

**Organisational Values as "Attractors of Chaos":
An Emerging Cultural Change to Manage Organisational Complexity**

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Abstract

Business organisations are excellent representations of what in physics and mathematics are designated “chaotic” systems. Because a culture of innovation will be vital for organisational survival in the 21st century, the present paper proposes that viewing organisations in terms of “complexity theory” may assist leaders in fine-tuning managerial philosophies that provide orderly management emphasizing stability within a culture of organised chaos, for it is on the “boundary of chaos” that the greatest creativity occurs. It is argued that 21st century companies, as chaotic social systems, will no longer be effectively managed by rigid objectives (MBO) nor by instructions (MBI). Their capacity for *self-organisation* will be derived essentially from how their members accept a shared set of *values* or principles for action (MBV). Complexity theory deals with systems that show complex structures in time or space, often hiding simple deterministic rules. This theory holds that once these rules are found, it is possible to make effective predictions and even to control the apparent complexity. The state of chaos that self-organises, thanks to the appearance of the “strange attractor”, is the ideal basis for creativity and innovation in the company. In this self-organised state of chaos, members are not confined to narrow roles, and gradually develop their capacity for differentiation and relationships, growing continuously toward their maximum potential contribution to the efficiency of the organisation. In this way, values act as organisers or “attractors” of disorder, which in the theory of chaos are equations represented by unusually regular geometric configurations that predict the long-term behaviour of complex systems. In business organisations (as in all kinds of social systems) the starting principles end up as the final principles in the long term. An attractor is a model representation of the behavioral results of a system. The attractor is not a force of attraction or a goal-oriented presence in the system; it simply depicts where the system is headed based on its rules of motion. Thus, in a culture that cultivates or shares values of autonomy, responsibility, independence, innovation, creativity, and proaction, the risk of short-term chaos is mitigated by an overall long-term sense of direction. A more suitable approach to manage the internal and external complexities that organisations are currently confronting is to alter their dominant culture under the principles of MBV.

Introduction

After decades of intense efforts to ensure the successful future of our organisations, we've reached the point where we must admit that it's not easy. But before conceding that it's a futile objective, we should examine the paradigms and tools that we have been using to understand organisations. One conclusion emerging from this examination is that if we maintain the management theories of recent decades, we must accept that no significant advances have been made toward a comprehensive understanding of which organisations will succeed and why. But if we change our mind-set and view organisational reality through a new prism, we may find the essential answers.

Traditional visions of organisations (and of the world in general) have always searched for the easiest way to explain and predict natural phenomena. In this search, we have tried to understand the universe by examining and explaining its separate parts. But partial analyses, as opposed to global ones, yield partial solutions.

The importance of holistic perception is embodied in the folk-tale of four sightless people encountering an elephant for the first time. Each described the animal in terms of the part they happened to touch, and four totally disconnected theories about the nature of the elephant emerged. The same partial and distorted view of global reality applies to organisational theories of the past. Unfortunately, reality is not as simple as we would like. It has complex rules that can't always be understood through their individual parts.

The term "complexity" does not explain only one kind of system behaviour; it means a set of characteristics that one can identify in most natural systems, including organisations and their processes. A complex system has many natural rules that influence its behaviour, and multiple intricacies for dealing with a turbulent environment. You can't control these natural rules, but the present paper shows that you can at least guide them and lead them toward one defined direction. The formula requires the right tool—which we propose is the concept of Management by Values (Dolan & Garcia, 1999).

Complexity

First, let's look at Figure 1, which compares the parameters that characterize a complex environment (Lissak, 1996) with those of the traditional approach. Of the parameters outlined in the figure, we will concentrate on the concept of chaos as it applies to organisations. Chaos theory tries to understand the relation between chaos and order. In this way, it is possible to follow both directions, from order to chaos, or from chaos to achieve order.

