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Collaborative Networked Virtual Organization Management with ICT Services

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Abstract

The Virtual management brought about by the rise of the Internet, globalization, outsourcing, telecommuting, and virtual teams, is management of frequently widely dispersed groups and individuals with rarely, if ever, meeting them face to face. Due to developments in information technology within the workplace, along with a need to compete globally and address competitive demands, organisations have embraced virtual management structures. Virtual teams are typically composed of team members who are not located face-to-face and their communication is mediated through information and communication technologies. Virtual teams represent an important emerging organisational structure which facilitates collaboration between team members located almost anywhere in the world. A virtual enterprise is considered a collaborative networked organization (CNO). The Virtual Organization Management toolkit (VOM) is a distributed system consisting of several partially independent modules specialized in supporting Virtual Organization (VO) manager during the operation phase of the VO. The task of the whole VOM is to assist the VO manager by monitoring performance of VO, alerting in case of upcoming or impending deviation in a VO performance, and on up-to-date data simulating alternative VO schedules and configuration to optimize the VO future performance.

Keywords *- Virtual Organization, VM lifecycle Management, VOM Toolkit, CNOs lifecycle, VE evolution, Decision protocol.*

1. Introduction

Virtual organizations emerged around the world due to increased globalization of enterprises and markets. Virtual organizations could be defined as goal-oriented enterprises composed of members from different geographical locations around the globe, brought together for the fulfillment of objectives or tasks, and who use media technologies to communicate and coordinate those objectives or tasks.

The virtual management could be introduced as a part of the virtual human capital development (Hanandi and Grimaldi 2010). The VHRD model is an approach of utilizing the captured knowledge and information inside the enterprise environment (top management, external expertise, knowledge worker, workforce), and leveraging this knowledge to a dynamic T&D e-content for developing and enhancing the human capital competitive advantage, This model focuses on rendering the human capital with the skills needed and driving their performance to face any future situation and solve it, by capturing the knowledge object during the interaction activities between the users and reuse it in producing a dynamic e-content for the training and development purpose and in the same adding value for the enterprise competitive advantage.

Virtual team leaders need to become virtually present in order to closely monitor team members and notice any changes that might affect their ability to undertake their tasks. Due to the distributed nature of virtual teams, team members have less awareness of the wider situation of the team or dynamics of the overall team environment. Consequently, as situations change in a virtual team environment, such as adjustments to task requirements, modification of milestones, or changes to the goals of the team, it is important that leaders monitor followers to ensure they are aware of these changes and make amendments as required.

2. The Virtual Machine Life Cycle

Automating the management of VMs through all aspects of the VM life cycle provides the ability to use your physical resources in the most efficient and productive manner. You create VMs as needed, put them under version control, provision them as jobs require, and remove them from the system when they are no longer needed.

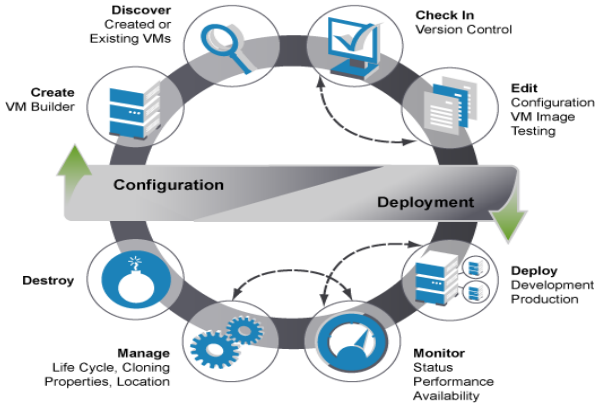

Fig. 1 The VM Life Cycle

The VM life cycle is divided into two parts: configuration and deployment. Configuration is performed on a VM in the security of a development environment which allows for creation, testing, and modification of the VM until you are ready to launch the VM into the production environment. Deployment performed in the production environment and the

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changes take place in real time. As the administrator, you might do both the configurations and deployments.

2.1 Virtual Machine Lifecycle management

Virtual Machine Lifecycle management is the class of management that looks at the life cycle of a virtual machine from the viewpoint of the application vs one focused on roles within an organization. A number of major software vendors, including Microsoft and Novell, have begun to release software products aiming at simplifying the administration of larger virtual machine deployments. Virtualized environments are fundamentally different from physical environments in architecture and capabilities. The flexibility they provide is derived from three fundamental characteristics:

1. **Time**: Over time, the topology of the environment changes with machines coming online and others going offline.
2. **Motion**: Unlike physical servers, virtual machines easily relocate around the data-center.
3. **Transparency**: With no physical presence, virtual machines cannot be seen, identified, touched or often, missed.

