

Integral Transformation of Organizational Systems under the Perspective of Collapse

Peon-Escalante I.^{*}, Oliva E.², Badillo I.³

^{*}Instituto Politécnico Nacional, México, ignaciopeon@gmail.com

²Instituto Politécnico Nacional, México, ²,coliva@avantel.net,

³Instituto Politécnico Nacional, México,, ibadillop@mixmail.com

Abstract

In the chaotic environment of economic globalization, a very common situation is the collapse of organizational systems (of different types), in particular in small and fragile organizations. There are few systemic studies on the collapsing process of organizations, caused by internal and external conditions. The collapse of organizations calls for a radical transformation process. Sometimes, it may be possible a resurgence of the organization under a more complex form, with emergent properties. It is a life-death-resurgence process.

This article, is a reflection on the life cycle of organizations and beyond each life cycle, as a radical evolutionary process towards a higher degree of complexity and consciousness, or complexification, and conscientization in social organizations under turbulent and uncertain conditions.

Keywords: evolutionary process, complexification-conscientization, life cycle, radical transformation, emergent properties, collapse, mutation.

Introduction

The theme for the 50th annual meeting of the ISSS is “Complexity, Democracy, and Sustainability” is oriented toward a systemic study of the co-evolutionary process of natural and cultural systems.

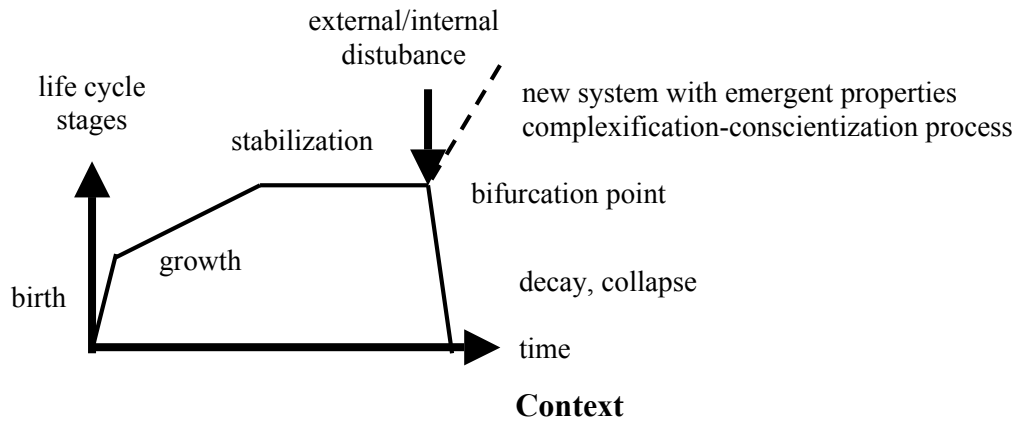
In the contemporary turbulent environment, we are both witnesses and actors of a radical transformation process of our world. Many types of systems collapse, new systems emerge.

We have learned from Diamond (2005), about some important effects of the collapse of past civilizations. Today, one of the scenarios for the future is the collapse of the most important world power. We know that it has a fragile speculative economy, and it has a large and growing internal and external debt. It has a very expensive system of internal and external security. The high level of consumption of its society implies a great dependency in energy sources such as oil; it is a non renewable source of energy with very limited reserves, mainly in a conflictive zone. The effect of an irresponsible life style on the global environment is very critical; climate change is showing dramatic effects. Many of the conditions are there, not only for an economic breakdown of some countries, but for a worldwide collapse, it may be just a question of time.

Collapse is an important stage of a system transformation. The evolutionary process of transformation, can described by means of the Life-Cycle Metaphor (Ayres, 2004).

The most complex and dynamic systems are human organizations, or open socio technical systems. Their life cycle has stages of emergence, growth, stabilization and collapse. When organizations collapse under the influence of external/internal disturbances, most of them disappear, and a few may emerge with a different form or architecture. Pierre Teilhard de Chardin described this dynamic of change as a complexification and conscientization process. Figure 1 represents the dynamic process of transformation, the life-death-resurgence process.