Figure 1. Comparison between a Traditional and a Complex Approach

Traditional Approach	Complexity Approach ¹
<u>Linear</u> It is possible to predict any system's future status or behaviour through a simple cause-effect equation.	<u>Non-linear</u> There's no proportionality in cause-effect relations, the future is uncertain, the system reactions are unpredictable, evolution occurs not continuously but in spurts.
<u>Reductionism</u> The whole is the sum of its parts.	<u>Fractal</u> The complex whole is made of n-million interactions of a single pattern that is repeated in different scales.
<u>Control</u> Chaos is synonymous with disorder. It should be avoided by controlling the system as much as possible.	<u>Chaos</u> There's a tight relation between chaos and order, so much that one leads to another in a dynamic process. You don't try to avoid chaos; instead, you use it to self-organise your system, through an "attractor".
<u>Uniformity</u> The system does not change in a sudden way. If it does, it's because something went wrong; it had not been well controlled.	<u>Catastrophe</u> One tiny influence can cause sudden, explosive changes inside a system.

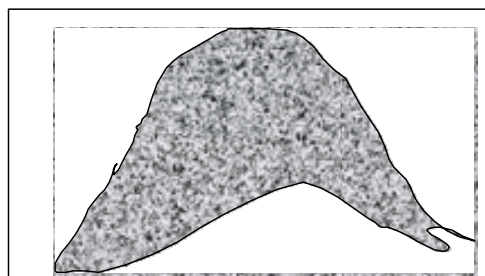
<u>Aristotle's Logic</u>	<u>Fuzzy Logic</u>
An element can't belong to a set of elements and to its complementary set at the same time.	The relation between elements and sets of elements is not only yes or no, but a matter of more or less.

In the first case, order $\rightarrow$ chaos, the system passes through a period of uniformity (order) to oscillation cycles and to turbulence and chaos, until it self-organises. Conversely, the chaos $\rightarrow$ order analysis uses an element called "strange attractors", a phenomenon that absorbs or catches the system's final status of order. The importance of the strange attractors is that chaos, which apparently seems unforeseeable, can be determined in certain aspects. This is possible because a strange attractor has two behaviour patterns:

1. It is deterministic because it defines the system behaviour. In mathematical terms, one should say that the attractor is the system limit. The "limit function" represents the situation where the system tends to be, instead of determining its
2. It is chaotic because such behaviour is unforeseeable; it's impossible to know where the system limit is moving through at each moment.

These facts, apparently antagonistic, can be illustrated through a graphic representation; Figure 2 depicts the final geometric state of a chaotic system.

Figure 2. Graphic Representation of an Attractor



The shaded area represents the limited possibilities where the system can be at each moment, which indicates the deterministic aspect of the strange attractor. You can be sure that the system will be found inside this area at any time and nowhere else. The area symbolizes the set of values accepted and incorporated by the system. However, it cannot be predicted exactly where, inside the area, the system is located at each time, and this represents the chaotic aspect of this kind of attractor. It explains a conduct pattern, but not the conduct itself. The most important thing to notice is that the presence of a "strange attractor" guiding a system's behaviour is what distinguishes between chaos and randomness (Cohen & Stewart, 1994; Coveney & Highland, 1995). A random situation is totally unforeseeable, whereas in a chaos situation the system's set of future behaviour possibilities can be approximately predicted.

Chaos

It is important to explain the concept of chaos because it represents natural evolution, which is uncertain and chaotic behaviour in a turbulent environment. Even in such an apparently complicated situation, nature always organises itself, as if it were following a "flow". Actually, this flow exists and it has to do with the totality thinking of complexity. Luhmann's Totality Paradigm (Luhmann, 1990) suggests that it is more important to analyse the relations between a system and its environment (external relations) than whole-part relations (internal ones) in order to understand the system performance.

If self-organisation represents the success in reference to a general natural phenomenon, we must think that it's also possible to apply the same rules by applying the metaphor of chaos to organisations. Nonetheless, we must ask why are we so determined to control uncertainty for so long. One plausible reason is the emotional aspect of human beings. People feel secure and stable when they can control situations and predict their future, whereas the unknown brings discomfort. The same kind of interpretation applies to organisations. Uncertainty causes an uncomfortable climate, insecurity, and feelings of powerlessness. In our society, control means security and power; one who can't control a situation is viewed as powerless

and unworthy of respect.

Such explanations were provided over the years by social scientists explaining why people resist change. It's a pity though, because it is on the boundaries of chaos that most creativity occurs; where there's no control at all, only self-governing parameters (i.e., values) can be established.

