Principles of Human Organization Change

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1. Introduction

Complex systems theories consist of a family of theories, e.g., dissipative structure, catastrophe, synergetics, fractal, chaos, etc. They are all theories of self-organization but with emphases on different facets of the self-organization features. Conventional organization theories, on the other hand, are theories of "other-organization".

A human organization, however, is a complex system. Its life-time behaviors, to a very large extent, follow the regularities collectively specified by the complex systems theories. It is legitimate to argue that "complete" organization theories must include theories of self-organization and other-organization.

The current status of complexity studies in the field of organization science is very much like what the fable of "the blind men and the elephant" is described and the results are disjoint, irrelevant and disappointing [Mathews, White & Long 1999; Cohen 1999].

In this article, organization change is the focus. The key theme is that the change of a human organization emerges from the interplay of the visible hand of the organization interveners (e.g., the leader, the management, or the change agent) and the invisible hand of the self-organizing force developed within the organization. The goal is to synthesize the regularities (principles) that govern the creation, the existence and the change processes of a human organization system.

The logic of this article is first to see an organization as a dissipative structure and its state change process as a catastrophe phenomenon (Fig. 1)**, and use these two theories as

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** Employing catastrophe theory to analyze the process of phase change, one must first define the system state as the dependent variable (state variable) and those inner causes and outer conditions that collectively determine the state of the system as independent variables (control factors). Two control factors defined in Figure 1 are

a frame of reference to comprehend the general features of the behavior of an organization; then for those specific aspects of behavior whose particular features cannot be fully covered by the theories of dissipative structure and catastrophe, other theories of complex system, i.e., synergetics, fractal, chaos and autopoiesis [Maturana & Varela 1992], are employed to examine these particular features. Through such a scheme, a unified, theoretically coherent platform of complexity that can be applied to the study of the behaviors of human organizations is established.

Nevertheless, a human organization is more than a natural complex system — Holland (1975) called it complex adaptive system. The constituent members of a human organization (called agents) have the will to act on their own. The wills of the agents are the sources of "other-organization" forces. To simplify the theory development work, it is assumed that if these wills are conveyed in a collective way following the mode of quick variable as defined by synergetics, then no differentiation is made between an agent and an element of a natural complex system; if the conduct of such wills lead to the mode of behavior of a slow variable, then they must be conceived as other-organizing forces, e.g., the will of a visionary leader or the will of a change agent.

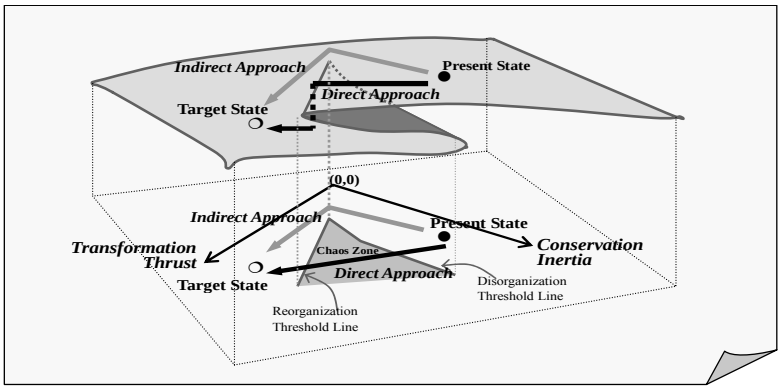

Figure 1. Cusp Catastrophe Model – Phase change process of a Human Organization

2. Four Principles of Organization System Change*

The following are the regularities that govern behaviors of a human organization system, which are presented in the form of principles and sub-principles or rules.

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the conservation inertia and the transformation thrust. The phase change of a system can be perceived as the process of a "ball" rolling on the state surface in Figure 1. The *direct approach* is a straight line which crosses the broken surface, thus the ball has to drop off the cliff to reach the target state; while the *indirect approach* takes a detour to by-pass the broken surface and thus avoids any abrupt drop in its course.