Figure 1.
Stages of transformation of the Life Cycle of Organizations and beyond (Peon, 2000)



The current condition of the social and natural environment is extremely turbulent. There are frequent wars, a polarized economic system that can provoke dangerous and destructive social disturbances such as migration and conflicts, an illegal traffic of drugs, guns, people, organs, and wastes. There are also world wide health problems such as AIDS, the depletion of natural resources such as oil, water, forests, the contamination of the air, land and water, etc. Under this chaotic situation, the life cycle of natural and social systems can be very brief, natural disasters and conflicts are very frequent. The premature collapse of biological and cultural systems can be disastrous, and we have every indication that the natural and cultural systems are unstable under the present conditions.

Under this chaotic context, the following questions call for prompt answers:

- Is the most probable scenario, one of multiplication of many types of natural and cultural systems collapses?
- Can we design and implement systemic actions to prevent the collapse of the most important natural and cultural systems?
- If the organized groups of society can not prevent the collapse of natural and social systems, what can they do to address their main consequences, and the aftermath?
- How a creative radical and robust transformation process and a systemic structural change of social systems facing the perspective of collapse can be designed?

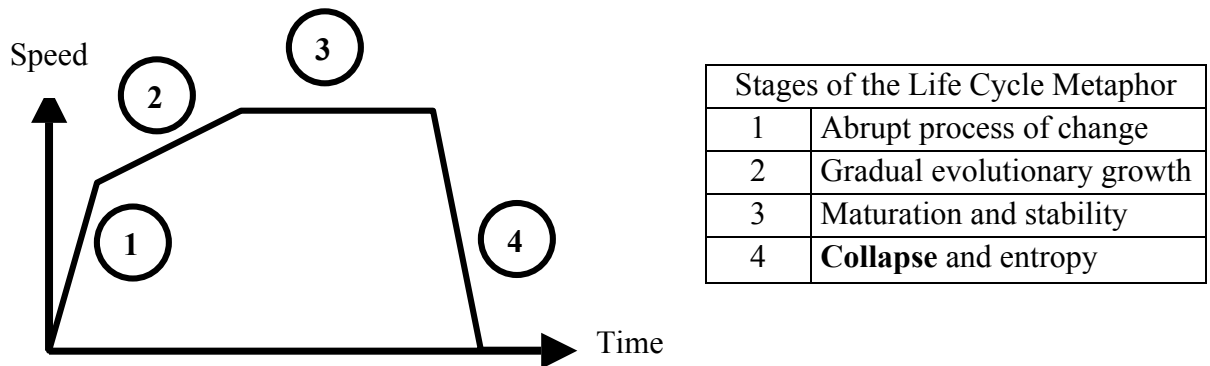
The study of natural and cultural systems facing the perspective of collapse is considerably different from that of systems under stable conditions. The whole transformation of change can be studied with the analogy of a birth-death process, using as a conceptual reference the life-cycle metaphor. However this is only a conceptual model, a simplistic analogy, the behaviour of natural and cultural

systems have important differences. Natural systems are adaptive; their evolutionary process of change is slow, while the creative and interactive cultural systems suffer radical processes of transformation.

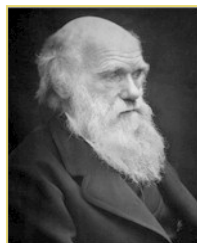
1. Natural and human systems transformation: Evolution and the complexification-conscientization process:

Every type of system is of a dynamic nature, whether non living, living or a conscious one, all are in a perpetual process of change; at some stages systems towards a higher level of organization, while at other stages they move towards a lower level of order, or complexity, it is a complexification process. The process of change can be described with the life cycle metaphor stages of transformation. In the first stage, the process of change is violent, in its second stage the transformation is a gradual evolutionary process, in the third stage the system achieves temporal stability, and in the last stage of its cycle, the system collapses (Figure 1). It is a simplified linear model of the life cycle metaphor (Peon, 2000).

Figure 1. Life Cycle Metaphor (Peon, 2000)



As it can be seen, the first and fourth stages are violent, while the second and third stages of change are gradual and stable. The first and second stages entail growth, while the fourth stage is a process of collapse, of death. In the XIX century, Darwin developed the theory of the evolution of natural systems. In the XX century, Pierre Teilhard de Chardin incorporated the concepts of complexification and conscientization to the evolution theory.



from Charles Darwin



to Pierre Teilhard De Chardin

Galileo transformed our sense of space. In these cases, the boundaries of the universe were extended to infinity. As astronomy has exploded the geocentric universe in which earth sits in its fixed place

at the center of all things, with the heavens above and hell below, so geology and biology have pushed the horizons of time backwards into the remote past and forward into the far distant future. So, the perception of the temporal dimension of systems has a broader scope. Also, as life came to be seen as evolving, across the millennia, in a gradual succession of living forms, gradually a notion of progress was born.

