The Meta-Management for E-Business in Virtual Organization

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A virtual organization is a group of independent enterprises who use Information and Communication Technology (ICT) to speculate the market opportunities. From management point of view, a virtual organization is a goal-oriented enterprise operating under a new concept of leading: meta-management. Meta-management characterizes the management of a virtually organized task (a goal-oriented activity that is implemented by an appropriate assignment or reassignment of concrete satisfiers to the abstract requirements of a task).
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Introduction

Virtual organization has many faces, so it is not surprising that it has stimulated a multitude of explanations and descriptions. Conceptual simplicity aids practical development as well as theoretical research. If nineteenth century mathematicians had not attempted to simplify propositional logic and build axiom systems for arithmetic, the general purpose digital computer might not be around today. This suggests that a sound and simple conceptual framework is indispensable for further progress with the theory and practice of virtual organization.
Also, a virtual organization can be defined like a temporary network or loose coalition of manufacturing and administrative services that come together for a specific business purpose. The coalition can be constituted ad hoc or permanently. Firms team up in a virtual organization to exploit an opportunity in the market before it evaporates.
In ad hoc variant, the virtual organizations are short lived, extremely focused, goal driven and poured by time based competition.
The live cycle of a virtual organization depends upon factors such as the objectives of the coalition, the type of products manufactured or like services provided. Organizations that are partners in one instance can be rivals and competitors in the next one. Virtual organizations are continuously evolving networks of independent companies linked together to share skills, costs and access to one another's markets and data.

Meta-management

Meta-management is the term we use to characterize the management of a virtually organized task. It can be resolved into five major responsibilities (figure 1):

- Analyzing abstract requirements;
- Identifying possible satisfiers;
- Switching and tracking allocations of satisfiers to requirement;
- Maintaining and possibly revising the procedure for allocating satisfiers to requirements;
- Reviewing and adjusting the optimality criteria of the allocation procedure.

The optimality or the satisfying criteria defining the objectives of the allocation procedure are based on organizational goals. Given the strategic importance of such goals, it makes sense to separate the review of criteria from maintenance of the allocation procedure.
Note that enterprise is not synonymous with company or business - it may refer to a unit or function within a company. Some activities within a firm may be organized virtually and others in a conventional way. The separation of satisfiers from requirements is essential for the realization of switching. Abstract requirements are the logically defined needs of a task, specified

without regard for how they might be met. Concrete satisfiers are the resources that can be used to meet the needs of a task.

By virtually organizing the task management can respond effectively to challenges and opportunities in the marketplace. Changes in the consumer market for one product provide opportunities to diversify base products and take advantage of differential pricing.

We speak of meta-management rather than plain old management, because the work of a running a virtually organized task has much in common with that of meta-mathematics. Meta-languages are used to investigate object languages that usually *serve as models for parts of informal mathematics and logic*. The logical separation of meta-language from object language enables investigation of system properties such as consistency and completeness which would otherwise pose serious logical difficulties. Similarly, the logical separation of requirements from satisfiers facilitates management use of switching. Analysis of requirements corresponds to the use of a meta-language, while determination of satisfiers is analogous to the function of an object language in meta-mathematics.

