Studying Social Complexity: From Soft to Virtual Systems Methodology

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Virtual system methodology (VSM) tries to extend system inquiring processes beyond the scope of soft systems methodology, and thus make it applicable to the whirling dynamics of social complexity. At the core of VSM is the process of virtual semiosis, the use of various signs and sign structures while making sense of the emergent behavior of a complex dynamic system as a whole. VSM applies virtual logic and operates with virtual meanings when exploring human systems. Various practical aspects of this kind of exploration are discussed, with a special accent on how to work with social self-organization.

1. Introduction

Social systems and their associated problems in many cases cannot be adequately explored within the cartesian worldview. Therefore, innovative methodologies are required for studying social systems. This paper contributes by proposing virtual systems methodology (VSM) as an attempt to extend systems inquiring processes beyond the scope of soft systems methodology (SSM), whose constructs of "purposeful human activity" lose their efficiency.

1.1 Beyond soft systems methodology

SSM is a systematic inquiring process developed by Peter Checkland for analysis of poorly defined systems that have a strongly embedded "human element." According to Checkland [1]: "models in SSM are constructs which represent, from some explicit pure point of view, purposeful human activity."

SSM inquiry consists of a comparison between a real-world problem situation and conceptual models of relevant systems of purposeful activity. SSM includes the following three major stages.

- *Stage 1*. Finding out about the problem situation.

- *Stage 2*. Using systems thinking to build conceptual models of the situation.

- *Stage 3*. Taking actions to improve the situation.

These three stages also take into account Vicker's appreciative system approach [2] in a series of participatory action-research cycles repeated until satisfactory (from the point of view of the participants concerned with the problem situation) improvements are reached.

SSM is useful for studying problem areas where human expertise is of vital importance. This makes SSM effective in the development of problem-focused expert systems [3].

In the complex and chaotic dynamics of today's society, where economical, political, ecological, and cultural phenomena, events and processes emerge in unpredictable ways out of a tangled web of ever-changing interactions of huge numbers of factors, SSM constructs of purposeful human activity lose their efficiency. Well-defined problems simply do not exist in such an environment, and poor or ill definitions often bring inquiry processes to blind alleys.

The complex human society of today may be thought of as a nonlinear dynamic world of spontaneous emergence and bifurcations, chaotic attractors and fractals, autopoiesis and self-organization; such real-world problem situations call for new methodologies free from the fixed periodicity of action-learning cycles, from the fragmentarity of expert knowledge, from adopted standards of optimal ("good," "right," "ethical") value judgements, from cause-and-effect type explanations and from the entire ideology of purposeful improvements which permeate most of the approaches under the umbrella of SSM.

Any preselected purpose, goal, objective, value standard, milestone, or plan inevitably stumbles over the chaotic dynamics of social complexity. Even the term "improvement" does not make much sense when dealing with the ever-emerging turbulence in the flow of life. How can we improve the whirlpool in the flow of a river? Improvements always imply purposive interventions, that is, interventions guided by preliminary defined purposes. Such purposes turn out to be misleading when dealing with the sparkling spontaneity of the self-organizing processes of reality. It is this sparkling spontaneity which propels the best of our capabilities as humans: to create, discover, and discriminate.

A purposive, rational intervention, be it individual or participatory, hard or soft, precise or fuzzy, linear or cyclic, theoretical or experiential, ontological or epistemic, ethical or aesthetical, action-research or action-learning based, cannot help but limit the serendipity of those who navigate through the labyrinth of chaos and complexity. Serendipity is a virtual faculty: it can be evoked, explored, nourished, and energized, but never purposed or imposed, inserted or transferred from one place to another, prescribed or ordered, directed or controlled. It needs freedom in order to self-realize and blossom. It needs a different type of logic; a logic that underlies processes in their becoming and helps to "sense" the meaning of what is in the process of emerging.

This logic can be called *virtual logic*, and the meaning of what is going to emerge can be named *virtual meaning*.

VSM applies virtual logic and operates with virtual meanings when exploring the complex dynamics of social systems.