* This article is a abbreviated version of author's working paper [Mao 2006]. The derivation of the principles and the relationships of the principles with the classical organization change related theories, such as the Lewin's 3-steps model, the leadership theories and the organizational learning theories, are omitted due to the constraint of paper length.

A. Principle of Self-Creation: A human organization exists as a process of creative advancement in which the organization ceaselessly defines itself and sustains itself.

This principle specifies the primary conditions which a human organization as a complex adaptive system must satisfy so as to maintain its existence. This principle can be further elaborated into three complementary rules.

A-1 Rule of Depedent Arising : The emergence of a human organization is a result contingent upon the match of the internal systemic causes and external situational conditions.

Human organizations, as complex systems, are emerged from nest function-structure causal chains. The creation of a particular human organization is contingent upon the match of two causes, one inside the system and the other outside it ─ a phenomenon called dependent arising or conditioned genesis [Smith & Novak 2003]. The inner causes refer to the core competence, the deliverable value proposition, and the functions and the structure of the organization; the outer conditions refer to the demand or the emerging niche in the outer ecosystem. When inner causes are congruent with compatible outer conditions, a position (niche) will emerge for the organization; without such congruence no organization can exist and sustain itself.

A-2 Rule of self-discipline: To sustain its structure, a human organization must carry out the metabolic function in a self-disciplined way.

A human organization is a dissipative system whose existence is like the situation described in Chinese idiom as: "when sailing against the current, forge ahead or fall behind". If falling behind, entropy will soon grow and lead to system degeneration. To minimize the buildup of entropy, the destiny of a human organization is to forge ahead endlessly. The rule of self-discipline is in line with the first lesson of *I-Ching* which says: "As the movement of heaven is ever vigorous, so must a gentleman persistently keep himself vital."

A-3 Rule of value commitment: To justify the legitimacy of its existence, a human organization must ensure that its value proposition is valid and is being effectively delivered all the time.

In a business context, any enterprise must make its contribution to the business ecosystem through the provision of services or goods with proven market value. This contribution builds the functional and structural ties of an enterprise to the outside world as well as justifies the legitimacy of its existence in the ecosystem. This value proposition is derived from the core competence of the organization. It is important to note that even when the same core competence is applied, different interpretations of its value (or meaning) should be given at different times based on the changing market demand. This updated value proposition is actually the hidden root (an information element) of the reciprocal structure-function causal chains, which determines how the structure and function of an organization should be ultimately shaped in a phase change process.

The self-discipline rule intends only to conserve an organization's existing structure, while the value commitment rule aims proactively to adapt an organization to the environment.

B. Principle of Binary-Mode of Existence: Human organization has two modes of existence, namely, regular mode and transitional mode, and each has its own conditions of dependent arising and rules of behavior.

The regular mode is suitable to the relatively stable environment. The transitional mode is suitable to the environment that displays significant changes. Two sets of rules, each of which governs one of the respective modes of behaviors, are identified as follows.

B-1 Rule of regular mode behavior: When in regular mode, a human organization will self-correct, with minimum work, the perturbations caused by the environment to conserve the integrity of its structure.

Without a strong enough external force to push the system away from its current equilibrium or stable position, a human organization will exhibit robust inertia against change and will always restore the system to its original order through the emergent self-correction force. The hysteresis effect observed in the cusp catastrophe model can be ascribed to this mode of behavior. In biology, such a mode is called homeostasis; in the realm of management, it is called exception management. They all aim at the conservation of structural integrity of the existing system. These self-correction activities are normally accomplished by following the law of *minimum work*, because in order to conserve itself, a complex system will self-learn the way that consumes the least amount of energy and materials, or, equivalently, generates minimum entropy in the conservation process.

B-2 Rule of transitional mode behavior: When the external disturbance exceeds certain limits and the existing order can no longer be restored by the regular self-correction force, then a human organization will build up energy and prepare itself to be transformed into a new structure which will be sustainable in the new environment.

In contrast to the law of minimum work followed by behaviors of the regular mode, to ensure that a phase change process in the transitional mode takes place successfully, an enormous amount of energy needs be built up in the system (see Fig. 2), the "ball" (system state) needs energy to ascend from cross-section B to F, and it carries the highest level of energy right before it falls into the new attractor at the left of energy profile F*.

