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The VSM under a Complex Systems Framework: The Multiprocesses (MP VSM)

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Abstract

This paper deals with the evolution of the Viable System Model (VSM) from its origins within the classical systems theory to its evolution whitin the complex systems theory. New visions and concepts are included in a new version of it, call it the Multiprocesses Management Viable Systems Model (MP VSM). This model is oriented towards to work with "hard", "soft", and "complex" processes. The result is a contemporary systemic model that is in homeostasis with time, technology, organizations and fundamentally with the human being, developing new processes and new tools for managing the organizational complexity of our times. The VSM MP is an interesting contribution to the Systems Sciences and also for the Management Sciences.

Key words: systems, viable, process, model, knowledge, complex.

Resumen
(El modelo de sistemas viables dentro de la teoría de sistemas complejos: el modelo de sistemas viables multiprocesos)

Este artículo trata de la evolución del modelo de sistemas viable (VSM) desde sus orígenes dentro de la teoría clásica de sistemas hasta su evolución dentro de la teoría de sistemas complejos. Nuevas visiones y conceptos son incluidos en una nueva versión de este modelo, el cual denominaremos el VSM Multiprocesos (VSM MP). Este modelo está orientado a trabajar con procesos "duros", "suaves" y "complejos". El resultado es un modelo sistémico contemporáneo, en homeostasis con el tiempo, la tecnología, organizaciones y fundamentalmente con el ser humano, desarrollándose de esta forma nuevas herramientas para administrar la complejidad organizacional de nuestros tiempos. El VSM MP es una contribución interesante a la ciencia de los sistemas y a las ciencias administrativas.

Palabras clave: sistemas, viable, proceso, modelo, conocimiento, complejo.

1. Introduction

This research is focused in the fact that the VSM has developed many facets during the last 50 years, even it could be considered an old "hard" systemic model, at present many organizations are working with many elements or ideas of the VSM and also many researchers are developing new interpretations of this model. The one developed in this paper is with organizations in mind, is a very practical model based on processes and adapting it to the concepts and ideas of complex systems. In this new scope the new model MP VSM works in an ambient which is a mixture of non linear systems, fractals and organizational complexity

The Viable System Model (VSM) is a cybernetic model based on feedback, coordination and control. In fact, the VSM is more than an old fashioned model about organizations; this model is a way of thinking about organizations and also it is a way to have an integral view of a system or an organization.

Stafford Beer a well known systems thinker developed the VSM in the decade of the 60's of the last century. He was the author of several books about organizations such as: Brain of the Firm, the Heart of the Enterprise and Diagnosing the System for Organizations. Since the development of this model until the present time, the interpretation and application of it has taken many facets. In fact, in this new century the VSM can be considered as a Model of Total Quality Management in which it is possible to include concepts such as empowerment, continuous

improvement, total quality, autonomy, leadership and many new organizational theories.

2. The VSM Structure

At the beginning, this model was developed as a way to design or redesign an organization from the point of view of feedback, coordination and control, but many criticisms have emerged from many systems thinkers about how it neglected the human factor.

The application of the model is based on the concept of recursion that means that it is possible to apply it from the atom to the Universe. The idea of recursion is like the one pointed out by Leonard [1] about Matriuskkas (russian dolls) you open one and a new one with the same characteristics appears in line with the other dolls or, cells or in our case systems.

The VSM is based on gaining high capacity of self-regulation and self-control. This model contains 5 basic systems (see figure 1).

System 1 is the internal client, the environment is the external client. System 2 is the coordinator of system one. System 3 is the control of the system in the "here and now". System 4 works in the future and it is the "intelligence" of the system.

