is no hierarchy in a VO. The positive effects of this structure would be enhancing the efficiency and the responsiveness of the organization, and decreasing the overhead (Bultje & van Wijk, 1998). The term “adhocracies” was introduced in (Toffler, 1970) as part of his predictions for the future, and later acknowledged in (Malone & Rockart, 1993) as a description of the management structure in networked organizations. It is the large amount of unpredictable lateral communication that makes this organizational structure extremely coordination intensive.

2.1.6. KC6 Distinction between strategic and operational level (~ separability)

According to (Mowshowitz, 1999), the logical separation of need from need fulfillment is the foundation of VO. He emphasizes that there, on a managerial level, is a clear distinction between the abstract requirements and the concrete implementation to reach the organizational goals. This is called the “switching principle”.

2.2. Other characteristics

The characteristics presented in this section are considered characteristics of a VO by several authors, but is not regarded as essential to define a VO.

2.2.1. OC1 Small sized partners: Small companies and/or parts of large companies

The core competencies of a partner are usually not the whole company, unless it is a small company that has specialized its operations within a niche. The smaller size of partners leads to more flexibility and makes it easier for the organization to take advantage of opportunities in the market. Several authors point to the fact that larger companies often are slower in decision making and innovation, which are essential factors in responding to opportunities.

2.2.2. OC2 Vague/Fluid Boundaries

It is not easy to determine where one organization begins and another ends when talking about VOs. This is the result of more co-operation among competitors, customers, suppliers, designers, etc. (Bultje & van Wijk, 1998). The boundaries of the traditional organizations are redefined by the VO. (Mowshowitz, 1994) distinguishes internal and external boundaries, where the latter is between the VO and the outside world as opposed to boundaries between the internal partners (units) in the VO.

2.2.3. OC3 Semi-Stable Relations

According to (Byrne, 1993), the relations in a VO are less formal and less permanent. The relations create dependencies among the partners, but the partners can also survive without them (Aken et al., 1998).

2.2.4. OC4 Dependent on Opportunism

Part of the most widely accepted definition of a VO by (Byrne, 1993), describes how companies band together to meet a special market opportunity, and are most likely to fall apart once the need disappear. When a company partners with others in a VO, they enlarge their scope and scale of opportunities available. Small organizations,

limited by size and lack of capital, often cannot take advantage of emerging business opportunities alone.

2.2.5. OC5 Shared risks

As described above, VOs respond to opportunities in the market, and risks are shared by every partner in the VO. (Chesbrough & Teece, 1996) provided informative lessons on how to analyze risks within networked organizations. The authors present a framework to help managers when to innovate by going virtual, when to form alliances, and when to rely on internal development. They state that “as market-based incentives become greater, the risk-taking will increase”.

2.2.6 OC6 Based on Trust

Since VOs are based on sharing information and knowledge, there must be a high amount of trust among the partners. Especially since each partner contribute with their core competencies. The most important contribution on the subject of trust within VOs was provided in (Handy, 1995).

“Virtuality requires trust to make it work: Technology on its own is not enough.” (Handy, 1995)

Handy discusses how you can manage people whom you do not see, and defines the rules of trust, based on common sense. An interesting comment on working in a VO is that a shared commitment still requires personal contact to make it real.

“Paradoxically, the more virtual the organization, the more its people need to meet in person.” (Handy, 1995)

Related to trust is also co-destiny discussed by (Byrne, 1993), which means that the fate of each partner is dependent on the fate of other partners.

2.2.7. OC7 Shared Ownership

This characteristic is related to the fact that every independent partner has its own interests in the VO, and that parts of the VO can be owned by different partners (Bultje & van Wijk, 1998). (Aken et al., 1998) state that a partner will, or can, step out of the VO once its goals have been met.

2.2.8. OC8 Shared Leadership

According to (Aken et al., 1998), every partner controls its own resources but not automatically the resources of the whole VO.