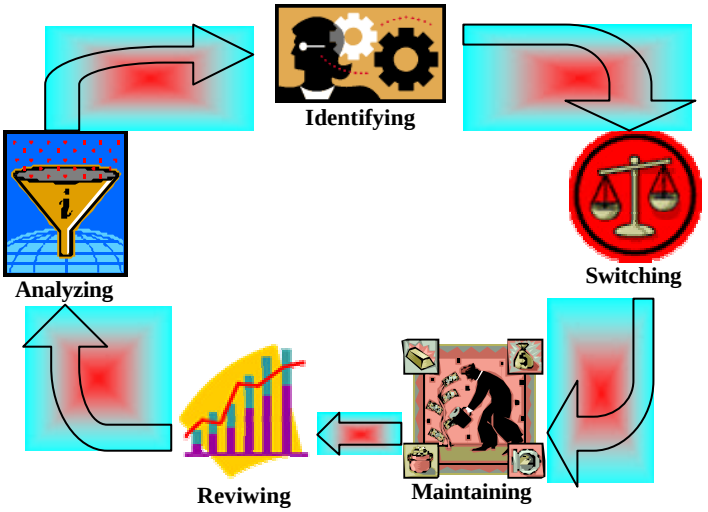

Fig. 1. Major responsibilities for meta-management

Meta-management is not restricted to the use of any particular approach to the allocation of satisfiers to requirements. Informal as well as formal methods may be used. At first glance, the model of a virtually organized task looks like the formulation of a matching problem in operations research. The solution to a matching problem is an algorithm designed to operate on fixed sets of elements. Meta-management must deal with dynamically changing sets of requirements and satisfiers and contemplate changes in the allocation procedure as well. Classical matching problems such as personnel and resource allocation can be interpreted as special cases in which requirements and satisfiers are fixed and for which a well-defined algorithm (for example finding maximal matching in a graph) is given as the allocation procedure.

Since switching alters the allocation of satisfiers to requirements, the meta-management must continually keep track of the current allocation. This responsibility must be coordinated with requirements analysis, because the underlying sets on which the allocation procedure acts may change over time. Switching has to take account of changes in the lists of requirements and satisfiers.

The meta-management for e-business in a virtual organization is build on the decision support applications that are being customized, personalized and web-enabled for use in e-business (figure 2).

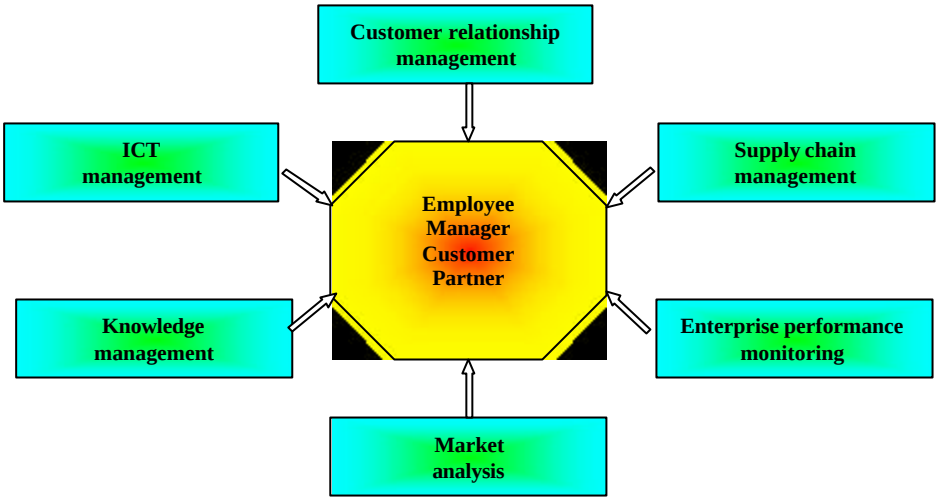

Fig. 2. Support applications for meta-management

Maintenance of the allocation procedure is another consequence of the dynamic character of virtual organization. The procedure may have to be adjusted or modified to keep pace with changes in the objectives of the task itself. Adjusting the criteria for the allocation procedure is a critical responsibility of meta-management. This process is a form of self-reflection in which goals come under scrutiny. In a competitive environment that is continually in flux, self-reflection is essential to survival. The structure and functions of virtual organization make the key elements of management explicit, providing opportunities to analyze business assumptions on a regular basis, as part of standard operating procedure.

The advantages of virtual organization derive largely from switching. As suggested earlier, this is a basic principle, equal in significance to division of labor and functional specialization. Like all useful innovations, switching has its limitations. Ascertaining these limits is one of the main challenges of research on virtual organization.

Meta-management through management information system

The management information system is the original type of information system developed to support managerial decision making for any business process, even e-business. A management information system produces information that supports many of day to day decision-making needs of managers and business professionals. Reports, displays, lists and responses produced by such meta-management support systems provide information that these decision makers have specified in advance as adequately meeting their information needs.

Such predefined information products satisfy the information needs of the decision makers at the operational and tactical levels of the traditional organization or virtual organization who are faced with more structured types of decision situations (figure 3).

Managers and other decision makers use a management information system to request information at their networked workstations that supports their decision making activities. This information takes the form of exception, periodic and demand reports and immediate responses to inquiries.

Web browsers, databases management software and application programs provide access to information in the intranet and other operational place of the traditional organization or virtual organization. When necessary, data and information about the e-business environment are are obtained from internet or extranet of the organization.