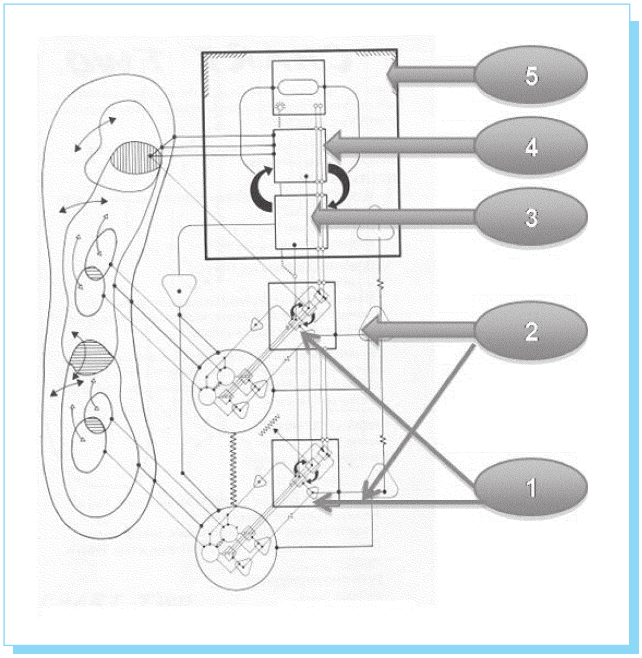

Fig. 1. VSM systems (adapted from Beer [2]).

System 5 is the policy of the system or organization under study.

These five systems, which are recursive at any level plus the different processes defined by Beer [2] are the foundations of the VSM for being capable of reflecting the nature of the environment in order to have an organization responsive to it, in other words to be a viable system.

The model is derived from the architecture of the brain and nervous system. Systems 3-2-1 are identified with the ancient brain or autonomic nervous system. System 4 embodies cognition and conversation. System 5, the higher brain functions, includes introspection and decision making [2].

The VSM is based on recursion. For this reason the model might be applied to atoms, human beings and even the entire universe. Also the VSM has foundations of getting their elements from a comparison with living organism. According to Tsuchida [3], the VSM was obtained with isomorphic mapping from the nervous system.

When this model is applied to organizations, they, as viable systems, must be immune to infections and very adaptable to enviromental changes and also self-capable of eliminating its cancerous growths Beer [2].

The VSM is a model for guiding organizations in being capable of responding to external changes even if those changes could not have been foreseen at the time of planning. It is a sophisticated model capable of managing the implications of Ashby´s law of requisite variety in organizations [2].

The VSM in the last century was an incredible surprise for the organizational thinkers. The main difference of the VSM built with cybernetics concepts vis a vis the traditional organizational chart is that VSM is focused on feedback rather than command. One element of the original VSM was the concept of variety and how to manage it but it was not very clear and produced some confusions. At present the organizational complexity is working with autonomy, self-regulation, self-vigilance, viability which are the basic elements of the VSM, those are possible to see in the worldwide franchises that works in a recursive way in which each system 1 can grow in a unlimited way working with feedback, communication and control rather than command. In some way many organizations are working with people in other countries or via internet and each person as a system 1 needs to develop self- learning, self-development, self-vigilance, self-organization and mainly viability and autonomy, then the VSM is more actual than ever.

3. Criticism about the VSM

About the original VSM, Jackson [4] criticizes the model as it gives an impoverished picture of the organization, because it neglects qualities of the human actors who make up organizations. Also that the model do not reflect social processes such as politics and power struggles that go in organizations and that the model is difficult to apply in practice because of the resistance that might provoke in an organization.

In fact the first idea that comes to our mind after analyzing those criticisms, could be the idea that the VSM is a "hard" model or that it could be another kind of systemic model focused on structure, neglecting the human dimension and silent in how to make an intervention in the system or about how to change organizational culture.

4. A New Interpretation of the Model

Espejo [5] refers the VSM as a new paradigm of problem-solving and also as a mental tool for the design of effective contexts for human activities.

This would be one of the new values of the model: the change from "hard" to "soft" because Espejo discovered a new facet of this organizational diamond that is the design of "effective contexts" for human activity and to develop organizational contexts of freedom and unlimited organizational and human development, then Espejo evoluted the VSM to a "soft" model.

The idea of a new interpretation of the VSM with a wider scope about processes, name it the Multi Processes VSM (MP VSM) contains the basis of the Beer's model [2], the ideas of Espejo [5] about designing contexts and all the new organizational theories, such as empowerment, leadership, knowledge management, etc. All these elements make it a universal organizational model that can be adapted to any culture, society or ideology, just adapting it, polishing as a diamond to reflect light from any of these multiple processes. Under that mark it is important to have a concrete reference, a systemic model that allows a clear vision about where organizations should arrive.