Teilhard went on to argue that there have been three major phases in the evolutionary process (De Chardin, 1963):

- The first significant phase started when life was born from the development of the biosphere.
- The second began at the end of the Tertiary period, when humans emerged along with self-reflective thinking.
- And once thinking humans began communicating around the world, along came the third phase. This was Teilhard "thinking layer" of the biosphere, called the noosphere (from the Greek noo, for mind). Though small and scattered at first, the noosphere has continued to grow over time, particularly during the age of electronics. Teilhard described the noosphere on Earth as crystallization: "A glow rippled outward from the first spark of conscious reflection. The point of ignition grows larger. "Till finally the whole planet is covered with incandescence." (De Chardin, 1963):

For Pierre Teilhard de Chardin:

- Evolution as the "general condition to which all other theories, all hypotheses, all systems must bow and which they must satisfy henceforward if they are to be thinkable.
- Nature is moving, erratically and haltingly perhaps, but nonetheless moving, towards higher and higher forms of consciousness.
- An increase in consciousness was accompanied by an increase in the overall complexity of the organism. Teilhard called this the "law of complexity consciousness," which stated that increasing complexity is accompanied by increased consciousness. "The living world is constituted by consciousness clothed in flesh and bone." He argued that the primary vehicle for increasing complexity consciousness among living organisms was the nervous system. The informational wiring of a being, he argued - whether of neurons or electronics - gives birth to consciousness? As the diversification of nervous connections increases, evolution is led toward greater consciousness.

Teilhard complexity-consciousness law is the same as what we now think of as the neural net. "We now know from neural-net technology that when there are more connections between points in a system, and there is greater strength between these connections, there will be sudden leaps in intelligence, where intelligence is defined as success rate in performing a task." If one accepts this power of connections, then the planetary neural-network of the Internet is fertile soil for the emergence of a global intelligence.

His picture of the noosphere as a thinking membrane covering the planet was almost biological - it was a globe clothing itself with a brain. Teilhard wrote that the noosphere "results from the combined action of two curvatures - the roundness of the earth and the cosmic convergence of the mind" (De Chardin, 1963).

Evolution includes slow evolutionary process of change and revolutionary violent transformations. The birth and death of individual systems, their initial and final states are only temporal stages of the existence of species. Their collapse and transformation process are linked. Each cycle of life is followed by new cycles of life, at the end of each life cycle there is death and after the death of individual elements new living beings are born, after the disappearance of social and cultural systems, new types organizations appear with emergent properties.

The Life Cycle of each type of system is a temporal view of its individual long term behaviour. Living species and cultural systems suffer an evolutive process through many cycles of adaptation and change. Living systems are adaptive, and cultural systems are innovative teleological systems. While the evolution of natural adaptive systems is slow, the transformation process of creative cultural systems is violent (Figures 2 and 3). Through an autopoietic process, living systems maintain their identity in a turbulent environment, living beings die, species survive. The cultural systems change their identity through their process of transformation, through a complexification and conscientization process, they acquire emergent properties at each stage of development.

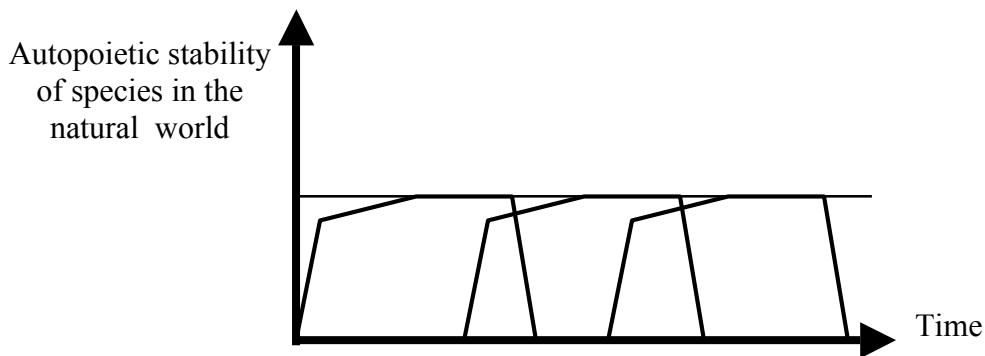


Figure 2
Life Cycle of living species (Peon, 2000)