2. Virtuality of meaning

Both verbal and nonverbal human expressions have a unique temporal property: The meaning of an expression simultaneously reflects the past, present, and assumed futures of both individual and group experience.

The past relates to the probabilistic characteristic of an expression: The expression appears as the most probable response given the experience and knowledge accumulated in the past. The present refers to the actual circumstances facilitating both the formation and interpretation of the expression. The future evokes possibilities for new comprehension of the expression and thus provides a virtual space for evolution of its meaning.

In the continuity of human experience, meaning always espouses virtuality in the sense of connectedness and contingency. This was understood by Peirce, the cofounder (together with Saussure) of semiotics, who wrote in 1905 [4]:

> No present actual thought has any meaning, any intellectual value; for this lies, not in what is actually thought, but in what this thought may be connected with in representation by subsequent thoughts; so that the meaning of a thought is altogether something virtual.

3. Virtual logic and semiosis

According to Kauffman [5], virtual logic is

> that which energizes reason: virtual logic is not logic, nor is it the actual subject matter of the mathematics, physics or cybernetics in which it may appear to be embedded.... It is the pivot that allows us to move from one world of ideas to another.

Kauffman is convinced that what empowers us "to move from one world of ideas to another" is not necessarily itself purposive, reasonable, or logical.

> There are many ways in which we encounter this sort of virtuality. One way is to proceed from within an apparently logical system and push its boundaries, find its limits. Another is to arrive from without in a leap, a bound, a jump into something new.

The way we have adopted originates in the process of *semiosis*—use of various signs and sign structures when making sense of a complex dynamic system *as a whole*.

Wholeness is a virtual entity—its numerous dynamic aspects have unlimited potential for becoming, that is, expanding or withdrawing, sustaining or destroying, transforming or transcending themselves. The process of making meaning about the wholeness, that is, the process of semiosis, is impregnated by this virtuality.

Peirce put it directly: "semiosis is inherently virtual." It inevitably includes appearance (emergence, discovery, creation) of connections (relations) between signs (things, events, phenomena, processes), *a priori* seen as not interacting with each other. Because of its virtuality, semiosis provides a basis for the following.

- Exploring the holistic nature of complex reality, where "everything relates to everything."

- Eliciting distinguishable dynamic patterns emerging out of the tangled web of interdependent relationships.

Let us use virtual logic to elicit the relations between the constituents of the following dynamic complex: body, mind, and nature.

This complex has a triadic "fractal" structure. Mandelbrot's concept of fractals [6] is used in chaos theory to explain the nested structures of chaotic (strange) attractors. Fractals reveal both the integrity (wholeness) and diversity of complex formations and provide a key for understanding their intricate dynamic behavior.

In this fractal complex, the body has the potential to affect virtually the functioning of the mind, while the mind can be empowered (energized, inspired) to affect, again virtually, the functioning of the body. Meanwhile, both body and mind exist in nature. Nature manifests itself through them, keeps their integrity, and nourishes their functioning. Conversely, the development of the body and the mind determines the ways an individual perceives nature.

4. Virtual systems methodology

Insofar as the roots of virtual semiosis are in the fertile soil of human experience, it can be used as a source for developing methodology for studying complex dynamics of this experience. This is what we refer to as VSM, which aims at discovery or creation of virtual connections between events, phenomena, and processes embedded in social complexity.

When approaching social complexity, VSM can use signs and sign structures of various forms (words, images, music, verbal and nonverbal expressions, narratives, internet, multimedia) to explore and navigate through the ocean of human experience at different levels of its manifestation.

5. Application of virtual systems methodology

An unchanging environment communicates nothing, therefore, it does not represent a field for application of VSM.

According to Allott [7], in order to be able to perceive change, the perceiver must have retained the pattern of what constitutes an expected flow of events (situations, phenomena), that is, a flow of events considered as "normally expected." Allott underlines that the complexity of our brains must be structured in terms of some kind of expected environment and "perception is the result of interaction, or matching between the expected environment and the current environment by which change is detected." If no change is detected, no emergence of meaning is perceived.