As mentioned above, turbulent environments are a rule in this world, not an exception. Thus, the best way to deal with it is not by going against chaotic behaviour trying to control it, but by developing an understanding of its characteristics that allows the possibility of following its natural flow. We're proposing that chaos cannot be controlled, but it can be guided by behaviour parameters, which we prefer to call "values".

Turbulent Environments

As most organisations operate in turbulent environments, the concept of turbulence requires comment. In physics, turbulences are high-intensity movements seen in fluids, whose flow shows random variations in time and space. This metaphor fits exactly with the turbulent economical, political and social-cultural environments where organisations have to grow and prosper.

In the current world, turbulences are identified through the existence of unexpected changes, uncertainty, lack of control, inhibition anxiety, complex decisions, group inter-dependency, high performance demand, confusion, disintegration, de-humanization, and neurotic organisations (Kets de Vries & Miller, 1984; Kets de Vries & Balazs, 1999).

The complexity approach analogy proposes that organisations cannot be seen as a separate part of this turbulence, once its paradigm is totality. This enables us to deduce that companies are not the product of deterministic rules and regulations, but rather they comprise chaotic dynamics that should be guided by establishing and incorporating values. The challenge for managers is to know how to guide chaotic dynamics to achieve the desired objectives. To reiterate, chaos self-organises through the existence of a strange attractor that is responsible for absorbing its final status. "Final status" does not mean a static result, but rather a dynamic, self-organised chaos process status; it corresponds to the highest point of information exchange, where creativity, innovation and development of a system occurs.

What remains is to find out how to get to this point of maximum development. We propose that one route is through defining the strange attractor set of values. What traditional management approaches fail to achieve is a confident reliance on human adaptation to turbulent environments. Both giving orders (Management by Instructions or MBI), and defining objectives (Management by Objectives) do not incorporate dealing with changes into their principal philosophy, and consequently fail to help organisations operating in turbulent environments. To deal successfully with complexity, chaos, and turbulence means to be embroiled in constant processes of change. A common view of managing change in organisations implies managing a cultural change, which affects the members of the organisation directly. It for this reason that we should humanize the concepts and tools that are used in the change processes. Furthermore, in turbulent environments, the human adaptation must be oriented toward the conditions listed in Figure 3.

Figure 3. Conditions for Adaptation to Turbulent Environments
Reach shared ends and principles
Generate trust to deal with uncertainty
Work with flexibility
Explore chaotic situation to develop creativity and innovation
Simplify structures and rules
Self-organise
Stimulate participation and collaboration
Create social responsibility
Create high quality relationships between oneself and others
Accomplish well-being in both ethical and emotional aspects

Such human adaptation to turbulent environments means dealing with a set of “new” values incorporated in the daily work inside a company. Values act as disorder organisers, and what is defined as principles, in reality results as the long-term ends.

Instructions, Objectives, and Values

Traditional management is incapable of absorbing all the complexity derived from the increased need of change adaptation at all levels of a company. There are four inter-connected trends associated with an increase in the complexity and uncertainty in companies, namely,

1. The need for quality and customer orientation. To compete in an increasingly demanding market, the industrial models of 1900, orientated toward producing vast quantities of standardized products, are now antiquated. Competitive conditions require value to be added continuously to productive processes, to ensure that the customer is always satisfied with the value received. The productive focus must increasingly be *ad hoc*, or specific to the particular customer and the situation; as a result, market segmentation or orientation of the business toward identified customer groups with similar characteristics is reaching the limits of its usefulness. Certainly it is more complex to orient a company to the changing tastes and requirements of demanding customers than to mass-produce standard items for purchasers with little market power. This first adaptive process is obvious and has been written about intensely in the last few years. It basically suggests that the demand for quality and customer-orientation will no longer be a competitive advantage for the coming years, but rather a basic condition for entry into and survival in the international marketplace.