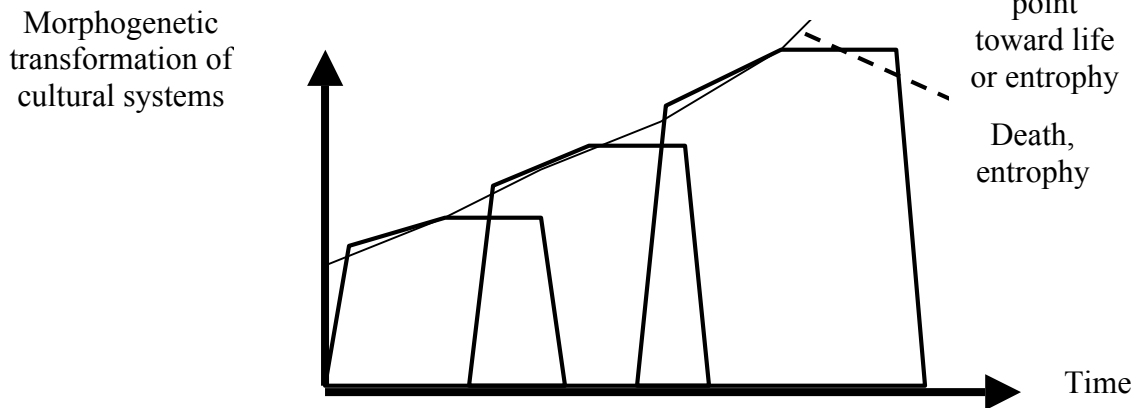
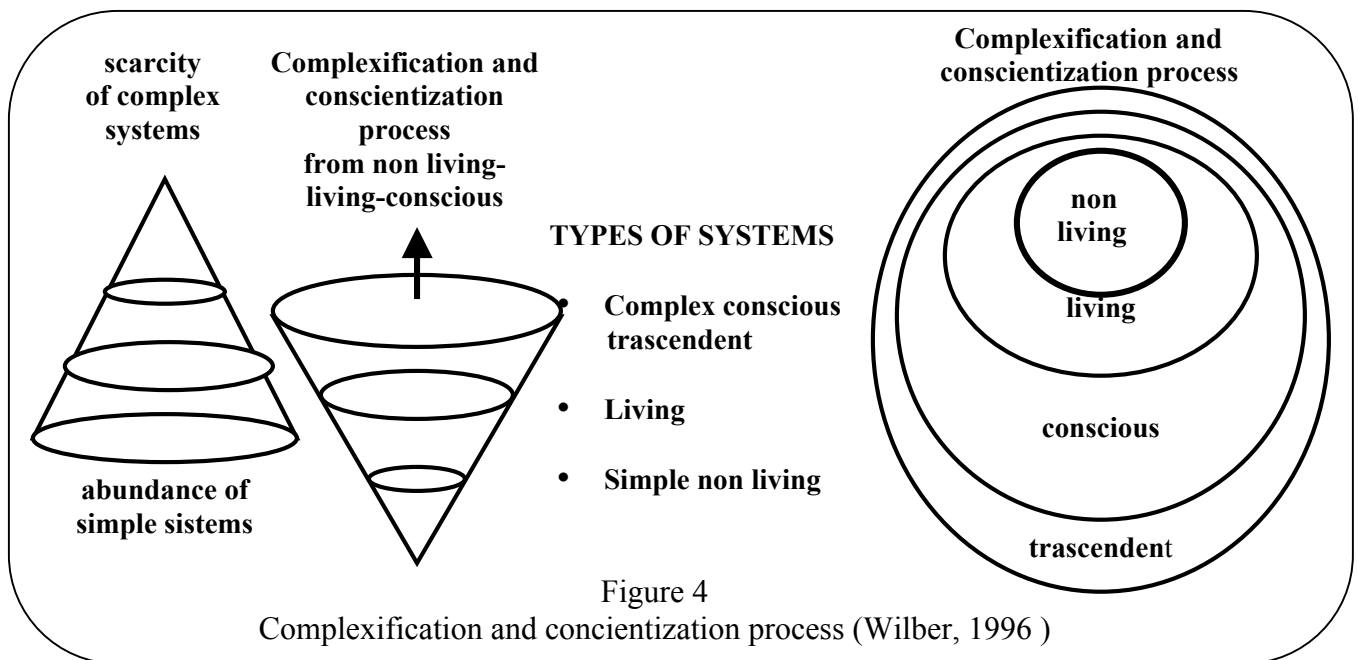


