SOCIAL INVENTION AND CHANGE MANAGEMENT

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Abstract. Social invention and its forms such as institutional, technical or even ideatic invention are analyzed in the paper, but an integrative and comprehensive vision upon human invention forms is also formulated, one which gathers scientific, artistic, moral and even juridical invention ways. Other social invention forms as invention of the future or invention of values are analyzed. Intellectual invention as a universal component of all kinds of individual and social invention is described. A conceptual model of invention, elaborated on this factual basis is presented. The role of invention, in its different social forms is pointed out and the precise function of intellectual invention is shown in the specific activities of change management. Diverse fields and levels of change management are identified. The internal structure of a system of management activities is sketched out. A special space is reserved to highlight the role of crisis management in the present economic context.

1. SOCIAL INVENTION AND ITS FORMS

Invention and inventivity are often conceived today as main human capabilities.

Invention as a unique and individual process and product is a system of activities, each of them complex, such as theoretical and experimental studies, reflections and constructive processes (intellectual operations, instrument manipulations and manufacturing processes).

As a social phenomenon, invention is a system too, and includes many types of actions, relations, processes and even institutions. Social invention means invention of new social structures, relations, activities and ideas, from the invention of the institutions to the invention of the individual and collective self.

Social invention includes scientific, technical, artistic, moral or political inventions and it is, very often, founded on interdisciplinary research and involves the co-operation of many gifted and skilled collaborative persons. Authors such as Th. Kuhn or S.W. Hawking, M. Mead or J. Diebold have analyzed or mentioned different forms of social invention, several of them being also examples of intellectual invention.

Intellectual invention is the generative structure of any cultural and social invention and, as shown by Pană [17], consists in the process of elaboration, the content and the result of the application of a productive idea, conception or vision. Intellectual invention is the most efficient form of action in our socio-technical system, characterized by a dynamic artificial intellectual environment, described by Pană [22].

In social life, the degree of efficient/intelligent use of information and the constitution/development of the intelligent environment can be considered the efficient answer to the problems induced by the growth of complexity. Nature responded to complexity and instability by multiplication and variation, then by increasing complexity, but also by creativity, by invention or reinvention of efficient

forms (eyes were five times invented). The failure of human some deeply rationalist projects results from their application to a reality which is not *stricto sensu* rational.

The major social invention is the invention of values, because values are the specific units of the cultural system. As cognitive, evaluative and prospective syntheses, values are even the core elements of each meaningful human action [17].

Invention of the future, as form of intellectual and social invention, concerns, theoretically, all the areas of cultural invention, but has nowadays its new specific forms, as shown by Pană [17]. A model of the future directs each individual or social project; science offers the methods of creating, and technology the means of simulating these models [12].

Past and present studies have not found solutions to a humanly (not just technically or economically) efficient social organization and development, and futurists are tired of launching warnings. Social systems are managed, not led. This is a sign of a healthy rejection of the artificial, exterior (political) control.

But societies are managed from within one or another of their subsystems: for the present advanced societies, the technological one, or even the economic one (see 19). There are assumed some guiding values, but not clear purposes; global ways are identified, but concrete and adequate means are not. These means have to be available for different cultures and not just for the present, but for the future ones too.

Yet we note attempts to replace not just the political, but even the technical and economic management by the knowledge management, and even some theoretical efforts to set the foundations for the building of a new economy, a culture economy [see, for example, 6].

2. SOCIAL INVENTION AND INTELLECTUAL INVENTION

The renewal of the cultural system is the result of a *system of invention*, with its forms and levels; we will insist on the intellectual invention, mainly as *social invention*. The understanding and promotion of the *invention culture* imply permeability for different types of information, the education of various cognitive attitudes, the usage of many forms of intelligence and the encouragement of diverse cultural attitudes, in short, a cultural synthesis between many intellectual and creative options.

Any invention includes or is even founded by an intellectual invention. Moreover, each significant human activity uses one or multiple intellectual techniques and can gain efficiency if becomes the object of a systemic approach. Such a study can be entitled *intellectics* [14]. The development of intellectics, based on the intellectual history, also needs a study of the present ways of thinking. We can show that in all intellectual activities there are used some kinds of techniques and in all human activities there are developed many and diverse intellectual techniques.

A fast development of a set of *intellectual techniques* is then necessary as a support of the intellectual invention but also as an instrumental aspect of the management of the specific resource of the future society: knowledge.

The intellectual activity, being the process of passage from the accredited to the fresh knowledge, by research, by cognitive construction and by specialized or general reflection and helped by technical means, represent an inventive activity.