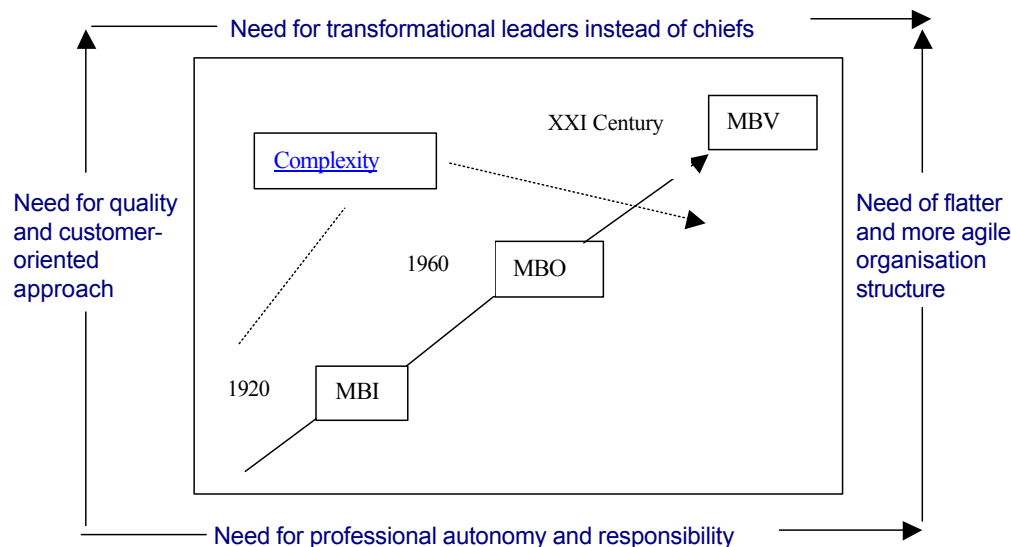
2. The need for professional autonomy and responsibility. With the appearance of new technologies such as robotics, process automation, and data telecommunication, the demand for orientation toward quality and the individual client is also increasing, and there is bound to be an increase in the level of professional knowledge and skills that are an integral part of the supply of products and services. This need to increase the general level of professionalism and creativity of employees brings with it an increase in the expectations and capabilities of employees to be treated as mature individuals with their own performance criteria. Such autonomous, flexible, and committed workers are capable of articulating their own values and translating them into creative initiatives. A professional without autonomy is not a real professional.

3. Need for *transformational* leaders instead of “bosses”. The preceding point explains why it is increasingly necessary to develop a style of “facilitating” leadership to ensure that the right things happen. Because complexity demands leadership oriented toward an attractor rather than ordering instructions or objectives, it also presupposes an evolution of transforming order-following workers into autonomous professionals. Although many people interpret the concept of leadership in a grandiloquent way, one should not lose sight of its essential characteristic comprising the capacity to inspire, to articulate a vision, and to hold teams of professionals together and channel their efforts.

4. The need for flatter, more agile organisation structures. The inefficiency of rigid bureaucratic structures, with many hierarchical levels and watertight compartments, can no longer be tolerated in companies that must compete in turbulent environments. It is widely accepted that the reduction in the number of levels in a hierarchy is associated with greater organisational flexibility and efficiency. Today, few would dispute the need to flatten structures, and to develop efficient teams and alliances.

Historically, the increasing influence of the above-mentioned trends explained the evolution of management philosophies from MBI at the turn of the 20th century, to MBO at the middle of the century, and then to Management by Values (MBV) at the dawn of the 21st century. These are depicted in Figure 4.

Figure 4 Pressures for Adaptation and Corresponding Management Philosophies: Evolution from the 20th to the 21st Century



In the early 20th Century, MBI was necessary due to the characteristics of assembly-line production. In such stable environments, where the objective was to maximize quantity through rationality and discipline, managers instructed and employees obeyed. Even in emergencies, the rules were to be followed without thinking. But simple and automatic answers in relation to well-defined stimuli do not fit conditions of turbulent environments and unforeseeable situations.

From the 1960s, the fundamental objective of all companies was to maximize the profitability of their resources over a long term. But this objective was too generic; with the aim of rationalizing and motivating the efforts of the people employed, it has been broken down into more specific objectives, and members of the organisation could now formulate their own objectives. This was the conceptual foundation of MBO, a management tool that proposed the rationalization and motivation of productive efficiency; it was based on the principles of “psychological success”, and on the theory of goal-setting.