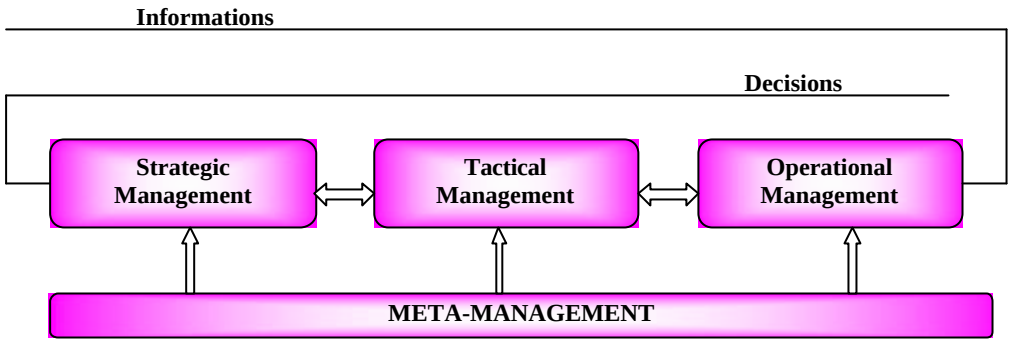

Fig. 3. Meta-management using management information system

Meta-management of e-business through management information system is based on a variety of information products for managers. In this case, the management information system provides four major reporting alternatives:

- periodic scheduled reports;
- exception reports;
- demand reports;
- push reports (information is pushed to a manager's networked workstation).

Few examples of decisions from meta-management process are illustrated in table 1.

Table 1. Meta-management decisions

META-MANAGEMENT		
Operational Management	**Tactical Management**	**Strategic Management**
Cash management	Business process reengineering Work-group performance analysis	New e-business initiatives Company reorganization
Credit management Production scheduling	Capital budgeting Program budgeting	Product planning Acquisitions Sites location
Inventory control	Program control	

Inventory control

For traditional or virtual organization, in business or e-business process (discrete part or continuous process), the requirements specify raw materials or partially finished components to be used in making products. In retailing the requirements are items to be offered for sale to customers. Satisfiers in both cases are suppliers, whether in- house or independent companies. The general problem of managing inventory control can be characterized as assigning satisfiers (suppliers) to requirements (parts or items). This assignment is a many-to-many mapping (two or more suppliers may provide the same part and one supplier may provide two or more parts), designed to satisfy certain criteria set by management. Switching signifies reassignment or changes in the assignment of suppliers to required parts or items.

The main problem for a good inventory control of e-business process in virtual organization is who respond for guarantee and service for all the products that are manufactured in cooperation using the virtual organization framework.

Although the general framework is the same, there are important differences between manufacturing and retailing that affect the assignment criteria and influence switching. The advantage of buying the same stock for a large number of stores can become a disadvantage if the retailer fails

to stay abreast of consumer taste and demand. Items left on the shelf are a dead loss regardless of how little they cost. So, tracking consumer taste and demand is critical for the large retailer.

Requirements must reflect the wants of consumers and thus may change quite frequently. Also, since entirely new items may be introduced, satisfiers may also change frequently in retailing. Switching is occasioned both by changing suppliers for a given item and by adding new suppliers for entirely new items. Requirements in some manufacturing plants may also run into the thousands, but do not change as rapidly as those in retailing. Potential satisfiers are also more stable. Unlike retailers, manufacturers have traditionally supplied a substantial proportion of their needs in-house. Indeed, that explains in part why outsourcing is a contentious issue in labor-management negotiations in the manufacturing sector. Work stoppages and labor unrest, resulting in diminished productivity, must be included in the cost-benefit analysis of virtual organization.

The logical split between abstract requirements and concrete satisfiers and the maintenance of independent meta-management activities dedicated to them is especially important in manufacturing using e-business and virtual organization framework.

Conclusion

The advantage of virtual organization over conventional methods lies in the use of switching and meta-management for e-business process. Organizations without walls, like virtual offices or virtual factories, perform their magic through management information system. Virtual teams are effective because resources can be leveraged by defining membership as the assignment or reassignment of an individual with certain expertise to a required function. The various innovations, standardization, commoditization of information etc. facilitate virtual organization all support switching and meta-management for e-business through management information system.

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