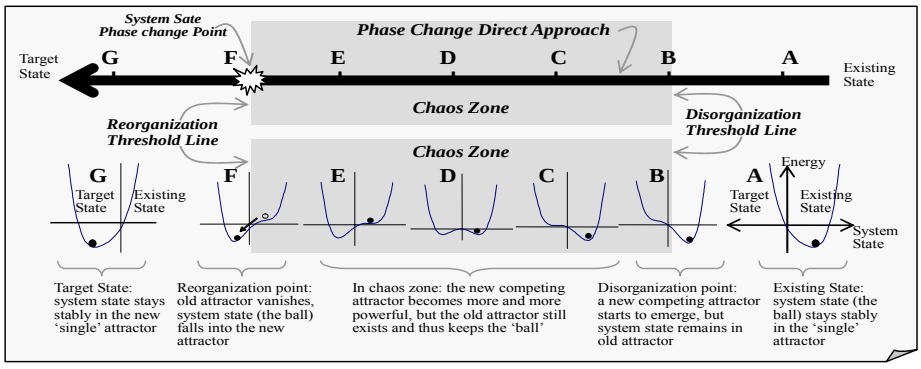

Fig. 2 The energy profiles of the direct approach of an organization phase change process

* Figure 2 shows the relationship of the system state (the 'ball') and the attractor in an organization phase change process. In the chaos zone (cusp shape shadow area), a new attractor emerges to compete with the existing attractor for the system state (the 'ball').

Shifting an organization's mode of behavior from regular to transitional can be compared to the action of "shifting gears" in a running car. In a human context, this is usually the occasion that gives rise to the intervention of leadership's *visible hand*. Successful leadership can facilitate the efficiency and effectiveness of the mode shifting process as well as the consequent phase transformation processes.

C. Principle of Phase Transformation: The phase change process of a human organization, macroscopically, starts from the disorganization of the old structure and finishes with the emergence of a new structure. Microscopically, the phase change process involves a self-catalyzed quantitative to qualitative transformation which diffuses from the level of individual constituent members to the whole organization.

The phase transformation principle governs the behavior of a complex system when it is in the mode of transition. The macro- and microscopic processes mentioned above can be further elaborated as below.

C-1 Rule of macro transformation process: Once entering the transitional mode, there are two forces competing for the governance of the organization state, namely the conservation inertia and the transformation thrust. and there are also direct and indirect approaches to accomplish a successful phase change. The difference between these two approaches is whether the conservation inertia has been effectively resolved at the beginning stage of the change process.

The definitions of the direct and indirect approaches is given in Fig 1. In the human context, phase change can be conceived as a process which takes place at two interrelated levels, i.e., cognition vs. implementation. At the cognition level, the process of phase change deals with the conceptual issues of why, what and how an organization change should be conducted. While at the implementation level, the process deals with operational issues related to the execution of the change program. If consensus can be reached at the conceptual level before execution, it means that resistance to change (i.e., conservation inertia) has been effectively resolved and the system state (referring to the "ball" in Fig 1) has already been moved near the origin of the axes. Departure from that position, the implementation of the change program, can then follow naturally the course of the indirect approach to arrive at the target state smoothly. At the implementation level, the direct approach is risker than the indirect one. The key to the indirect approach is the strategy of "cognition first, action second".

C-2 Rule of micro transformation process: The change of the macro state of a human organization stems from the change of behavior patterns occurring at the level of the individual constituent member, which in turn is started from the change in his/her cognition state; then through a process of co-evolution, such a change at the individual level will grow into a macro phase change at the organization level.

A new individual behavior pattern is the micro fractal module of new order in an organization. Therefore how to alter each individual's existing cognitive schema and transform it into a new one is the first target of the *visible hand* in an organization change process. In light of the slaving principle of synergetic theory, at the individual level, the *visible hand* should start with those few critical members who behave as slow variables,

e.g., the opinion leaders of informal organizations, and bypass the vast majority of the members who behave as quick variables. Once a sizable amount of individual members have successfully shifted their cognitive state and developed new patterns of behavior, then these local achievements will self-catalyze and grow into a global result, i.e., the organization-wide phase change.