In the corporate world, for example, the most meaningful signs for survival are the markets, because of their rapid and unpredictable change, driven by competition, shifts in technology and permanent interplay of various economical, political, and cultural factors. Those firms with the best chance of survival are able quickly to adjust their rhythm to these changes. Such organizations are characterized by two vital signs: the pace of introducing new products and the choreography of transition from one activity to another, to the cadence of the dynamics of the market's characteristics.

In the presence of high-velocity markets the way of dealing with the future is not through scenario planning or by building predictive models but by promoting individual and organizational capacity for change.

The viability of an organization is not judged by the presence of signs revealing its sustainability (persistence through stability) but depends on the dynamics of the signs demonstrating its fitness for change, its ability to embrace the unknown and to coevolve with it.

5.1 Semiotic dynamics

Semiotic dynamics relate to the changes in the meaning carried by signs and sign structures.

For example, narratives about the "war in Kosovo" represents a sign structure with complex semiotic dynamics. The meaning of these structures changes when moving from one group of people to another: the narratives shared by Albanian refugees differ from the narratives of other Serbian people, which are entirely different from the narratives of the official political propaganda in Belgrade. The narratives shared by people living in the neighbor countries differ from the narratives of those who live in the countries participating in NATO military operations. The narratives of those who express their sympathy and solidarity with Albanian refugees are different from the narratives of those who support the policy of the Yugoslavian government.

Simultaneous consideration of all available narratives would help create an integral, multidimensional meaning of the "war in Kosovo" as a sign structure simultaneously pointing to the following.

- The ethnic cleansing of the Albanian population as conducted by the Serbian army in Kosovo.

- The NATO bombardment of military targets in Yugoslavia and, at the same time, destruction of human life, material objects, and the environment.

- Individual suffering from various aspects of the war.

With VSM we attempt to capture, as fully as possible, the meanings which can be drawn from the sign structures in their dynamics and diversity, in order to facilitate the emergence (or creation) of a coherent virtual meaning. In the above case, such meaning may be the *lack of unconditional virtue shown by all participants*.

5.2 Static sign structures

Static sign structures bear preimposed, fixed meanings. Military commands are examples of such a structure. Dictators, bureaucrats, and experts around the world often deal with this kind of structure. Powerful economical, political, and religious oligarchies condition people in today's world to insert static sign structures into their perception, interpretation, and consciousness. The media (particularly, commercial television) collude in this process and impose fixed patterns of economic behavior through their programming and advertising strategies.

VSM is intolerant of fixed meaning: the whole idea of VSM is to liberate the meaning out of the prison of any preimposed interpretation and hence to extend its virtual space. Once the meaning is liberated, it would be difficult to push it again into a box with a fixed label.

Any knowledge of the "for sure" may have fatal consequences on the application of VSM. The meanings related to such kinds of definite knowledge tend to substitute for the meanings extracted from direct human experience.

This is a psychological paradox, which is extremely difficult to deal with. Once the meaning of living experience is substituted by a meaning fixed by a doctrine (dogma, prejudice, standard, stereotype, habit), VSM loses its creative potential, as its roots lie in a more direct experience of reality, that can never be fixed nor standardized.

For example, addicts know for sure that their addiction (alcohol, smoking, gambling, gluttony) can be fatal for their life; moreover, they are even convinced that they are able to change their addictive behavior in any moment. This definite knowledge becomes an impassable psychological barrier for practically dealing with the addiction. That

is why the first thing a participant in the Alcoholic Anonymous (AA) program does is to declare genuinely their ignorance both about the nature of the addiction and about any prescribed way to stop its urge. Through surrendering to a force that is unknown and greater than personal determinacy to fight the fatal addiction, AA succeeds in dealing with it [8].

Paradoxically enough, the more liberated (unfixed and flexible) our knowledge related to a specific sign structure, the easier we move into a virtual space of meaning beyond this structure, and hence the higher our capacity to apply VSM.

It appears that a kind of disestablishment of the meaning carried by a certain sign structure is necessary for its further virtual development; acceptance of disorder (breaking certainty) at one scale is often consonant with order (emergent of a coherent meaning) at another scale.