All cultural fields are constituted by inventive activities as the scientific hypothesis, the artistic imaginative process, the moral conduct or the political commitment. New specific values, such as the political competence, the technical effectiveness or the scientific veracity and productivity are also generated in diverse cultural domains.

Invention is, in each cultural field, a complex activity, which can cognitive processes, constructive imagination and practical or theoretical methods, techniques and procedures. An artistic product for example can begin as a creative idea, it can be computer aided projected and can be finalized by computer guided sculpture tools or by a metallurgic engineer. Invention is, thus, a system of activities.

Social invention includes scientific, technical, artistic and moral invention. Any invention is founded by an intellectual invention. The study of the *moral intelligence,* initiated by our paper "Moral intelligence for human and artificial agents", is the result of a *moral invention*. This is based on the analysis of human morality at its practical and theoretical levels, but also on the anticipation of an *artificial ethics,* common for intelligent human and technical systems.

Intellectual activities are assisted by specific techniques and the most abstract activities are no exception: metaphysics itself was sometimes defined as an explanatory technique for prime principles. In the field of axiology, formal axiology includes techniques of value measurement. The philosophy of the language defines its subject matter as the "technique of techniques".

Even techniques for stimulating invention were developed: dialogical, analytical and aggregate types of creative methods and techniques are used in informative and training activities by firms and organizations, in their race for the competitive advantage. Some effective combinations of these techniques are recommended in diverse types of activity.

The technical culture is the one which imposes the greatest set of *new intellectual techniques* in all fields of activity. Thus, intellectual activity as a whole has been changed by using the *information machine* (the so-called computer), by using intelligent agents and even multi-agent systems for the interrogation of the computer environment, by hypertext and communication techniques used on the Internet.

Both at its elementary and high levels intellectual activity is now entirely transformed. Informing activities are facilitated by information techniques, which

allow the reconstitution of a line of search by recording the successive links achieved, help to place "reading marks", ensure the integral representation of the "map" of knowledge and offer unprecedented means of structuring, editing, multiplying and transmitting messages.

Specialized intellectual techniques are also renewed and changed with information technologies which allow the perception of different kinds of information, show new resources of scientific cognition (such as the genuine non-sentential human reasoning or the high formal representation and manipulation of information), offer new instruments for the analysis, modeling and simulation of theoretical constructs, inaugurate group and long-distance e-activities, open the knowledge trade and facilitate even the virtual and artificial creativity.

Scientific computing is now generalized by educational computing and particularized towards new directions. Not just artificial life or artificial intelligence, but even artificial psychology, artificial philosophy, artificial morality or art are becoming possible.

These changes produced at the elementary and high levels of the intellectual activity influence the entire structure and dynamics of human activity. The highlighted new forms and means of intellectual activity generate a new intellectual environment, which is mainly an artificial technical intellectual environment.

As a consequence, the way from information flows and nets is today continued by the progress to the knowledge works and groups and then information becomes an integral part of all kinds of actions, products and services, and the information content is the one which determines the value of products, as well as the value of the market for the new categories of goods. In this new context knowledge management develops as one of the main social forms of management.

3. SOCIAL CONTROL AND SOCIAL MANAGEMENT

The internal structure of the system of management activities is represented on the next page.

We can observe that at the basic level of social management the highest importance is attributed to culture and competence management.

Change management is implied in many, if not even in all represented levels of management. In competence management it refers to the individual, organizational and societal forms of change.

Each of the outlined forms of change is, in fact, a complex of human activities. Organizational change is, as an example, a culture based, a group or association oriented and technically realized social change.

The scale of management levels is open and we have to conceive it as a both feed-up and feed-down cybernetic system which ensures an efficient social evolution.

Management fields and levels

↑
Project Management
Invention Management
Knowledge Management

SOCIO-TECHNICAL MANAGEMENT

↑
Teams Management
Processes Management
Systems Management
TECHNICAL MANAGEMENT

↑
Financial Management
Material and Energetic Management
Production Management
ECONOMIC MANAGEMENT
↓

Development Management
S T R A T E G I C M A N A G E M E N T

↑
Time Management
Crisis Management
Change Management
POLITICAL MANAGEMENT

↑
Career Management
Curriculum Management
Talent Management
INDIVIDUAL MANAGEMENT

↑
Cultural management
Competence management
Structural Management
Human and Environmental Management
SOCIAL MANAGEMENT

4. SYSTEMIC CHANGE AND CRISIS MANAGEMENT

Considered as an age of changes, our age ends with systemic changes that can, either confirm and continue this characteristic trend of the current social evolution, or open a new era, an era in which the current changes will come to an end, within a homogeneous and stable global system. In the latter case, an aspect

that should be considered is represented by the nature and the structure of the new social organization, aspects that will also determine the characteristics of its dynamics. The next social order will be necessarily a new one, but at this moment, its structure is hard to predict. However we have to formulate rigorous social models in order to avoid both a) spontaneous evolutions towards crisis and b) failed social experiments at high human costs.