According to Tsuchida [3] who developed the Autopoietic VSM, the VSM has three approaches, The first one is the investigation into structures; the second is the comprehension of functions; and the third is the understanding of individual behaviours and processes. Focusing on the third approach the MP VSM is a cybernetic holistic model based on processes, which will include the main process viability and as sub processes feedback, communication and control. In addition, we could include the processes of autonomy, total quality, recursion, homeostasis, leadership, empowerment creativity, self-learning, self -regulation, self-vigilance, self-development and homeostasis, that could be defined as concepts or states but in this model are considered processes with different phases of development from the design until the implantation and the continuous improvement of each one. Take as an example the four phases mentioned by Tsuchida [3] which explains that in the theory of autopoiesis the social process generally consists of four stages, the first one is groping in the dark, the second one is forming a consensual domain by linguistic behavior, the third is to expands the consensual domain with the concept of time, the final stage is reaching the culturally domain and people can progress culturally with mutual concessions. These four stages can be applied not only to autopoiesis, but to any social or human process such as leadership. Why leadership? Is clear that an organization capable of leading workers to autonomy, self-regulation, self-vigilance and self-development is giving a proof of high-level leadership. If an organization wants to develop a leadership culture, it needs to design this process in its different phases of development from the design until the final stage of creating a shared vision of leadership, the model of Peter Senge [6] is a valuable tool for applying to a leadership process in which you stark from darkness until a common vision a common language and creating a culture of sharing the future. The same happens with the process of Knowledge Management, it needs to be like a virtuous teaching cycle described by Tichy [7] which creates an interactive process of four stages to knowledge creation or by the four phases proposed by Nonaka and Takeushi [8]. Autonomy is a processs for developing a culture of autonomy, then again it begin from darkness until a shared vision of it.

5. The VSM under a complex systems framework

The study of complex systems in this new century gives a new vitality to many areas of Science, this theory is used for approaching in a different and a deep way the problems of different disciplines including the neurosciences, social sciences, meteorology, chemistry, physics sciences, psychology and many more areas. In these complex behaviors, the scientific ones frequently look for nonlinear rules that produce a complex phenomenon. The human societies and the human brain are complex systems in which neither the components nor the connections are simple. Nevertheless, these exhibit many of the characteristics of the simple systems. It is important to observe that the non-linearity is not a necessary characteristic in the modeling of complex systems.

The complex systems are rule by other laws and another type of scales, for example the power laws that means that some patterns are developed in the space and it can be expressed with a mathematical formula also the temporary fluctuations of a complex system imply the existence of specific scales in which the phenomenon is valid and outside this it is not, that is to say, the phenomenon is pronounced and been valid in all the scales of the system conserving the same properties that characterize it Theories of complexity provides a conceptual frame, a way to think and see the world, because organizations that interact create complex interrelations whose details cannot be predicted, and are able of adaptability and evolution and in addition they can create a new order and coherence with self capacity, self repair and self maintenance.

Recently, the dynamics of self-organized criticality (SOC) has become a popular subject of investigation in theoretical physics since it is believed that SOC is a one of the most universal self-organization mechanisms in nature.

Other concepts within the theory of complex systems exist such as: emergence, which is the appearance of patterns in self-organization systems, attributability, that means that the behavior extends the norms, connectivity where the behavior of the system cannot be decomposed in strange parts and universality like the fact that systems of very different nature exhibit the same behavior independent of the particular details of its components. Another interesting point is the evolution of the organizational complexity, according to Yaner Bar-Yan [9], the organizational structures are at the moment more complex because there are not linear or matrix structures but more complex networks and require of diffusion of the power and not of its centralization.

The theory of complex systems comes to complement the vision of systems, because now it is possible to speak of "hard", "soft" and "complex" approaches, these last perhaps too complex ones for the common industrialist that looks for a traditional vision of systems, like the Senge [6]. In fact we can conclude that the complex systems in addition has an interesting tool that look for the prediction of events on the basis of a deep and ample data analysis and on the basis of the emergent properties of the system, the fractal dimension, it is a new land. Mandelbrot is widely hailed as the father of fractal geometry, a new geometry of roughness with the power to describe a vast array of natural and manmade phenomena. The term fractal (from Latin fractus -irregular, fragmented) applies to objects in space or fluctuations in time that possesses a form of self-similarity and cannot be described within a single absolute scale of measurement. Fractals are recurrently irregular in space or time, with themes repeated like the layers of an onion at different levels or scales. Fragments of a fractal object or sequence are exact or statistical copies of the whole by shifting and stretching. Fractal geometry has evoked a fundamentally new view of how both nonliving and living systems results from the coalescence of spontaneous self-similar fluctuations over many orders of time and how systems are organized into complex recursively nested patterns over multiple levels of space [10].