2.2.9. OC9 Shared Loyalty

Along with shared ownership comes shared loyalty. Every employee of every partner in the VO must identify themselves with the VO, and at the same time with their own company. It is important to build a culture within the organization. As Sieber puts it:

“People determine the success of a VO.” (Sieber, 1998)

The concept of a Virtual Culture is discussed by (Ash & Burn, 2000), who describe it as a perception of the entire VO held by its stakeholder community. In other words, it is the feeling of collectivity with respect to value sharing and time-space arrangement. For example, each client’s expectations are satisfied in the product

accessed, and each partner has the feeling of a continuous access to the organization and its products.

2.2.10. OC10 Dynamic Network

The description of a VO as a dynamic network is related to the fact that organizations or individuals can enter and leave the network at any time.

2.2.11. OC11 Dependent on Innovation

As described earlier, the VO is often based on market opportunities, and the essential element is the corresponding responsiveness. (Chesbrough & Teece, 1996) state that the adequate way to react to a market-based incentive, is through innovative products and services. This is not necessarily only in a technical perspective, and could for instance be related to innovation in organizational design.

2.2.12. OC12 Geographical Dispersed

Several authors state that the partners in a VO are geographically dispersed. The definition of “geographical dispersed” in the work of (Bultje & van Wijk, 1998) is that “a company is geographical dispersed if the buildings are separated”.

2.2.13. OC13 No Organization Chart and Meta-Organization

The VO can be looked upon as some sort of umbrella organization, a meta-organization. There are all kinds of organizational structures within the cooperating companies, which make it difficult to draw an organization chart. Another implication is the dynamic characteristics of the VO, where the stakeholders in some instances come and go dependent on whether their goals for the co-operation have been met.

2.2.14. OC14 Customer Based and Mass-Customization

Mass-customization is related to individual services and products to satisfy the particular needs and wishes of the customers. A concretization of this is the concept of the Virtual Product introduced by (Davidow & Malone, 1992) based on strong interaction with the customer.

2.2.15. OC15 Lifespan of Co-Operation: Temporary vs. Permanent

The lifetime of a VO is widely discussed in the literature, but most of the authors are focusing their definition towards VO as a temporary network of independent companies as stated by (Byrne, 1993). The underlying notion is that they unite quickly, exploit an opportunity and disband afterwards. Other research uses the interpretation of VO as a temporary organization that also can exist on a long-lasting base (Aken et al., 1998). Van Aken introduces the concepts “Project” for temporary organization, and “Program” for the long-lasting organization. As an example, a VO can be disbanded in the event of project completion, but can also have an undetermined duration in the case of the organization remaining functional for as long as customer demands exist and/or the participants find their collaboration to be beneficial (Jägers et al., 1998).

2.2.16. OC16 Balance of Power: Equality of Partners vs. Core-Partners

Because of the high dependency between the partners in a VO, the participant relations become more equal. (Jägers et al., 1998) state that the former culture of

control is replaced by a culture based on the desire to share skills and information. On the contrary, (Aken et al., 1998) make a distinction between a VO with or without a core-partner. They state that “a core-partner is some sort of ‘leader’ of a VO to which the other partners have to comply”. Worth noting here is that since members of a virtual alliance may be partners in one venture but competitors in others, they have less incentive to be open and share data than within hierarchical organizations or within their alliance with suppliers and customers.