These characteristics come together to define all the benefits of virtualization, from cost-savings to disaster recovery. However, they also change the nature of management of the infrastructure itself. The emerging space of Virtual Machine Lifecycle Management is the result of the time, motion and transparency qualities of virtual environments. This need cuts across software development and operations, encompassing all segments of the ITIL framework:

1. **Service Strategy** – As virtualization extends from a transparent back-end alternative to a full infrastructure offering within the organization, Virtual Machine Lifecycle Management provides the granular controls to enable wholly new delivery models, from short-term provisioning to outsourced virtual machine hosting.
2. **Service Design** – When designing the virtual infrastructure services, administrators consider both the structure of the individual virtual machine given to the customer as well as the interactions between all of the virtual machines in the environment, as they come online, move, and expire
3. **Service Transition** – Virtual Machine Lifecycle Management augments the traditional set of requirements built into delivering an infrastructure component to the business. Best practices and specific tools can be used to create the right controls within each virtual machine, ensuring the behavior of all the machines is in line with the design.
4. **Service Operation** – Once operational, virtual environments are extraordinarily dynamic, by design. Above and beyond the complexity of a traditional operating environment, management needs can be minimized with strong controls set in the transition phase and ongoing monitoring and alerting specifically designed to address the unique characteristics of the virtual infrastructure.
5. **Continual Service Improvement** – As virtual environments mature and grow, internal customers and management will be keen to understand the savings and benefits of the paradigm, security groups will increasingly audit the infrastructure, and new chargeback methods will emerge to account for the new model. Virtual Machine Lifecycle Management tools, with their innate understanding of the environment and its transient and mobile nature, will deliver the metrics needed to demonstrate success to all the constituents.

2.2 CNO life cycle

A virtual enterprise is considered a collaborative networked organization (CNO), its organizational life cycle is different in terms of time spend on creation (entrepreneurial stage) and dissolution (decline). Collaborative Networked Organizations (CNO) has become one of the most prominent strategic paradigms that companies have sought as a mean to face the challenges imposed by globalization. There are several types of CNOs, like as supply chain, virtual labs, virtual organizations breeding environment (VBE), extended enterprises, virtual organizations and virtual enterprises. The common rationale behind such alliances is that they rely on collaboration with other companies to be more competitive. This work focuses on virtual enterprise. The CNO life cycle includes the stages:

- **Creation (initiation and foundation):** During the initiation a strategic plan is made for the operational stage and the foundation of the CNO is executed by the constitution and actual start up.
- **Operation:** Execution of operations within the defined scope of the strategic plan.
- **Evolution:** The context of virtual organizations is rapidly changing and therefore in continuous evolution of its operation within the current strategic plan this means minor alterations.
- **Metamorphosis or Dissolution:** Because a CNOs did gained much experience during it relatively short life (compared to brick-and-mortar organizations) they either keep the knowledge by metamorphosing into a new organization (changing its form) with a new purpose or dissolute.

2.3 Collaborative decision support for the virtual enterprise evolution

This framework gathers such aspects and groups them into four categories, or pillars: Human, Organizational, Knowledge and Technological. The essential rationale of these four pillars is to enable humans to discuss and to decide about a problem related to a given organizational process, applying a set of organizational procedures and methods, using information and knowledge available in the VBE's repositories, all this supported by a sort of ICT (technological) tools and infrastructures. That discussion is framed by a decision protocol (conceived using project management foundations) and is carried out within a distributed and collaborative decision support environment. The decision protocol is the mechanism

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which "links" the four pillars according to the particular problem to be solved within the VE evolution phase.

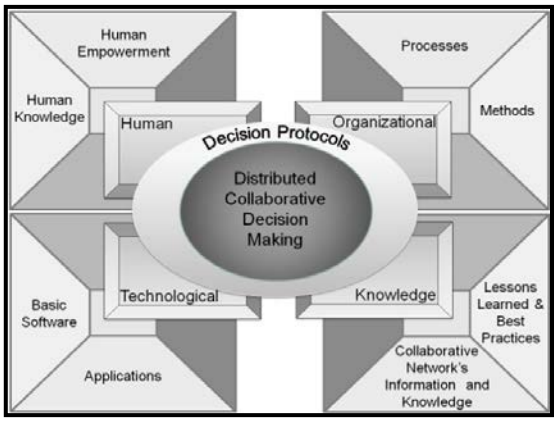


Fig. 2 Framework for VE Evolution Management

2.3.1 Framework architecture

The four framework's pillars are operated through three concrete elements: the decision protocol, the distributed and collaborative decision support computing environment, and the ICT Toolbox. They all form the Distributed Collaborative Decision Support System for the Management of VE Evolution (DDSS-VE). The framework architecture, also illustrating the relation of the elements with the pillars. It shows the three different types of actors that are involved in the discussions about the problem detected in the VE operation. To be highlighted the fact that all transactions – involving both humans and systems – are carried out over computing networks making use an adequate ICT supporting infrastructure.