In spite of its apparent advantages over MBI, MBO often falls short of its intended function of rationalizing and motivating value-creating action, precisely because it does not take proper account of the previously discussed premises regarding psychological success and the theory of goal-setting. MBO has a fundamental defect: it has been proposed as a global system of management when, in fact, it is no more than another tool devised to respond to other much deeper concerns, such as the need to make sense of one's day-to-day work in an organisation. MBO neglects to consider the human factor, in the sense that objectives only have a meaning when they are intimately linked to people's beliefs and values.

Working with values does not mean forgetting objectives. Shared essential values are success-critical elements on which instrumental objectives are based. As a tool that deals directly with values or attractors of an organisation, MBV is oriented toward the re-design of corporate cultures, thus helping leaders guide strategic change in the company that will both adapt it to environmental changes and reduce internal tensions (Garcia, Dolan & Navaro, 1999). MBV's function is to absorb the organisational complexity that comes from its increasing change adaptation necessities, and especially to provide a vision through directing the strategic action to where the company aims to be in the future, its attractor.

The explanation of these approaches shows that in turbulent environments, neither instructions nor simple objectives can guarantee organisational success. A company is a chaotic social system that can self-organise. Its capacity of self-organisation comes directly from the fact that its internal components freely assume a set of shared values or actions

conducts. The differences among MBI, MBO, and MBV are tabled in Figure 5.

Figure 5. Differences Among MBI, MBO and MBV

	MBI	MBO	MBV
PREFERABLE SITUATION FOR APPLICATION	Routine or emergencies	Moderate complexity. Relatively "standardized" production	Need for creativity in the solution of complex problems
AVERAGE LEVEL OF PROFESSIONALISM OF MEMBERS OF THE ORGANISATION	Basic level of instruction (management of operatives)	Moderate average professionalism (management of employees)	High level of average professionalism (management of professionals)
TYPE OF LEADERSHIP	Traditional	Allocator of resources	Transformational (value shaper)
IMAGE OF CUSTOMER	User-buyer	User customer	Customer with judgement and freedom of choice
TYPE OF PRODUCT MARKET	Monopolist. Standardized	Segmented	Highly diversified and dynamic
TYPE OF ORGANISATIONAL STRUCTURE	Pyramidal with many levels	Pyramidal with few levels	Networks, functional alliances, project team structures
NEED FOR TOLERANCE OF AMBIGUITY	Low	Medium	High
NEED FOR AUTONOMY AND RESPONSIBILITY	Low	Medium	High
STABILITY OF ENVIRONMENT	Stable environment	Moderately changeable environment	Very dynamic, changeable environment
SOCIAL ORGANISATION	Capitalist-industrial	Capitalist post-industrial	Post-capitalist
PHILOSOPHY OF CONTROL	"Top down" control and supervision	Control and stimulus of professional performance	Encouragement of self-control by each individual
PURPOSE OF THE ORGANISATION	Maintenance of production	Optimisation of results	Continuous improvement of processes
REACH OF STRATEGIC VISION	Short term	Medium term	Long term
BASIC CULTURAL VALUES	Quantitative production. Loyalty, conformity and discipline	Rationalization. Motivation. Efficiency. Measurement of results.	Developing Participation; Continuous learning. Creativity. Mutual trust. Commitment. Enjoy work.

Values

Basic beliefs and values that form its organisational culture are the parameters that will lead the company to its success (or not) in long term. Values will guide people's behaviour and work conduct into achieving the desired results, just as do the attractors. There's a strong analogy between organisation values and strange attractors; both lead a system to its aimed status. The key question is how to build values within an organisation.