Figure 3
Life Cycles of cultural systems (Peon, 2000)

In the natural world, the living species maintain their autopoietic identity through their reproductive process, and their homeostatic equilibrium. They preserve the genetic structure of each type of specie. The adaptive evolutionary process of the natural species is very slow (Figure 2).

In the cultural organizations the evolutionary process is violent. The cultural organizations as creative and open teleological have a dynamic and abrupt transformation process (Figure 3).



The complexification and conscientization evolutionary transformation from non living, to living, and conscious systems, from simple to complex and conscious processes is represented on Figure 4. At each evolutionary jump, emergent properties appear. Living systems not only have physical properties but also organic processes. Conscious systems have organic processes, and also teleological capabilities. Henry Bergson saw a force at work across the whole face of this planet as life evolved from the most simple and original forms to the most complex.

2. Collapse and mutation in natural and human systems

2.1 Natural disasters

The analysis of mass extinctions of natural systems and their radical transformation in the next step of development, is essential for an understanding the life-death-mutation process, in different types of systems. In particular, we seek to answer the following questions:

- How rapidly do these extinction events occur?
- What caused them, and is there a single mechanism for all extinctions?
- What became extinct, what survived, and why?
- How did life recover aftermath of these events?
- What types of emergent properties surge in the next evolutionary step?

Since the appearance of life on earth, five major catastrophes have occurred (Table 1).

Period	Millions of years ago	% animal species wiped
Ordovician	440	80-85
Devonian	365	80-85
Permian	245	95
Triassic	210	70-75
Cretaceous	65	70-75

Mass extinctions are brief episodes of greatly increased extinction, commonly affecting both marine and terrestrial species. Since the origin of animals, some 500 million years ago, there have been at least five major mass extinctions. The disappearance of dinosaurs during the end-Cretaceous mass extinction, 65 million years ago is perhaps the best known event. But the Permian-Triassic (P-T or PT) extinction event, sometimes informally called the Great Dying, was the Earth's most severe extinction event, with about 90 percent of all marine species and 70 percent of terrestrial vertebrate species going extinct. It is the most dramatic example of collapse of a very complex system, the biosphere.

A combination of the following factors might have caused the Permian extinction (Bowring et al, 1998):

- A supernova weakened the ozone layer, and then
- A large meteor impact triggered the eruption of the Siberian Traps. The extinction is contemporaneous with the eruption of a large-volume (3-5 million km³) flood basalt province in Siberia.
- The resultant global warming eventually was enough to melt the methane hydrate deposits on continental shelves of the world-ocean, thus producing extensive floods in the coastal areas..
- Widespread evidence of low oxygen content (anoxia) in both deep and shallow levels of the oceans before, during, and after the extinction interval; The pattern of extinction of species in the oceans, is consistent with a drop in the percentage of atmospheric oxygen (required by groups with active metabolisms).
- Dramatic shifts in the carbon cycle of the atmosphere and oceans indicating sequestration of organic carbon in the deep ocean before the extinction and a rapid change in the isotopic composition of carbon in carbonate rocks during the extinction.
- There is evidence for significant global warming after the extinction.
- The extinction occurs during a rise in sea level.

There is no way to calculate the odds of such combination occurring, but for it to have occurred once in the four billion year history of Earth is not unlikely. A better understanding of the end-Permian extinction and its recovery should allow for new insights into the role of mass extinctions in evolution.

2.2 The effects of natural disasters on social systems

For the study of disasters the following premises need to be established:

- Natural disasters can interrupt a certain process of development.
- They should be studied as part of social and economical processes
- A distinction should be made between the internal attitudes of the population groups directly affected by the phenomena, and the external response of local and federal authorities
- The effects of the natural disasters at additional hardships to the social and economic daily disasters of the local population.