In light of the rule of value commitment mentioned above, the root of both macro and micro transformation processes is the message (an information element) carried by the value proposition of the organization. At the organization level, this message is translated into the goal of the change initiative; and at individual level, this message is interpreted as guidelines which shape new behavior patterns. In sum, the principle of phase transformation provides a link to connect the phase change process taking place at the micro level with that at the macro level.

D. Principle of Bifurcation: The history of a human organization is a history of bifurcation and choice that are governed by the following two rules.

D-1 Rule of irreversibility: The bifurcation of an organization change process is an irreversible dependent arising phenomenon, i.e., as the response of the inner causes to the altered outer conditions reaches a certain critical level, a phase change of the organization becomes inevitable; however, which particular one the system will choose among the bifurcated paths of evolution is contingent upon the specific combination of the inner and outer factors at the instant of change.

The contingent nature of the evolution process reflects the butterfly effect which is characterized by "a small discrepancy leading to a great difference". In a human context, this could be a matter of "different leadership produces different performance", or the momentary slip of a decision-maker, or a lucky coincidence or an accidental mishap at the turning point of phase change. Both the inevitable and the contingent part of the phase change process are irreversible. This irreversibility amplifies the risk borne by the process of organization change, because the adaptability of an organization can only be proved after the change has occurred. If the organization has made a wrong choice at the bifurcation point, then it might be weeded out in the subsequent environmental test.

D-2 Rule of inheritance: The evolution of an organization at any stage is inherited from the system status of its previous stage.

In light of the effect of path-dependence, any organization has an unbreakable tie with its history. This history can be either an asset or a liability to an organization. In an organization change process, in addition to initiating something new and useful, the change manager should also differentiate those aspects of the organizational heritage that are valuable from those that are obsolete or harmful; the former needs to be preserved and the latter abolished. The rule of inheritance addresses the genetic aspect of an organization change process. The core content (the gene) to be carried on in such a process of evolution is "information" which is the same information element mentioned previously in the rule of value commitment.

Table 1. The relationships between the principles of organization change and Complex Systems Thoeries

Principles / Theories	**Self Creation**	**Bi-Modal Existence**	**Phase Transformation**	**Bifurcation**
Dissipative Structure	Function/Structure causal chain ; Dependent Arising; Open system; Metabolism function	Outer world stable Inner system conserves; Outer world change . Inner system adapts		
Catastrophe		Binary mode of system state; Hysteresis	Struggle between control factors; Rise and Fall of attractors; Direct/Indirect phase change approach	Contingency of Control factors
Synergetics	Value rule; Effect of Order Parameter	Conservation: negative feedback; Transition: positive feedback	Coopetition of attractors; Co-evolution; Long range correlation	
Fractal	Value rule; Effect of Order . upper levelstructure		Function/Structure Module; Lower level function upper level structure	
Chaos			Criticality of phase change	Initial value effect; Irreversibility

3. Summary

Table 1 lists the relevant concepts of the complex systems theories fromwhich four principles of organization behavior are derived.

The principle of self-creation reveals that an organization is a dependent arising phenomenon, must undergo metabolic activities to conserve itself and update its value proposition to adapt to the environment. The principle of binary-mode highlights that in a stable environment an organization resists external disturbance to conserve its existing structure; when the environment changes, an organization adapts its system to fit the changed environment. The principle of phase transformation articulates that organization change is a process that starts from the change of cognition and behavior patterns at the individual level, and then through co-evolution diffuses the micro level change into an organization-wide state change. The principle of bifurcation stresses that organization change is a process of irreversible choice in which some parts of the heritage of the organization are preserved and others abolished.

Any living system is characterized by three basic properties: metabolism, adaptation, and reproduction. The four principles of human organization change cover all of these three aspects of the activities of an organization that take place during its life-span. They

can be thought of as a sufficient, if not complete, set of propositions to be applied to describe, explain and to predict the process of human organization change.

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