2.3.2 Decision protocol

The decision protocol is a sequence of steps that defines the activities that have be executed in given situations within a given context to solve a problem. Decision protocols are seen in this work as an instrument to: i) systemize a set of actions where there is a strong human intervention, ii) to standardize and iii) to enhance their execution efficiency. Conceptually, it should indicate what has to be done, why, by whom, where, when, how, and with which resources.

The DSS (Decision Support System) mainly supports VO operational and strategic management by simulated rescheduling and reconfiguration of a VO. A simulation module, which is the core module of the DSS. It utilizes multi-agent technology, where each (existing as well as potential) VO member is represented by an agent. The employed technology allows simple configuration of each of the partner's model resources and behavior independently of other models (agents). The VO schedule and configuration simulated adaptations are negotiated about by agents upon request and under control of the VO manager.

The VOM Toolkit is an integrated environment that has been developed to help the VE coordinator in doing several activities, such as VE performance monitoring, alerting about changes in the expected performance, and rescheduling and reconfiguration simulation to optimize the VE performance.

The conception of the proposed protocol has considered three aspects: its generality, its underlying foundation, and its execution automation. As far as the generality is concerned, the protocol is not seen as a reference protocol that would be generic enough to comprise all possibilities of how every single different problem should be solved by/at certain companies related to a certain VE. Instead, it is seen as a basis on which particular protocols can be derived, grounded on project management reference models, considering the VBE policies and operation rules. This particularization means that new steps can be added, some modified / adapted and some disabled.

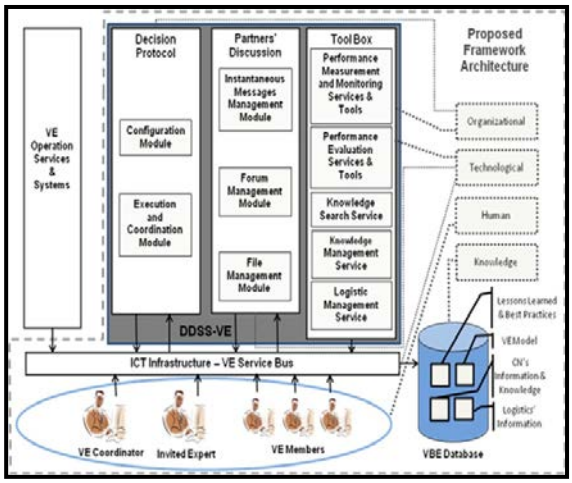
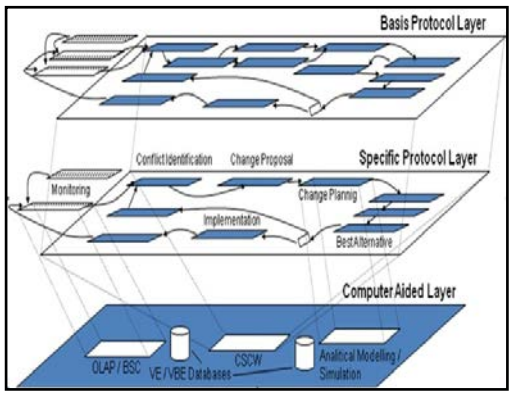


Fig. 3 Framework Architecture

The whole approach can be seen under three layers: basis protocol, specific protocol, and computer aided. As said before, the basis protocol layer for the VE evolution phase is the one , where the box outside the main square contains activities within the VE operation phase. The specific protocol layer represents the one that would have been customized for a given VBE and that would be effectively applied in the VEs created from it. The computer aided layer contains digital information repositories and very concrete ICT tools and infrastructure that are used to support the diverse actions in a decision-making process.



4 Multi-layered conceptual scenario of the proposed framework

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2.3.3 Performance monitoring and measurement

Performance monitoring and measurement look to the current situation of the production system, treating the problem in the (VE) operation phase. The goal of this aspect from the VE evolution management point of view is to offer conditions for the VE partners to measure their own performance and to check their capacity in order to get more confidence when deciding about how to do respecting the given problem. This involves, therefore, monitoring (i.e. gathering of internal information) and further analysis (performance measurement). There are a number of performance measurement models. Two of the most relevant ones are the Balanced Scorecard (BSC) and SCOR (Supply Chain Operation Reference).

3.Conclusion

The virtual management uses the VHRD model. This model increase agility of Virtual Organizations. It focuses on rendering the human capital with the skills needed and driving their performance to face any future situation and solve it. Virtual Machine Lifecycle management define all the benefits of virtualization, from cost-savings to disaster recovery. CNOs life cycle face the challenges imposed by globalization. The decision protocol, VOM toolkit and ICT tools and infrastructure that are used to support the diverse actions in a decision-making process. They all form the Distributed Collaborative Decision Support System for the Management of VE Evolution (DDSS-VE). Performance monitoring and measurement are used to find current situation and measure the performence of the VOM process. It is also enhance the VOM organization using the ICT services. Future work is to increase the business value of the VOM users by reducing their costs and response time using VO schedules and configurations to optimize the future performance.

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Biography

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