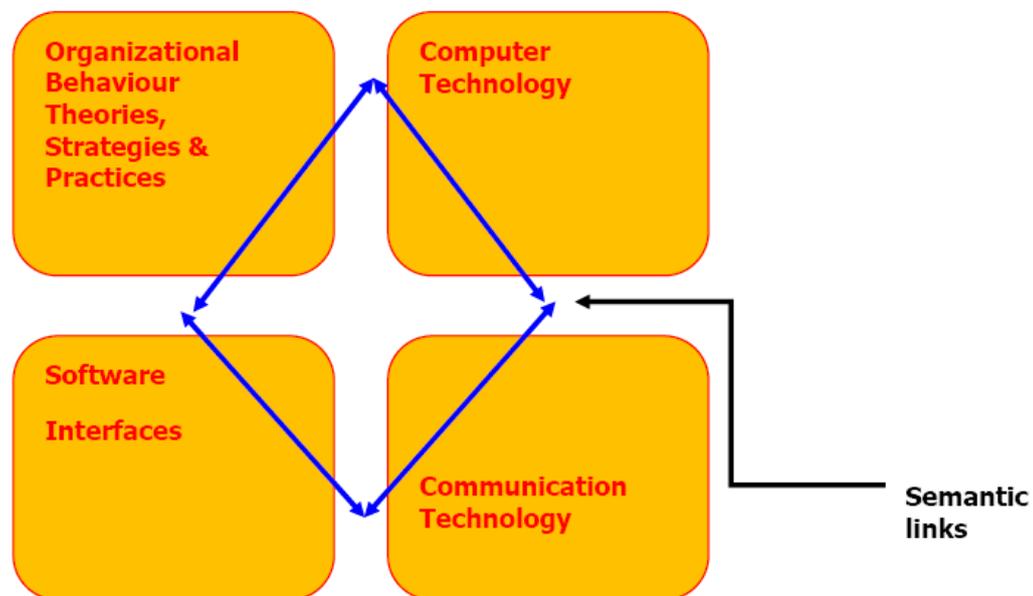
2.2.17. OC17 Mission-overlap: Partial vs. Complete

Partners that do business outside the context of the VO, in addition to the work within the alliance, are considered having partial mission-overlap. While partners performing all business within the organizational context, have complete mission overlap. The literature describes both kinds of VOs (Bultje & van Wijk, 1998).

3. Result & Discussion (Modeling of Virtual Organization)

3.1. Designing Model

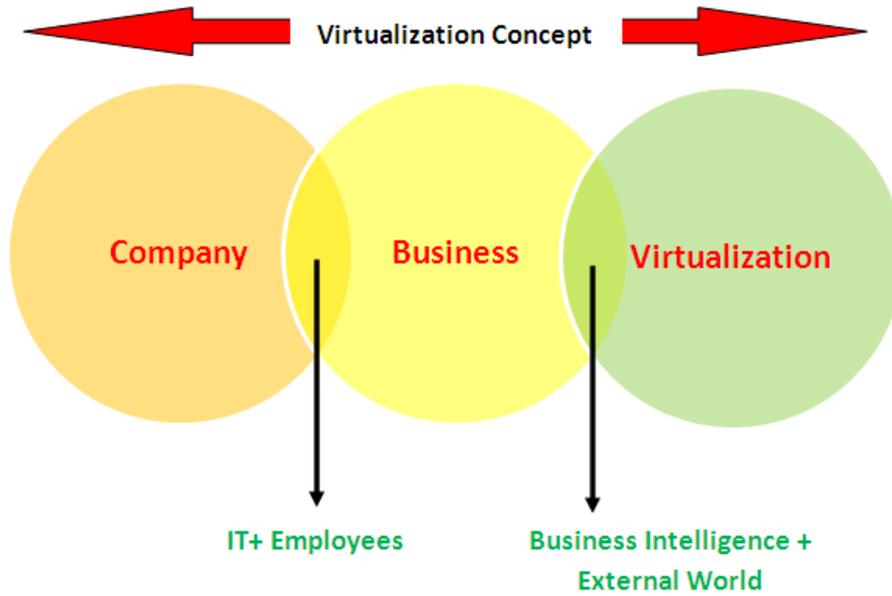
This is our first purposed model “VO Designing (VODM)” which has four important domains for successful VO engineering and is “Organizational behaviour theories, Strategies and Practices, Computer Technology, Communication Technology and Software Interfaces”. In first domain all the relevant knowledge need to gather before to start VO engineering at technical ground or level. With combined analysis of domain Computer & Communication technologies effective VO delivery possible where as to visualize it lucid graphically we need advance software or software-like web interfaces. Every domain glued with semantic links to maintain unity & integrity.