Our age is also an age of crisis; it presents even a system of crises. The way that the manifestations of the current crises are approached suggests that not all the current crises (economic, financial, political, ecological) are spontaneous or necessary. Some of these types of crises, such as the managerial ones, the crises from the field of labor and human resources, or the project crises, result from or are induced by the way of conceiving and organizing the cultural and educational processes. We consider here the aspects pertaining to the economic culture, technical culture, biological culture or spiritual culture.

Aside from the information culture, the computer culture and the culture of computer environment, it is necessary to initiate the biological culture, the culture of a socially-oriented mind, and the prospective culture. The prospective thinking also involves the concern with avoiding certain special forms of loneliness of the human being as self-privileged biological species, as social being and as cosmic entity, itself on the verge of extinction through ecocide, through progressively abandonment of natural relations and through extreme individual originality.

In the present paper we emphasize the conditions of social evolution based on intellectual education oriented by a social design and supported by the development of knowledge-based IT instruments. We explore, starting from our previous papers, the possibility of developing certain intellectual techniques based on information technologies.

The complexity of human evolution and, therefore, the necessity of its efficient orientation are also demonstrated by the life cycle of neuron, the natural unit of intellectual activity, which has a biological origin, a social conditioning, a cultural causality and an individual evolution which, however, takes place within a specific ecosystem, and which now imposes the ecology of mind.

The finality of the paper is the development of the crisis management research field, as a field of strategic management. The place of crisis management in relation with other management fields such as change management, risk management or emergency management is established.

The paper highlights the natural, informational and sociological bases of an efficient social evolution and organization, with a strong IT involvement, starting from the fact that in certain fields and at certain levels of organization, the automatic evolution or control of processes is the most efficient.

A theory of systemic change oriented crisis management will be developed in a next paper, on the basis of the selection and the application of certain principles

related to Systems Dynamics, Systems Practice and Human Systems Designing. The proposed theory explains the ensemble of remnant, current or emerging crises in today's society and formulates a methodology for the management of social crises.

The developed theory explains both the great number and the rapid succesion of the recent crises, the scope of the current crisis, and the failure of the repeated attempts throughout the last 50 years to solve or to postpone the developing crisis.

Based on this theory, alternative or successive – economic, political, technical – ways of crisis management, attempted in the last historical period, are identified. Obviously, among these ways, the most recent, namely the one based on IT development, was also the most successful.

The same theory offers a methodology (a set of principles) of social organization, starting from the study and the application, for the purpose of Design for Society, of three categories of principles: the evolution principles, the principles of efficient action and the principles of systemic colaborative thinking.

The examination, based on the same theory, of the probable evolutions of social systems coexisting nowadays, allows the identification of a solution for a social evolution realized as a development. For this purpose the theory of crisis management is associated with the application of a model of technological development similar to the one in progress in the co-evolution of natural and artificial intelligent agents, given the fact that the stages of the evolution of artificial intelligent systems are accepted as steps in the human evolution.

The mixed evolution, natural (human) and artificial, can generate new and efficient models of economic growth, of technological development and intellectual evolution. This possibility is illustrated by the current processes of creating new forms of technological art and information aesthetics, new species of computing ethics and even of machine ethics or new fields of scientific computing and artificial philosophy.

The co-evolution of the natural and artificial intelligent entities will not necessarily lead to the emergence of a new mixed, natural and artificial, species, but to a mixed evolution which could induce more formalized and more operational common activities and even some aspects of automatization of the social evolution, which will be, however, far from the current aspects of standardization and beaurocracy. In this process of co-evolution also new, common capacities and aptitudes could be generated.

The social innovation, in its various forms, is also taken into account as a factor in the management of the system of crises; and the possibility of combining the algorithmic and the euristic as a solution for an efficient social evolution, euristically oriented and algorithmically realized is assessed.

In a larger version of our paper we hope to examine 1) several ways in which the evolution of the artificial intelligent systems can be realized as 2) some causes

of the failure of certain forms of social evolution so far practiced, that can be represented through four graphs.

We also have to highlight some methods of identifying a global and systemic, but modular and evolutionary, solution which could be sequentially applied for social and cultural models based on different economic, political and spiritual development strategies. These ways of development tolerate errors, non-standard attempts and aging phenomena, exclude the acceleration of the social processes towards unknown objectives or the recourse to powerful technologies without fundamental knowledge and involve the development and application of new socio-cybernetic technologies as well as the development of intellectual techniques based on information science and technology.