From pertinent experiences, it can be understood that the natural disaster play the role of an additional detonator of the social, economical, and political crisis. The causes are multiple and the socio-economic and environmental situation of a particular place, that has been affected should be analyzed from a systemic viewpoint.

Natural disasters are only a manifestation of nature, they may provoke a social disaster when there are conditions of vulnerability. There are two main types of impact: natural, and socio-economic.

In the systemic study of disasters as large scale complex processes of transformation, it is difficult to understand the main causes of collapse, and it is also very hard to design preventive, predictive and curative models to confront some of their most important socio-cultural, economic and environmental effects. The science of systems approach, is an integral process with feedback, it is a dynamic cybernetic learning process toward a deeper knowledge of the complex and dynamic behaviour of systems under the perspective of collapse.

There are different investigation alternatives for the study of the integral context of organizations under critical conditions. The scientific approach is a continuous one to learn from the social practice, the knowledge we obtain is a reflex of the projection of the real world, it is a dynamic searching process toward a deeper understanding of causes and effects of catastrophic phenomena.

We should not forget, that the study of a particular phenomenon is but an element of a whole, it is true that it is important to know about the manifestations of a natural catastrophe, its main effects are socio economic There is a relationship between the parts and the whole. The destructive effects of a catastrophe can not be explained by its elements but by the whole. The whole includes social, economic, political, educative, physical, and technical dimensions. The social and political actors may understand part of the wholesome effects of the natural disasters.

Each type of disaster should be analyzed in its own particular context as a dynamic phenomenon. For that reason it is useful to develop a systemic tool under a cultural perspective to understand better the causes and effects of each type of natural disasters under its own social and historical perspective.

2.3 Conditions for the collapse of social systems: Risk and vulnerability

To understand better the systems collapse process, we describe some of the causes, and effects of natural and social disasters of great magnitude. Natural disasters, play the role of additional

detonators of the social, economical, and political crisis. An organizational collapse, is also a product of a combination of conditions of risk and vulnerability. Their causes are multiple and their socio-economic and environmental effects are extremely important.

The collapse of natural systems included factors of risk such as:

- The effect of a supernova that weakened the ozone layer in the Permian-Triassic Era
- The impacts of large meteors in the Permian-Triassic and in the Cretaceous Eras produced large floods, volcanic eruptions with toxic gases, and a climate change.
- Temperature change in the sun, it is 25% warmer now than in the early stages of life

Some of the causes of failure of large social organizations, or civilizations, are described by Diamond (2005)

- Failure to anticipate and to perceive
- Rational bad behavior based in disastrous values
- Environmental conditions and situations

In the collapse of small social organizations, the following premises can be defined:

- Disruptive internal and external forces of natural or social origin, can interrupt a certain process of organizational development
- The effects of the collapse of organizations add additional hardships to the social and economic welfare of the population.
- It is important to distinguish between the external conditions of risk and the internal conditions of vulnerability.
- When many organizations collapse after some type of crisis, new ones can emerge with a different organizational architecture and emergent properties, after a radical process of innovative redesign.

Some of the main factors for the collapse of small and medium social organizations are:

- A turbulent external, where the conditions of economic competition in an open market are favorable only to large corporations
- Poor administrative practices and absence of preventive planning, they don't know how to detect comparative advantages
- Lack of political power of the small and medium size organizations, they have almost a null influence in government policies of development
- Small organizations have a difficult access to credit
- Inadequate professional formation of business managers, they don't have the necessary experience to manage in the new conditions of an open market
- Personal with insufficient training and motivation
- Small organizations do not have the economic and human resources to buy and use appropriate technology
- They can not compete with large transnational corporations in an open international economy, under current rules and conditions of trade.

Number of Business (000)	Business Size (No of employees).	Total number of business (000)	%	Births (000)	%	Deaths (000)	%
1990	Small<20	4,536	89.4	515.9	95.3	517.0	94.6
	Medium<500	5,060	99.7	540.9	99.9	546.1	99.9
	Big>500	14	0.3	0.3	0.1	0.4	0.1
	Total	5,074	100	541.1	100	546.5	100
1995	Small<20	4,808	89.5	572.4	95.7	485.5	94.7
	Medium<500	5,354	99.7	597.5	99.9	512.0	99.9
	Big>500	15	0.3	0.3	0.1	0.4	0.1
	Total	5,369	100	597.8	100	512.4	100
2000	Small<20	5,035	89.1	558.0	95.4	524.0	94.7
	Medium<500	5,635	99.7	584.8	99.9	552.8	99.9
	Big>500	17	0.3	0.3	0.1	0.5	0.1
	Total	5,653	100	585.1	100	553.3	100