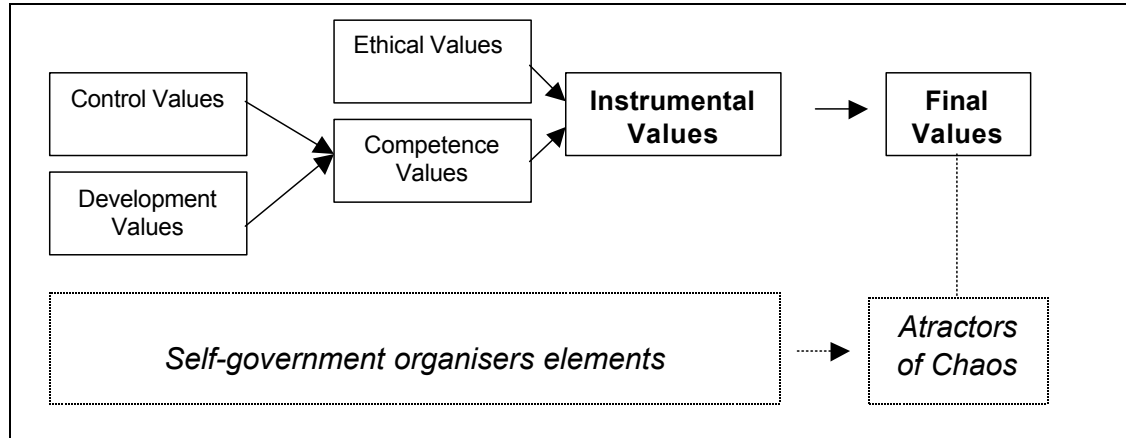
The word "value" can be understood in many ways. Axiology is the study of values; for ancient Greeks, *axios* meant guidance, loudness and axis. For our purpose, let's consider values as strategic references indicating that acting in one way is more appropriate to achieve goals than behaving otherwise. Honesty, loyalty, sympathy, and money are all values that people use to conduct their lives. Values are always a consequence of human internal beliefs, and that's why, to produce changes in a company, one must start re-evaluating people's beliefs to incorporate new values into their working lives.

Values can also be categorized into two main groups: finals and instrumentals. Final values can be explained as existential objectives, or, the answer to the question, "What do you/your company intend to be/achieve in the future?" The answer, often embodied in the corporate mission statement, can be economic benefits, excellence in products and services, customer or employee satisfaction, personal fulfilment, happiness, and so on. To achieve these final values, one must define the instrumental ones. Actually, it's necessary to clarify the set of the instrumental values that will be used to reach the future.

As shown in Figure 6, instrumental values can be organised in two groups: ethical and competence values (Rockeach, 1973). The ethical values refer to the conduct, the means that are justified to achieve the final values). Usually, these are associated with social values such as honesty, integrity, sincerity, and loyalty. Competence values are more individualistic and have to do with the personal impression of what is necessary to achieve final values, or to be competitive. Examples include creativity, patience, flexibility, order, intelligence, and health.

Figure 6 also shows the relations between values, management, and chaos theory. Assuming that final values act as attractors of chaos, they also define the final status of an organisation; instrumental values are the system internal values that will lead or organise the chaotic system to its self-government and self-organisation.

Figure 6 Value Classification and Its Relation to Chaos



Additionally, there is another important classification of values in organisations that keep changing and adapting during their life cycle: competence values can be either control oriented or development oriented. Depending on their balance, they are responsible for expanding or contracting organisation processes. Efficiency, discipline, responsibility or punctuality are examples of control-oriented values. Trust, creativity, freedom, or having fun on the job are examples of development-oriented values.

We suggested above that the inherent chaos within an organisation should not be controlled, because it stimulates creativity. If left alone, it is able to self-organise through the existence of an attractor. At the same time, we should remember that an organisation has many internal quantitative characteristics that are necessary and should not be left to chaos, because the survival of the organisation could be threatened. Thus we need to look for a formula where the two sets of values will co-exist in a balanced manner.

Values oriented toward development are essential to create new opportunities for action. These include self-learning, initiative, diversity, self-organisation, and flexibility. The control values, on the other hand, are also necessary to maintain and bring together the various organisational sub-systems. Thus, they guide such activities as centralization, planning, order, certainty, and obedience.

In the natural cycle of growth, the firm needs to alternate between moments of development (creating or expanding) and moments of control (consolidating). As in physics, in a chaotic situation such as fluidity, the balance is not maintained by keeping the fluid statically in an intermediary state, but rather in its oscillating around a central point. Similarly, organisational managers should use an adequate mix of values (through control or development) in each situation to achieve an acceptable level of positive results in terms of both economic and social outcomes.

Organisational Changes

Thus far, we have identified key concepts and elements that should be used in managing change in organisations. First, we argued that organisations are complex systems, so that they are *open* and *dissipative* structures. That means they are in a constant adaptive change with their environment, receiving energy from it (through many forms) and reacting by producing energy into it.