The complexity generated problems also need a global intelligent construction and conduct, capable to avoid, at the same time, autocracy, technocracy as well as nousocracy and abstractocracy.

5. SOCIAL INNOVATION BASED ON INTELLIGENT DEVELOPMENT

Sustainable and durable development is a general accepted and more or less supported social project of the last decades. Some present day authors are inclined to leave behind this kind of social approach and open a debate about the so-called intelligent development. Complexitaty and particularly the growth of complexity in society needs an intelligent answer [19]. In its turn, the study of complexity must be prolonged through intelligent active reaction.

The most practical and fast, then the most effective, reaction to complexity is given by technology, that worked, right from its start, on the building of an artificial world. Its main present contribution is the creation of an intelligent artificial environment which takes in a lot of different types of entities, created by man, the tehnician of any field of culture, and by his own artificial creatures.

But for the evolution of the whole social system, the exceptional performances from one or another field of culture matter less, be them even the technical singularities, can have diverse significances and consequences; they may eventually accelerate social development towards unknown, unforeseeable or even hazardous or dangerous objectives. Innovation at a social scale is the most important.

Diverse forms of social innovation [12], not only the technological one, are to be studied by systems thinking, and to be integrated in a systemic vision, as the basis for social change and development.

Innovation strategies were formulated at continental, regional and local level. An integration process of invention results from all fields of activity, realized at the leading level of society is now a social priority. These results will have to be corroborated with the integrated use of any kind of stuctured information at all levels of social organization and in each activity field.

Information expresses the profound structure of reality, *knowledge* highlights the mutation produced in nature by man, and *effectiveness*, if obtained through technology, illustrates the implementation of efficacy models developed by nature and discovered by scientific endeavour. Information appears mainly as structural information at the physical level of existence, where it is enclosed in the specific forms of organization. It is manifested as functional information at the biotic level, where it has a finality that quarter it in finitude. Information becomes free and infinite at the human level, where it is active information, sometimes even creative information.

Information and cognition may be autogenerative, at high levels of activity, such as innovation and creation. The Romanian cyberneticist St. Odobleja showed how ideas themselves are artificially created by sinergic resonance processes [10]. Nowadays some young computer scientists describe how artificial discovery goes on. But such forms of automatic and cybernetic evolution are peculiar in our days only to the upper level of human activity, those intellectual, and we cannot speak yet about a social level of information.

The model of the life cycle of knowledge can also be used to explain the generation of new values in the culture of innovation, which starts with information searching, knowledge processing and by thought systems building, all these being necessary to foster the creative process, which is not very often finished by social use of scientific findings or of innovative works.

But only the integrated use of the results of knowledge and invention allows the realization of coordination and control functions of cybernetic systems, in our case, the social system. Integration as a scientific discipline [6], as a methodology and also as a model of cognition and action can be studied.

In its turn, the managing activity, if realized at a broad, social level, aims to be not only a meta-activity, but it has to be a part of any social activity, namely, the part which provides inclusively social responsibility. As freedom is the existential condition of responsibility in any kind of human action, social responsibility is conditioned by the possibility to use individual intelligence and to provide conditions for innovation implementing.

When the efficacy of nature is challenged by technology, new social responsibilities are imposed, because while nature evolves thorough growing complexity, which appears as the realization of an internal finality, structurally integrated is its own causes, society is often directed by crucial interventions of some artificially added co-systems of social system.

We also observe that natural complexity is obtained by careful essays on the model of trial and error, endlessly restarted in new and new forms and conditions, in an authentic cybernetic manner, and that nature evolves through diversity and adaptability, by micro-evolutions in mega-units of time, while society and technology advance through revolutions, i.e., through radical, general and swift changes. Humanity often makes succesive essays of suicide by ecocide.

Socio-cybernetics has to know the social reality, future reality included, with the help of systems thinking concepts, principles and methods, and it has to found and to indicate the way of social action with its specific means, those of cybernetic coordination and control. We will add a number of three figures that synthetize a few variants of the future possible dynamics of social evolution, and that take into account the convergent influence of factors such as complexity and development, invention and management, knowledge and reflection.

We will discuss in a next study a model of social evolution, especially in its economic dimension, based on diverse socio-technical structures, and we will distinguish and characterise (four) successive stages of economical evolution, from the perspective of efficacy and stability (which includes safety and certainty), as from the point of view of sustenability and predictability, with the aim to conclude if social systems are today intelligent systems, if they have a self-determined, project guided, open and efficient evolution, and then, if they are sustainable and humanly desirable systems.

The solution to the problem of the orientation and control of an abandoned complex system will be found by the next generation, if we are able to turn the present information culture into an invention culture.

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