The fractal dimension has been formally studied in the last 10 years in comparison with the Euclidean geometry of 2000 years. Because the theory of fractals is the theory of the geometry of Nature and the tendency of systems theory is to visualize organizations as live organisms, many scientists are working with the theory of fractals for the prediction of finances, economy and social phenomena. Balankin [11] comments about it as that there is no a paradigm so universal and as a discipline so multidisciplinary as the one of fractals.

Adapting the VSM to the complex systems framework requires to take into account that the ideas of organizational complexity with the living organisms, organizations exhibit very similar properties and also respond to the chaos in the same way that living systems.

For all those reasons this new model could be visualized as a multiprocesses VSM with the following differences to the original VSM model: 1) Working with new processes such as: emergence, powers laws, complex evolutive system, autopoiesis, self organization, connectivity, interdependence, feedback, co evolution, hysteresis, returns, attributability, universality and especially diffusion of power. 2) Changing the organizational metaphor from the old one of "brain" to "organism" and finally to a new one of a fractal or "geometry of nature" in which knowledge is more complex. 3) Managing multiprocesses, as an example is possible to propose the following:

1 Feedback
2 Coordination
3 Control
4 Planning
5 Directing
6 Total Quality Management
7 Leadership
8 Autonomy
9 Empowerment
10 Creativity
11 Knowledge Management
12 Self-regulation

13 Self-vigilance
14 Self-development
15 Homeostasis
16 Recursion
17 Holistic
18 Viability
19 Autopoiesis
20 Self -organization
21 Co-evolution
22 Diffusion of power
23 Interdependence

The VSM evolutes in different forms because this model is capable of self learning in new frameworks, from a "hard " to a "soft" or "complex" framework, then instead of self learning it can be visualized as a process of Knowledge Management in the 4 stages of Knowledge Management defined by Nonaka and Takeuchi [8]. And it can be applied to any other process such as autopoiesis in the four stages proposed by Tsuchida [3], or any other process such as; viability, quality or any process of the complex systems framework. Another application is to select the most important processes for some organization, 5, 10, 20 or more and to distribute in a chart of four phases. This methodology of four phases is specifically designed for the MP VSM: The first stage is called "creation", this phase is the designing of a new culture based on the organizational values of the VSM such as self organization, autonomy and others, the second one is the "differentiation" phase, in this part the documentation of the organization is developed, the third one is capacitation in which all the workers are capacitated in the following of the processes of the model, looking for having a shared visión of the future and the final one is integration, in this phase the "complex" systems processes are fully understood and workers desire to follow and to improve each one of the processses.

6. Application of the VSM MP

The VSM MP has been succesfully applied to several organizations in line with the main processes proposed by the ISO 9001: 2008, adding "soft" and "complex" processes to the quality norm for developing a culture of continuous improvement.

7. Conclusions

In the broadest sense managing an organization is a complex, chaotic and fractal system, complex because of the mixing of several disciplines and the presence of nonlinear elements such as money, time, and internal and external changes, chaotic because of the incredible amount of interfaces but at the same time capable of continuous self organization, fractal due to the fact that organizations are considered as a living cell with some kind of fractality. At present it is possible to find different versions of the VSM as the one of Espejo [5] for designing organizational contexts, the autopoietic VSM of Tsuchida [3], Knowledge Management application developed by Leonard [1] and other researchers are working in the Fractal VSM, the one presented in this paper is focused to be more practical because it is a model capable of being mapped and evaluated with different indexes in all the processes. In this new framework the MP VSM appears completely renewed showing a new worker with new freedom degree and having a new co evolution with is organization and with society and with the knowledge of the world. A universal model has been outlined, it can be applied on a national, a social, or an organizational level where the systems roots can be adapted or transformed according to the spirit of each system under analysis.

This new vision develops a new idea that the man's destination in this global village is to become a integral business unit, which means that each man becomes responsible for himself in the multiple dimensions that correspond him with enough autonomy and empowerment to achieve self-regulation, self-control; self-vigilance which can evolve according to its own objectives, and to grow in agreement with the corporate philosophy and policies. The recursion of the model from the universe to the atom, allows us to think in an integral, holistic and human being that is a business unit connected to another business units, to his organization, society, earth and the universe.

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