5.3 Fractality and virtuality

Fractals represent similar patterns appearing at different levels (scales) of a complex structure. Each pattern is an image of the whole structure.

The patterns that appear at different levels of a complex sign structure are bearers of meaning. They also exhibit similarity, as each of them relates to the same sign structure. Even tiny changes in the meaning at one level can immediately affect the meanings related to the other levels, and thus the meaning of the sign structure as a whole, that is, its virtual meaning. This kind of butterfly effect is of enormous significance for the practical application of VSM. It makes it possible to radically change the virtual meaning of a complex sign structure by consciously generated small changes in the meaning related to a level that is relatively easy to observe and study.

For example, human health can be considered as a complex dynamic sign structure with three sites of manifestation: the physical, emotional, and mental. Although each site has its own set of signs indicating the state of individual health, there is similarity between the levels. The signs of tension (or stress) observed in an individual indicate a high degree of similarity through all the levels. This similarity makes tension and stress easily recognizable, no matter what site it reveals itself at.

Semiotic dynamics of the signs (indicators) of tension reflect both the current degrees of vulnerability of each site and the intensity of the source of tension. If an intensive source of tension is activated at a mental fractal of health, one can expect a virtual decrease in the individual's ability to concentrate and think productively. If, despite the intensity of this source, the individual succeeds in keeping the efficiency of their thinking capacity high enough, tension will inevitably explode either emotionally or physically, depending on which site is more vulnerable at the time.

Mens sana in corpore sano (healthy mind in a healthy body) says the famous Latin phrase. Translated into the language of fractals, this means that by actions, stimulating positive changes captured by the signs of health at a physical level, we also affect positively the signs of health at emotional and mental levels. As a result, changes occur in the whole virtual space of the dynamic sign structure related to the overall state of our health. The reverse Latin phrase: *Corpore sano in mens sana* (healthy body in a healthy mind) also makes sense in the semiosis of fractals and virtuality. Positive emotions, combined with mental patterns in which we see ourselves as healthy and able to deal successfully with any health problems, brings forth favorable changes in our physical health (demonstrated through its dynamic sign structure), and thus affects the virtual space of the sign structure related to our health as a whole.

5.4 Dealing with self-organization

By providing a limitless virtual space for meaning to emerge, VSM simultaneously creates free space for the self-organizing capacity of a complex dynamic system to reveal the characteristic signs of its nature. VSM does not try to push the dynamics of signs into procrustean beds of various hard and soft theoretical models. On the contrary, its exploratory tools adapt to and coevolve together with the self-organizing dynamics of the signs.

The approach used by VSM for understanding and working with self-organization includes the following.

- Gently "nudging" from within the system in order to understand how the process of self-organization works. What are the characteristic signs of this process? How do these signs relate to each other? What kind of changes do they undergo?

- Carefully "catalyzing" the process of system self-organization by pointing to signs and sign structures that reveal forces acting against self-organization, and thus "assisting" the system to cope with these forces.

For example, the self-organizing capacity of an organization is revealed through a joint activity of its members. The more complementary and coherent this activity, and the lower the degree of using a power-based hierarchy, the stronger the collective self-organizing ability of the organization. A great deal of today's research in complex systems is devoted to exploring practical ways of stimulating the self-organizing capacity of an organization [9].

6. Conclusion

Society is becoming more complex and dynamic, and the manifestation of spontaneous social self-organization (including self-organizing

criticality) is more evident. Social researchers need to keep pace with this process by bringing new dimensions to their understanding of and dealing with social systems.

Virtual systems methodology (VSM) represents an attempt to extend systems inquiring processes beyond the scope of soft systems methodology, and thus to foster better understanding and ways of dealing with social complexity. VSM aims at discovery or creation of virtual connections between events, phenomena, and processes embedded in social complexity.

At the core of VSM is the process of virtual semiosis, the use of various signs and sign structures while making sense of emergent behavior of a complex dynamic system as a whole.

The examples of the applications of VSM, presented in this paper, reveal it as a form of evocative exploration, the future development of which will require elaboration and refinement of semiotic tools to stimulate the self-organizing capacity and the evolutionary drive of human systems.

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