Second, the 21st century business environment is turbulent and cannot be handled with the traditional tools of the past. The change situation is a current pattern in this chaotic dynamic, and it happens continuously at different levels and depths.

At a more superficial level, the changes are called adaptive, and they often occur when the company is redirecting its internal processes in order to become more competitive. On the other hand, significant changes that cause reconfigurations and transformations are the cultural recreation of new beliefs and values that are responsible for defining the organisation's collective identity.

The transformational change does not only establish new rules of interaction with the environment but mainly define new political and internal interactive rules, such as employee autonomy. Figure 7 contrasts the differences between these two depth changes.

Figure 7. Characteristics of Two Depth Level Changes

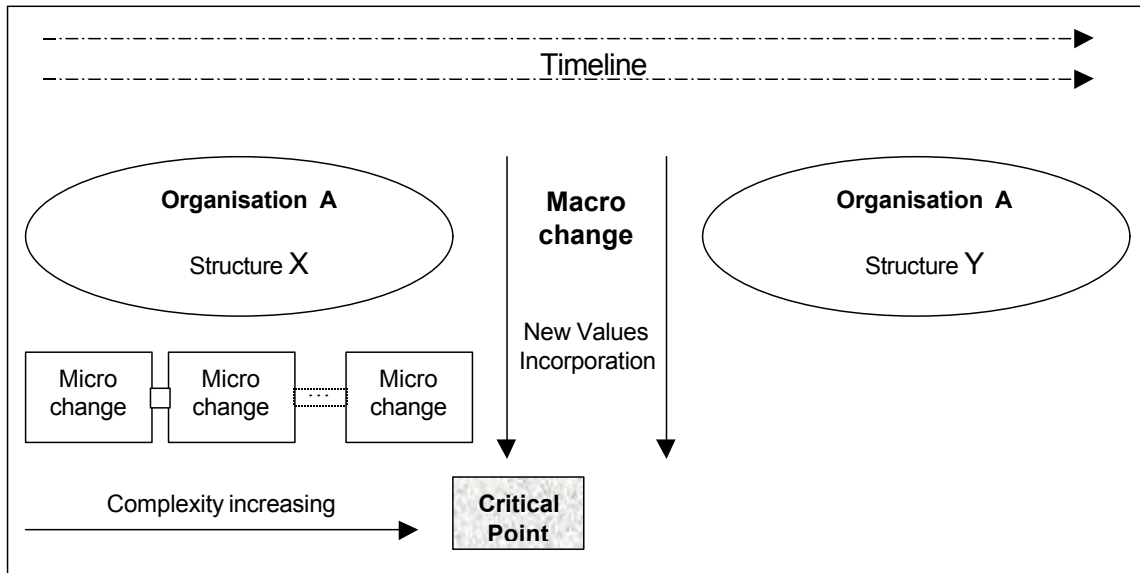
	Survival and development conduct	Organisational change level
ADAPTIVE CHANGE (micro change)	"Economic" conduct: competitive interaction for access to environment resources in relation to competing	Organisational change is derived from new interactions with market environment: increasing need to synchronize technology and structure
TRANSFORMATIONAL CHANGE (macro change)	"Reproductive" conduct: transmit the organisation's basic structure to its new life- cycle generation	Cultural redefinition of essential values that construct an organisation's shared identity

Figure 7 shows the main difference between micro and macro changes in relation to complexity. While in the first case changes occur smoothly and increasingly, real adaptation can be labelled as "shaping" to the environmental demands; in the second case, the change is incremental, characterized by leaps and jumps. The macro changes can happen only when new values for the system are established.

Let's imagine this process in a longitudinal or timeline perspective. An organisation has a structure X and temporally realizes micro changes to better adapt. This increasing adaptation generates increasing complexity within the company until it reaches a critical point, where it becomes necessary to define new values for the system to transform itself and to reappear and/or to be restructured. This change is not smooth but happens suddenly, and it can be compared to a catastrophic process where changes are explained as discontinuous transition in structures in order to maintain stability. The important contribution in this definition is the fact that a change is the element that keeps an organism's identity, and does it by changing and re-establishing basic values.