In the 1990-2000 period almost 90% of US business were of small size (<20 employees), almost a 100% were of small and medium size (<500 employees) and only 0.3% were of big size (>500 employees). In this period almost 95% of the US business births and deaths, were of small size business, almost a 100% were of small and medium size business and only 0.1% were of big size business

Year	Total number of business (000)	% growth in the numbers of business in 5 years periods	Births (000)	% business births in 5 years periods	Deaths (000)	% business deaths in 5 years periods
1990	5,074	-	541.1	-	546.5	-
1995	5,369	6	597.8	10	512.4	-6
2000	5,653	5	585.1	-2	553.3	8

In the 1990-1995 period there was an almost 6% increase in the number of enterprises, while the number of business births grew almost 10%, and there was a diminution in the number of business bankruptcies of almost 6%. In the 1995-2000 period there was an almost 5% increase in the number of business, while there was a diminution in the number of business births of almost 2%, and there was a growth in the number of business bankruptcies of almost 8%.

Year	Total number of business (000)	% of growth in the number of business since 1990	Births (000)	100 % number of business births	Deaths (000)	100 % number of business deaths
1990	5,074	-	541.1	10.7	546.5	10.8
1995	5,369	5.8	597.8	11.1	512.4	9.7
2000	5,653	11.4	585.1	10.3	553.3	9.8

In the 1990-2000 period, the number of business in the U. S. have grown more than 11%, the number of business births nearly 10 %, a very similar % of business have collapsed.

Tables 2, 3, 4, gives us the evidence that almost all of the radical organizational processes of change in organizations (birth and collapse) occur mainly in small and medium business, organizations with less than 500 employees. Most of those organizations are small business (95%), with less than 20 employees they are very fragile social systems. Almost a hundred per cent of all of business births and deaths, where of small and medium size business. In México, 3 out of 4 small enterprises go broke in their first two years of existence (FUNDES, 2002).

3. Mutation, a radical form of organizational transformation, under the perspective of collapse

“An intelligent man, learns more from failure than from success”

Benjamín Franklin

We can design systemic strategies of radical organizational transformation, but first we have to learn from the failure of different types of systems. After the failure of a system, new systems surge with emergent properties through a complexification and conscientization process. Most of the systems that fail disappear, but a few of them change their structure and processes and emerge as a new type of system with emergent properties.

Strategies of change can be designed as a complexification-concientization process. The main types of social organizations under the perspective of collapse are small and medium social systems. Small and medium organizations, can not survive in the present turbulent conditions, unless they mutate through a radical process of transformation.

Their mutation toward a higher state of organization, or complexification implies a radical or structural process of change in their structure and processes. As an example of the complexification or organizational development process, strategies of radical change such as:

- Build a networking process to link small and small business and small and medium size business
- If a great number of small businesses can not survive in the formal economy, they might survive through an outsourcing process, in an informal economy of service.
- The small business organizations can practice a system of barter, or multibarter among them like many NGOs do in many parts of the world. It is an alternative credit and exchange system.
- Develop practical and economic tools such as Systems of Information and Communication, with tools such as Linux.

The mutation of social organizations toward a higher state of awareness, or conscientization, implies a deeper process of understanding on the external and internal conditions of their organizations. As an example of the conscientization process we propose strategies such as:

- Develop a reflection process on the market conditions, among groups of small and medium business with the help of people from the academic medium who have a systemic vision
- Develop their own particular identity for specific markets
- Use an integral regional multi-products and services approach, a life style integral strategy for local markets

Conclusions

Violent change caused by a combination of internal and external forces can drastically reduce the life cycle of organizational systems. A systemic study of systems collapse and its aftermath is very important for the prevention of disasters, and for the radical redesign, or mutation of new socio technical systems with emergent properties.

Some times, preventive measures can be designed with sufficient time, in other occasions the external forces are so sudden that little can be done to prevent the collapse of the organizational system. We need to be aware, in critical situations, that there are also opportunities for a creative radical process of systemic transformation or mutation.

Thankfulness

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