Source: Prof. Md. Sadique Shaikh & Prof. Safeena Khan

Figure 3. VO Design Model

3.2. Model

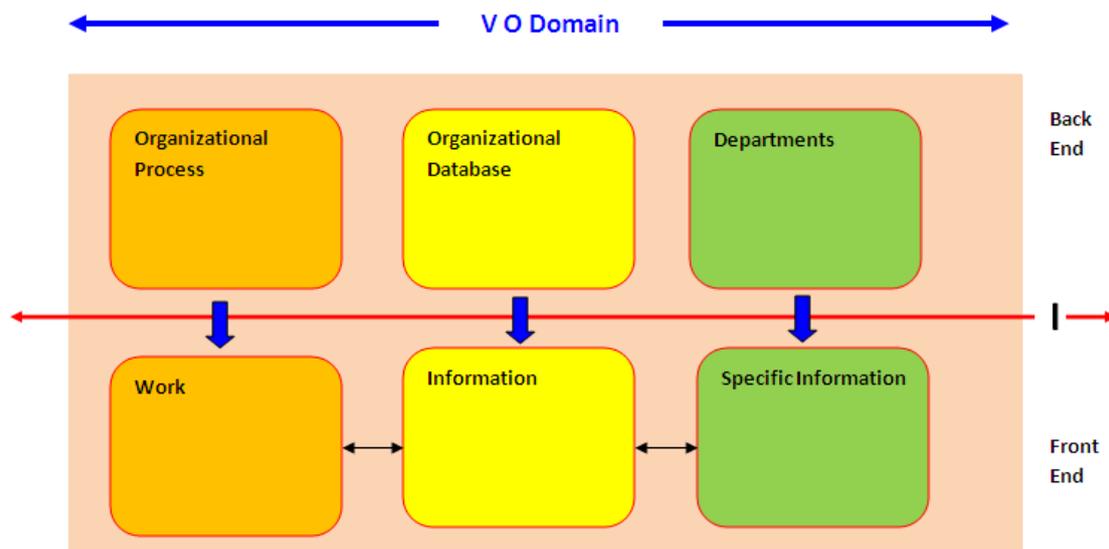


Source: Prof. Md. Sadique Shaikh & Prof. Safeena Khan

Figure 4. VC Model

This is our second engineered model called VCM. In VCM we tried to show concept of virtualization and virtual organization in Business. As we you can see here to switch from physical-to-virtual organization three things are responsible Company, Business and Virtualization. Company have Business and when cascade these two in intersection we get IT and employees factors of the organization. These two cascaded module further attached to virtualization and in intersect we get Business Intelligence and External world to in/out information to/from Virtual Organization(VO).

3.3. VOD-Model



Source: Prof. Md. Sadique Shaikh & Prof. Tanvir Begum

Figure 5. VOD-Model

This is our last developed model named VODM (Virtual Organization Domain Model). With the help of VODM we are trying to understand how many domains in VO and how they work with their outcomes. As exhibit in model VO segmented into two major domains .i.e. Back end and Front end separated by Interface I. back end further has three jargons Organizational processes, Organizational Databases and Departments, whereas at Front end we showed Work, Information and Specific Information which are vertically connected via Interface I directly and individually to Organizational Processes, Organizational databases and Departments respectively as well as at only Front end they also connected horizontally to give overall VO performance to Employees, Stake holders, Customers and external world with integration.

4. Conclusions

Performance and performance improvement are two of the central interests of business management. By adopting new organisational structures or new ways of practicing business, organisations are able to generate revenue from new sources. Performance measurement in a virtual organisation context is quite similar to any other performance measurement. However, networks are not easily put into formal organisational charts, nor apprehended. The context of knowledge work is more complicated because it is very abstract. Moreover, operational measures are difficult to derive from success factors. Yet absolute and relative competence should be taken into account when performance is defined, for it is the key to understanding knowledge work .i.e. Virtual Organization.

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