Figure 8 represents the dynamic of changes inside an organisation A, in relation to micro and macro changes. When the system passes through the critical point, there is a cultural transformation, because new values are incorporated by members of the organisation provoking internal change processes. This way, the same organisation elevates, in a “jump”, to a superior level with a new structure Y. In this process the values act in two ways: (a) as organisers of the system toward the final status, and (b) as the final status itself, or the attractor of this chaotic behaviour. At the moment of the critical point, values play an important role because, if they fail to reorganise the system, it will fall into different behaviour patterns. If this behaviour is non-linear, the results can be different from those expected.

Figure 8. Organisational Change Timeline



Conclusion

True leadership of a progressive 21st century company must operate through values. Indeed, the idea of managing change in turbulent environments refers to the deployment of resources in the construction of a strategic architecture, bridging the gap between the vision of the future and the current reality. Values are the framework of this structure; they are the glue that holds an organisation together when confronted with chaos and the need for change.

The turbulence of the international financial and labour markets, the stunning leaps made by technology, and the troubling cases of political instability are all factors that contribute to chaos and make it practically impossible to engage in a clear-line planning. For instance, Microsoft, which has long dominated its industry, is at the time of this writing facing a breakup following allegations of anti-trust violations by the American government. All that a firm can do with some certainty in order to survive is to attempt to construct so-called “self-fulfilling prophecies” in the arena of organisational values; the latter will channel activity and decision-making toward a heuristic concept of future success. Such is the principal task of the transformational manager. Many organisational leaders have

articulated this concept by developing and communicating a clear vision statement to their principal stakeholders; an example is the recent mission statement of a global beverage firm:

We exist to create value for our share owners on a long-term basis by building a business that enhances The Coca-Cola Company's trademarks. This also is our ultimate commitment. As the world's largest beverage company, we refresh the world. We do this by developing superior soft drinks, both carbonated and non-carbonated, and profitable non-alcoholic beverage systems that create value for our Company, our bottling partners and our customers. In creating value, we succeed or fail based on our ability to perform as stewards of several key assets: (1) Coca-Cola, the world's most powerful trademark, and other highly valuable trademarks; (2) The world's most effective and pervasive distribution system; (3) Satisfied customers, who make a good profit selling our products; (4) Our people, who are ultimately responsible for building this enterprise; (5) Our abundant resources, which must be intelligently allocated; (6) Our strong global leadership in the beverage industry in particular and in the business world in general (<http://www.cocacola.com/co/mission.html>), 1998).

For centuries, the benchmarks of a well-run organisation focused on systematics, rules, and procedures, all in the service of meeting immediate objectives. A prime example of this is the oldest form of large-scale task group, the military organisation. Increasingly, it's being realized that traditional military roles and rules no longer lead to an accurate predictions of each outcome. Like other high-tech industries, the modern military is gradually coming to grips with the principles of chaos.

If in the past, an organisational consultant were to state in the final report, "Your entire corporation is in utter chaos", this would have called for a strenuous rebuilding. Today, in light of the above arguments, it would likely mean that this corporation may have an opportunity for real transformation. The modern consultant who has detected the state of chaos, who has perceived the presence of transformational leadership, and who senses an articulation of shared values – this expert would likely complement and encourage the organisation for the journey that it is starting.

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¹ Complexity theory has been studied by numerous scholars: (i) Fractals were widely studied by B. Mandelbrot (1988), *Los objetos fractales. Forma, azar y dimensión*. Barcelona: Tusquets. (ii) Chaos and attractors were referenced by E.N. Lorenz (1995), *La Esencia del Caos. Un campo de conocimiento que se ha convertido en parte importante del mundo que nos rodea*. Madrid. Chaos self-organisation was discussed by I. Prigogine, (1983), *¿Tan sólo una ilusión?* Barcelona: Tusquets. (iii) Catastrophy theory is explained in R. Thom (1985), *Parábolas y catástrofes. Entrevista sobre matemática, ciencia y filosofía a cargo de G. Giorrello y S. Morini*. Barcelona: Tusquets. (iv) Fuzzy sets were explored by B. Kosko (1995), *Pensamiento Borroso. La Nueva ciencia de la lógica borrosa*. Barcelona: Grijalbo Mondadori.